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AN INVESTIGATION OF PHYSICIAN SELF-DIRECTED LEARNING ACTIVITIES

By

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ABSTRACT

AN INVESTIGATION OF PHYSICIAN SELF-DIRECTED LEARNING ACTIVITIES

By

Linda Joy Hummel

This study investigated the self-directed learning activities of physicians in an attempt to discern the extent to which physicians use self-directed learning to remain current. Two specialty groups, family physicians and general surgeons were included in this exploratory-descriptive study in order to compare and contrast the learning behaviors of different physician specialities. Through the use of a structured face-to-face interview, physicians described how they assessed, designed and carried out learning projects. The learning project concept, defined as a series of clearly related and deliberate learning episodes of at least seven hours, was the identification mechanism used for disclosing physicians' self-directed learning activities.

The physicians interviewed cited 190 learning projects over a 12 month period of time which involved 5,255 hours. All but one physician reported learning projects. Overall, an average of 181 self-directed learning hours per physician were reported. Seventy-five percent of learning projects were vocational and related to clinical issues, with general surgeons reporting 82% vocational and family physicians 63%. The majority (68%) of the learning content was of a

Thank you kindly!

practical, problem-solving orientation. Learning motivation, resources and benefit outcomes were also investigated. Findings show a striking lack of importance given to credit as a motivator for learning and most (89%) of the learning projects were learner planned.

Physicians do a major amount of their professional learning through self-directed learning activities. The results of this study confirm what other medical educators have reported about physician learning. That is, physicians know what they need to learn and will seek out this learning. They are practical and highly self-sufficient in their learning approach and rely on a variety of persons and other resources to obtain this learning.

This study reports that self-directed learning is a major and important component of physician learning behavior. Therefore it is suggested that medical educators strive towards teaching and further encouragment of self-directed learning.

In loving memory of my father, Stanley S. Hummel, who by example, taught me the merits of hard work and persistence. His value for education and scholarship achievement had significant meaning for me. His sense of optimism and a positive view of the world have helped me in my pursuit of this educational goal. I appreciate his encouragement and support for continued educational achievement. I remember him often and miss him, and I am grateful to have been his daughter and friend.

ACKNOWLEDGEMENTS

A learning project this extensive can only be carried to completion with the help, support and encouragement of many caring planners and colleagues.

I would like to thank Dr. Howard Hickey, Dr. Robert Richards, Dr. Maxine Ferris and Dr. Larry Lezotte for their willingness to be a part of my doctoral committee. Their support and encouragement have aided me in completing this learning project.

Special appreciation is extended to Dr. Robert Richards and Dr. Howard Hickey. Completing a dissertation 2,500 miles from one's committee manifests some unique difficulties, and both Howard and Bob worked with me to minimize this disadvantage. Dr. Hickey was always helpful and generous with his time, advice and guidance. As chair of my committee he clearly defined his expectations and held to his highest standards. Most of all his optimism and humor gave me strength. To Dr. Richards I am pleased to acknowledge my indebtedness. From the very first stages of the dissertation proposal he demanded the highest quality of critical thinking. He has been a dear friend, mentor and critic of my writing for which I am grateful. He graciously and generously reviewed the dissertation and struggled with me through the rewrites.

The completion of this project may not have materialized without the support, love, and critical nudging from David, my husband, who unconditionally provided his strength and support. He believed in me and zealously offered strength at times when tasks seemed insurmountable.

There are many others who have crossed my path during this dissertation process, and it is with heartfelt thanks that I acknowledge all of you who have touched my life.

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CHAPTER 1

STATEMENT OF THE PROBLEM

Introduction

The importance of physicians maintaining their competency in the practice of medicine has been recognized and emphasized by the medical profession since the early days of medicine. Professional obsolescence of physicians has become a growing concern given the rapid expansion of medical knowledge and technology, and the demanding social changes of today's world. The ongoing changes occur at such an accelerating pace that much of current information becomes quickly outdated and this necessitates selective replacement with new information.

Clearly, it will not suffice to condense and compact medical knowledge into one sliver of time. We cannot teach medicine for the twenty-first century for the simple reason that most of that information does not currently exist (Smith, 85). Physicians must maintain and further their professional competence by acquiring new knowledge and skills through a lifelong learning process.

The importance of a lifelong learning approach in medicine is reiterated by Millis.

> Medical knowledge has been growing so rapidly that no practitioner can safely rely on what he learned as a student, or consider his own resources as adequate for optimal patient care. It is now widely agreed that for a physician to remain highly competent his education must not terminate at the end of a formal residency, but must continue as long as one practices (Millis, 1971).

Medical educators recognize that a physicians initial education and training is hardly sufficient to equip that physician with all the knowledge, skills and attitudes necessary to maintain optimum delivery of care. Rather, education and training is merely a learning foundation which further education and experience will enhance. Alan Gregg appropriately declares, " A good education should leave much to be desired " (Gregg, 1957).

In order to be a lifelong learner there must be an inherent component of self-directedness. This implies that physicians who possess sufficient qualities of self-directedness (i.e. self-confidence, desire to learn, ability to set learning priorities) will more naturally be lifelong learners. Unfortunately, many pre-medical and medical education experiences do not foster and encourage the self-directed learning skills which physicians may have brought with them to medical training. Since the focus of pre-medical and medical education is primarily teacher-directed, with an emphasis on acquiring facts, the practicing physician may leave formal training absent of skills and good habits in self-directed learning. The clinical problem-solving emphasis in the third and fourth year of medical

school and during house staff training does, however, include a major component of self-directed learning activities.

The issue of how physicians learn and keep up with medical knowledge after completion of their formal training, and how this learning can be encouraged, facilitated and integrated into practice was considered by Manning and Denson (1979) to be one of the major concerns in continuing medical education (CME). These concerns include the belief that too little is known about the processes by which physicians learn of and adopt medical advances. Additionally, there appears to be a difference between the educational activities which inform physicians of medical information and those which convince the physician to act or change their behaviors for the good of clinical practice (McLaughlin and Penchansky, 1965).

Traditional didactic CME has historically emphasized the content of learning rather than the learning process. The teacher, as expert, imparts what they determine the physician-student should learn. The value and effectiveness of this teacher-directed approach has been questioned by some medical educators. Specifically, a dissatisfaction with the traditional medical education approach was initiated by Miller (1967) and continued through the 1960's and early 1970's.

The last two decades have brought new interest in and appreciation for self-directed learning in medical

education. There is an emerging focus in medical education which places a value on the use of individual and problem oriented learning activities. Self-directed learning, as one component of a physician's lifelong learning, offers significant learning advantages. The value of self-directed learning to physicians is particularly suited to solving individual patient care problems in a timely and accessible manner. Self-directed learning is a process of learning that is highly individualized and flexible towards meeting learning needs. The characteristics of accessibility and adaptability increase the learner's options and advantages.

Richards (1978) argues for local, patient-centered, participative learning processes rather than many of the traditional approaches to CME. Numerous findings solidly support the premise that these processes are more effective in influencing physician behavior and improving patient care. Medical educators are beginning to proclaim the wisdom and foresight of William Osler:

> If license to practice meant completion of his education how sad it would be for the practitioner, how distressing to his patients! More clearly than any other, the physician should illustrate the truth of Plato's saying that education is a lifelong process (McGovern, 1969).

Need For the Study

The literature in the field of medical education points to an increasing interest in physician self-directed learning. There is acknowledgement and realization that physicians do

Need for the Study

indeed learn on their own, with or without a structured learning system. This advancing change in the thinking by medical educators accentuates the need for specific investigations into the behaviors of physician self-directed learning. There are two major reasons which offer justification for this study.

First, the accelerated social and technological changes encourage the continued competency and learning for physicians. It is imperative that educators understand as much as possible about how and why physicians learn, in order for them to assist physicians with their learning. Both learning needs and learning environments are changing rapidly, and physicians will need help more than ever before in maximizing their learning effectiveness.

Second, the current practices of continuing medical education are primarily serving only one component of physicians' needs for continued learning. The learning emphasis must be shifted to include more programs related to self-directed learning. This study investigates physicians' current use of self-directed learning activities and reports physician patterns.

CME planners acknowledge their interest in and search for a better and continuing knowledge of physican learning (Davis, 1977). An important first step is for CME professionals to acknowledge and subsequently explore the significance of self-directed learning as a component of the physicians' education. While traditional CME lectures,

rounds, meetings and conferences play an important role in physician learning, they are truly the tip of the iceberg (Richards, 1985). It has been suggested that increasing energies targeted in the direction of self-directed learning may result in developing instructional methods compatible with individual physician learning styles (McLaughlin, 1965). To this end, CME planners will benefit from an expanded knowledge and understanding of the integral role self-directed, intentional learning efforts play in the physicians' educational process.

Purpose of the Study

The purpose of this study was to examine all deliberate and intentional learning activities of a specific physician population. This included intentional physician learning regardless of whether it was learned from a traditional mode or whether it was individualized and self-directed. The primary focus was to identify and discuss the self-directed learning activities which physicians report and which fit the learning project definition.

There is overwhelming evidence that physicians learn on their own, without the constructs of formalized and structured educational activities. However, there has been little research to document and verify the extent of this self-directed and individualized learning. Certainly other physician learning research has examined segments of

Purpose of the Study

The purpose of this study was to examine and

non-traditional learning. However, the primary focus was to answer questions of who learns, when and where. This study also addresses these questions, and further investigates physician learning from another perspective which the majority of other physician learning research has neglected. This is the specific examination of physician intentional learning activities regarding how much, how long, why, and the value of this learning.

Scope of the Study

The study focused on the individualized self-directed learning projects of physicians. This included the systematic identification of physician learning using the learning project concept introduced by Tough (1971) and used extensively to study adult learning. The emphasis in this study was on describing and analyzing the characteristics of learning projects which this population of physicians had engaged in over the preceeding 12 months. A structured face-to-face interview with each physician was the research technique determined to be most effective for gathering this learning project data.

Physicians from two specialty groups were studied in an attempt to discern and compare learning activity differences among two physician groups. The learning activities were expected to vary among the two specialties since these physicians are involved with dissimilar subject matter

Scope of the study

content and because their practice arrangements vary considerably.

The intent of this study was to identify and describe selected variables in the self-directed learning activities of physicians. These variables included:

1) the frequency and extent of physician participation in learning projects.
2) the motivations or trigger incidents which prompted physicians to initiate learning projects.
3) the learning content of the learning projects.
4) the primary source of planning or the planner for each learning project.
5) the type(s) of resources physicians sought out and used during learning projects.
6) the physicians perception of the correlation between his/her learning and, a) enthusiasm, b) benefit to others, c) the amount of knowledge acquired.
7) the extent to which credit was a motivator of the physicians participation in learning projects.

Definition of Terms

The following definitions are provided to clarify a number of terms that are used in this study:

Definition of Terms

Learning: the acquisition of knowledge, attitudes, or skills and the mastery of behavior in which facts, ideas, or concepts are made available for individual use (Verner, 1962).

Self-directed learning: the process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975).

Learning Project: major, highly deliberate efforts to gain certain knowledge and skills, or to change in some other way. A series of clearly related episodes adding up to at least seven hours of effort. (Tough, 1971).

Learning Episode: a relatively uninterrupted, well-defined period of time where the learner's primary intention is to gain certain knowledge and skill and to retain it for at least two days (Tough, 1971).

Contributions and Implications

Several contributions are seen as being made by this study:

(1) a contribution to the literature in continuing medical education and adult education

(2) research information concerning the self-directed learning behaviors of physicians

(3) an understanding of the influencing variables which motivate physicians to initiate a learning project as a component of their educational activity.

Implications of this study exist for both educators and physician learners. It has significance for CME planners, adult educators, researchers, and individual physicians. For CME planners the findings will enhance their knowledge of which factors contribute to and encourage physicians' participation in self-directed learning projects. The motivations for learning, the learning content and resources cited will offer insight about the how and why of physician learning. Additionally, these findings suggest that there is tremendous diversity in physicians' choice of CME activities. These choices reflect the individual physicians' learning needs and preferences, and point to implications for program planning changes for CME planners. Lastly, the findings from this study suggest the need for additional research in individualized learning behaviors of physicians. This refers specifically to further investigations which will explore how physicians use self-directed learning. Certainly, several other specialty groups should be researched to determine the differences or similarities of their learning project patterns.

In the area of general adult education this study will contribute additional data to the present body of research on self-directed learning activities. Previous research studies clearly point out extensive self-directed learning activity in both the general adult population and in groups of professionals. This study's findings will document such

activity by physicians. These findings complement and to some extent validate findings of earlier studies of general adults and professional groups relative to the amount, importance and effectiveness of self-directed learning.

For individual physicians, this study substantiates and affirms the value and prevelance of self-directed learning as a learning behavior. Those physicians who routinely elected individualized learning projects are now better able to identify their behaviors and confirm their value. Those physicians who participated in this study will especially benefit, as the interview itself was informative and caused them to think about the ways they learn and the value they receive from their learning. Continued emphasis and attention to self-directed learning projects will bring additional awareness to physicians for the value of their naturalistic, self-directed learning. Knox (1973) suggests that one barrier to self-directed learning is the lack of a positive image to these learning activities. Formalized programs have acquired and maintained the image that they represent continuing education. This image will change with more gradual emphasis on self-directed learning.

Overview of the Study

This chapter includes an introduction to the general concept of physician learning, its importance and the potential for self-directed learning. The need for the

Review of the Study

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study and major purposes are explored, and the contributions and implications are discussed.

Chapter II includes a review of the literature and discusses four appropriate areas in both adult and physician learning. Specifically, this will include a review of 1) the characteristics of adults as learners, 2) the importance and benefit of self-directed learning, 3) continuing learning of physicians, and 4) learning projects.

Chapter III consists of the methodology used in the study including the background, the population and sample, the development of hypotheses, the instrumentation, and the data analysis procedures.

Chapter IV contains the analysis of the findings.

Chapter V includes a discussion of the results, interpretations and some of the implications that can be drawn from the findings. Limitations of the study and further research suggestions are also included.

Chapter VI presents a summary and conclusion.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

Our world is a rapidly changing one, both technically and socially. And, while change is stimulating and generally progressive, it creates the burdensome necessity of keeping pace with the newly discovered. Change is particularly fast moving in the medical profession where new discoveries, new technologies, new therapies and different drug products are continually being developed and introduced into practice.

The vehicle a physician uses to cope with this constant change is generally some form of continuing education. Continued education is recognized as an important component in the health professional's life. Staying abreast of changing medical information is critical for the practicing physician. Given that medical information has a half-life of five years, it is no longer possible to rely on facts and skills which were learned and polished during medical school and residency training. The accelerated progress in medicine demands constant review and integration of both old and new medical information, as well as the discarding of obsolete information.

Introduction

Another factor which impels the modern practitioner to stay current results from a new public awareness and interest in medical competency. Today's consumers of medical care are better informed, more interested and demanding of a physician's expertise and service. The media accentuates this demand with the aggressive offering of information about new and/or experimental treatments and procedures. Subsequently, patients expect their physicians to be informed of such treatments. A physician's credibility may be threatened when his/her patients feel that the physicians knowledge is inadequate or not up-to-date.

Most physicians see their continued learning as a natural and necessary extension of their professional responsibilty. Given the overall high quality of medical care in the United States, it may appear that the majority of physicians exercise this responsibility and are motivated to monitor their own performance and subsequently upgrade, reinforce and improve their clinical knowledge and skills as they see fit. However, there are many unanswered questions about what kind of continued learning is best and how much is necessary in order for a physician to remain competent.

In its simplest form, continuing education is the method by which professionals learn about developments in their individual field and in the surrounding environment. It is the process by which new skills are learned and new knowledge is integrated by each individual professional.

Continued learning for physicians has received increasing attention in the past twenty years. No longer is it merely a professional concern, rather it has become a public issue. A physician's continued learning is considered by many to be more significant than the continuing education of other professionals (the teacher or accountant), given that physicians assume immense control and responsibility for a patient's health and life. This responsibility for a person's health triggers a series of somewhat unique questions associated with physicians' continued learning. These include: 1) what should physicians learn and who decides that they need it? 2) who helps them learn? 3) what is the most effective way for physicians to learn? 4) when will they find time to learn? 5) what proof is there that learning has occurred?

These unanswered questions lead to one description of physician continuing learning as a "learning dilemma". This dilemma is worsened for physicians given the amazing bombardment of medical journals, slick pharmaceutical literature, structured educational opportunities, and creative computer programs which all claim to fill their learning needs.

Traditional CME has generally filled many of the learning gaps for physicians. However, only a portion of learning results from these activities. Other types of physician learning, since they are more difficult to observe and document, have largely gone unnoticed until recent

years. Most educators and researchers acknowledge that physicians do learn "on their own", outside of traditional CME programs. However, there is minimal knowledge about this learning. It is this "on their own learning" that needs attention in medical education. It would be useful to document all learning activities which physicians engage in, not just those noted through acquisition of Category I hours, the "gold standard" in CME. Such tracking and information would advance the understanding of physician learning patterns and preferences. Additionally it may assist educational planners and researchers with decisions regarding physician learning - learning methods, subject matter preferences, learning needs and desired educational assistance.

In order to better understand the scope and importance of continued learning for physicians, it is necessary to review the relevant literature. This chapter includes a review of the literature and discusses four appropriate areas in both adult and physician learning. Specifically, this will include a review of 1) the characteristics of adults as learners, 2) the importance and benefit of self-directed learning, 3) continuing learning of physicians, and 4) learning projects.

Selected Review of Literature and Research

Adult Learners

Review of Literature and Research

Adults have unique learning characteristics which which significantly effect their acquisition of knowledge and change of behavior. These characteristics and the distinction from child-like learning will be discussed in this section.

Prior to the 1960's there was a striking gap in the research and literature of adult learning. This forms the basis of Knowles observation that the adult learner is a "neglected species" (Knowles, 1978). Fortunately, this lack of attention to adult learning has changed dramatically over the past twenty years and the gap is gradually being closed. The escalating participation in adult education activities has created more interest in adult learning and in the need to consider the peculiarities of adult learning behaviors.

Many of the early adult education studies examined the learning ability of adults rather than the processes of adult learning. When the American Association for Adult Education was founded in 1926 there were two directions of inquiry evident. The scientific direction was seeking new knowledge about adult education through the investigative or research process, while the artistic direction sought new knowledge through an intuitive focus and through the analysis of experience about how adults learn (Knowles, 1978).

However, the first attention to "why" adults learn and the related motivational factors was initiated by Houle (1961). This investigation focused on the actual learning

Chapter 3: Motivation and Barriers to Learning

3.1 Why Adults Learn

3.2 Barriers to Participation

3.3 Overcoming Barriers

behaviors of adults and revealed not only the "why" but also shed some light on the "how" of adult learning. Subsequently, the findings challenged educators by suggesting that continued learning is based on understanding the way adults approach the tasks and opportunities of adulthood (Penland 1977). From this study Houle (1961) developed a typology of learner motivational patterns. The measure used for typing adults into these learner groups was the belief they held about the purposes and values of their continued learning. Houle suggests that an adult's motivation to learn is specifically related to their learning orientation. He described the three orientations as follows:

1) Goal oriented - adults who use learning to accomplish fairly clearcut objectives and specific goals
2) Activity oriented - adults who engage in learning because it offers the opportunity for socialization and interaction with other adults.
3) Learning oriented - adults who learn for its intrinsic value and who seek knowledge for its own sake.

The identification of these learning motivation categories is useful in unraveling the complexities and the process of adult learning behaviors.

The "continual growth" concept of adult development - that adults move through stages of development as they grow and change - has been studied and documented repeatedly.

Chapter 2

Theoretical Framework

Overview

Adult Learning Principles

Motivation and Engagement

Summary

Unfortunately, the integration of this knowledge into adult learning practice has been slow and cautious. Altering traditional educational beliefs is a sluggish and often dawdling process. Knowles confirms this problem, " but for all this promising development (the study of adult psychology) there are as yet few deliberate and systematic attempts to formulate a position from which to develop a differential psychology of the adult years" (Knowles, 1978).

Adult educators, for the most part, have attempted to deal with the unique problems of adult learning through the adaption of theories about child learning. In an attempt to offer some further distinction between these two learner groups, Knowles saw the need for integrating and differentiating concepts of adult learning. He attempted to formulate a theory of adult learning that captured the experience and research findings about adult learners unique characteristics. He introduced the term of andragogy into the American literature in 1968, although the term itself was first coined in Germany in 1833.

Andragogy has experienced an evolving definition, yet basically is considered to be "any intentional and professionally guided activity that aims at a change in adult persons" (Knowles, 1978). Andragogy is more than defining a clear-cut differentiation between child and adult learners. Knowles explains the concept well in his statement:

> Andragogy assumes that the point at which an individual achieves a self-concept of essential self-direction is the point at which he psychologically becomes adult. A very critical thing happens when this occurs; the individual develops a deep psychological need to be perceived by others as being self-directing. Thus, when he finds himself in a situation in which he is not allowed to be self-directing, he experiences a tension between that situation and his self-concept. His reaction is bound to be tainted with resentment and resistance (Knowles, 1978).

Some educators see andragogy as the unifying theory through which the concept of lifelong education can be further studied and developed.

There are several key assumptions about adult learners which form the foundation of modern adult learning theory and further describe differences between adult and child learners. These distinctions are helpful in understanding adult learning. Edward Lindeman, strongly influenced by the educational philosophy of John Dewey, was a pioneering theorist in adult learning around 1926 and he set forth these theories. Subsequently these theories have been supported by contemporary research and continue to be relevant today. They are as follows:

1) Adults have a different orientation to learning given their multiple roles, life tasks, responsibilites and opportunities. Their orientation to learning is life-centered; thus the appropriate units for organizing learning are life situations, not subjects.

2) Adults have more accumulated life experiences than do children as a result of their numerous roles and responsibilities. Experience is the richest resource for

adult's learning. Each person's experiences make them unique as do their specialized talents and developed interests.

3) The development phases of adulthood effect the adult's physical, social and psychological areas of life. Individual differences among people increase with age. Therefore, adult education must consider differences in style, time, place, and pace of learning.

4) Adults are motivatved to learn by their needs and interests which they believe learning will satisfy. Therefore these needs and interests must be the starting point for adult learning activities. Adult learning is most often of a practical and problem-centered nature.

5) Adults have a deep need to be self-directing and autonomous in their learning style. The role of the instructor must be that of learning facilitator rather than one of transmitter of knowledge (Knowles, 1978).

In his development of these theories Lindeman did not dichotomize adult versus youth education, but rather adult versus "conventional" education. This implies that some children might also learn better when their needs and interests, life situations, experience, self-concepts, and individual differences are considered (Knowles, 1978).

These generalizations about the characteristics of adult learners apply in part to all adults. There are, however, specific features which further identify the

learning characteristics of professionals and these will be discussed in the attempt to better understand physicians as adult learners.

Uniqueness of Professional Learners

Professionals, as a group, are most likely to continue their education (Aslanian & Brickell, 1980). The explanation of this is a complex one, but in part results from the commitment to uphold their professional obligations. Also, professionals have relatively high incomes, they have access to numerous resources and enjoy a varied life style. Berg (1973) and Houle (1980) both report that a good indicator of one's potential participation in continuing education is a positive track record of past participation. Professional learners are also generally better established in their communities, more mobile and more confident in their abilities than adults at large.

Aslanian and Brickell (1980) found that professionals frequently become disenchanted with formal education and lean towards directing their own learning. Generally, however, pre-professional education does not assist professionals in the development of self-directed learning skills. The emphasis in preparatory training is on the authoritative presentation of information.

Professionals generally report their learning to be of a problem-solving nature. Houle (1980) indicates that a professional's work almost automatically demands continuing

Preparation of information.

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learning. Seventy percent of useful and job related learning resulted from personal and collegial problem-solving activity. In a survey of 290 scientists and engineers, Margulies and Raia (1967) found that 42% of professionals saw "on-the-job problem solving" as the most fruitful learning experience.

The reasons for participation in continuing professional education are as varied as the professions. However, a large amount of participation is motivated by the need to maintain one's professional competence. Price (1967) and Houle (1980) suggest that a professional's desire to learn arises from the intensity with which a practitioner feels a sense of personal inadequacy in difficult situations. In addition, there may be licensure or organizational mandates for professionals to document their educational participation. This is true for physicians, lawyers, and accountants in some states. Many professionals, curious and eager to keep their mind active, engage in continued learning as a natural extension of everyday life. Lawrence Jacks, confirms this belief in his statement, "Earning and living are not two separate departments or operations in life. They are two names for a continuous process looked at from opposite ends...a type of education based on this vision of continuity is, obviously, the outstanding need of our times" (Jacks, 1932).

Physicians as professionals must participate in continuing learning activities. Attention to their unique adult learning characteristics will facilitate more effective learning. Adults experiences, needs and interests, self-concept, and life situations significantly affect their learning behaviors. Therefore, assumptions about adult learning must include the unique factors associated with their learning patterns. The physician, as one type of professional adult learner, has additional unique learning needs given their occupational focus and mission. This will be discussed in the section titled, "Physicians and Continuing Education".

##

Self-Directed Learning

The importance of autonomy and individual initiative in adult learning is complemented by the concept of self-directed learning. This section will describe self-directed learning, highlight its importance and benefit, and cite relevant studies in self-directed learning.

Both humanistic and behavioral psychologists have studied the characteristics and traits which effect independence and self-actualization in learning. The notion of self-directed learning emerges from human development theory, alleging that individuals become more independent and fitted to self-direction as they mature and encounter the various human development life stages. Carl Rogers, a humanistic psychologist, describes learning as an internal process controlled by the learner and used to engage himself with his environment as he perceives it (Rogers, 1983).

Self-directed learning is by definition a proactive type of learning wherein learners take the initiative and responsibility for their learning. Alan Knox (1977) provides the most universal definition of self-directed learning; "this form of learning involves the individual learner's initiative and responsibility to, with or without the assistance, identify, assess and set priorities for learning needs, define goals, select and organize learning activities, and evaluate outcomes in terms of performance".

Self-directed learning may be mistakenly associated

with the notion that the learner carries out his or her activities in isolation and on a solely independent basis (Knowles, 1975). Rather, self-directed learning frequently includes peers, teachers, friends and relatives as an integral part of the learning process. These individuals serve as helpers at various learning stages. Knowles (1975) formulated an operational definition of self-directed learning, "a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing, and implementing appropriate learning strategies, and evaluating learning outcomes.

Some of the problems and ambiguity associated with the definitions and study of self-directed learning results from its complexity and multi-faceted nature. Self-directed learning has been used to describe learning activities which range from participation in programmed learning to the self-planned activities of very highly self-directed learners, described by Maslow as self-actualizing individuals (Maslow, 1969).

Houle's classic publication, The Inquiring Mind, served as an important impetus in the research of self-directed learning (Houle, 1961). He examined the importance of adult learning through the study of individuals who were the most actively engaged in such learning. "If we are ever to understand the total phenomenon of continuing education, we

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must begin by understanding the nature, the beliefs, and the actions of those who take part to the highest degree" (Houle 1961). Benjamin Franklin, Abraham Lincoln, and Socrates were classified as having been strong self-directed learners. However, in their time, such learning characteristics were considered to be limited to only a few outstanding citizens.

Kulich (1970), in his historical study of the adult self-learner gives credence to the notion that self-education has historically been the most important method man uses to learn about and cope with his world. However, it has been less emphasized with the development of formalized education and institutionalization of learning.

Indeed the notion of self-directed learning has roots in the humanistic psychology and human development theories which promote self-actualization and individual autonomy. Carl Rogers, has impacted self-directed learning theory through his study and writings of self-actualization. Rogers (1983) asserts that learning is more effective when learners define their own problems, discover their own resources, decide their own course of action and recognize the consequences of their learning decisions. Learning becomes much more significant and lasting when it is integrated into one's work or is achieved through active involvement. He claims "the most lasting, persuasive result of self-directed learning is the learners' own personal initiative. Self-directed learner's consider change a

necessity and are comfortable with adapting their performance in response to new knowledge" (Rogers, 1983).

The theories of human development encourage and support the possession of self-directed attributes. As people mature and develop they progress through defined developmental stages, becoming more independent and self-directed in their pursuits. These theories affirm that the motivation to be self-directed is available in every person to some degree depending upon their developmental level. This style and attitude is consistent with the maturing process individuals undergo as they develop and take increasingly responsibility for their own lives. Therefore, self-direction in learning exists on a continuum and its scope is affected by each individual's maturation.

Knowles (1975) describes self-directed learning as more in tune with the adults natural processes of psychological development. We develop an increasingly deep psychological need to be independent, first of parental control, and then, later of control by teachers and other adults as we grow and mature.

Research in adult learning clearly points out the virtues of self-directed learning and its effectiveness (Knox, 1977; Houle, 1980). This type of learning process fits the adult learner's desire for autonomy, flexibility and convenience. Knowles states "there in convincing evidence that people who take the initiative in learning (proactive learners) learn more things and learn better,

than do people who sit at the feet of teachers passively waiting to be taught (reactive learners)..they also tend to retain and make use of what they learn better and longer than do the reactive learners" (Knowles, 1975).

Importance and Benefit of Self-Directed Learning

Self directed learning, over the past ten years, has been receiving increasing attention in all segments of adult education, and specifically in continuing professional education. Both the measured and potential benefits of self-directed learning have been described by educational researchers. Knowles affirms that self-directed learning is necessitated by survival - our survival as individuals and also the survival of the human race. "Self-directed learning is not something that would be nice or desirable, neither something that is a new educational fad, it is about a basic human competence, the ability to learn on one's own, that has suddenly become a prerequisite for living in this new world" (Knowles, 1975).

Self-directed learning is necessary for an individuals continuous growth. In addition, the changing nature of our society requires that all citizens gain new skills and knowledge throughout their life. Formal education, once thought of as a vaccine that would prevent ignorance later in life, is not recognized as adequate by itself. The obsolescence of knowledge, the rapid growth of new knowledge, the shifts in national priorities, the complexity

the rapid downfall of the
ideology as adequate by itself. The
assumption that would prevent adjustments
to a new world that would prevent education
conditions that left children
behind. In addition, the changing
needed learning to necessary for
" (Ibid, p. 12).

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of social problems, and the close relationship between the application of knowlege and social progress will make lifelong learning not only desirable but necessary.

The importance of individualized learning and one's personal responsibility for that learning is asserted by John Gardner in his book on individualized learning and self-renewing societies.

> Education at its best will develop the individual's inner resources to the point where he can learn (and will want to learn) on his own. It will equip him to cope with unforeseen challenges and to survive as a versatile individual in an unpredictable world. Individuals so educated will keep the society itself flexible, adaptive and innovative (Gardner, 1963).

Patricia Cross (1978) in her paper entitled "The Missing Link" further illustrates the importance of self-directed learning. She proposes that the goal of the learning society should be to foster adult development and reward self-motivating and self-directing learning behavior. Many of the new developments in education - the self-paced curriculum, computer assisted instruction and accelerated classes are already putting heavy responsibility on learners to take maximum initiative in their learning. It is important that students who enter these programs enter with the skills of self-directed inquiry in order to avoid experiences of anxiety, frustration and even failure. Roby Kidd (1973) stated, "education's purpose is to produce a continuing, inner-directed, self-operating learner".

The only stable characteristic occurring in this rapidly

changing world is change. It is no longer realistic to define the purpose of education as transmitting what is currently known, rather adults must be capable of learning and integrating new information every day. The main purpose of education must now be to develop the skills of inquiry (Knowles, 1975).

Research Studies in Self-Directed Learning

It has only been in the previous couple of decades that the adult education arena and specifically self-directed learning has interested researchers. The research and theory development of such writers as Cyril Houle, Allen Tough, Johnstone and Rivera, Hiemstra, and Penland have awakened this fresh frontier of self-directed learning (Gross, 1977).

Other researchers from the field of Adult Education have also described the importance of and value for self-directed learning. This section will review and summarize the highlights of most significant studies.

While self-directed learning has been studied in varying degrees, one of the first major studies to acknowledge the uniqueness of self-directed learning was the Johnstone and Rivera survey in the early 1960's. This was the first national survey to examine adults' educational pursuits. The large sample of 12,000 American households adds to the validity of the results. Their findings revealed that one in every five persons engaged in at least one self-instruction project during the previous year. Self-teaching was the

Learning Style and Self-Directed Learning

preferred mode of teaching for many. The authors conclude that "self-teaching may well represent the most overlooked avenue of activity in the whole field of adult education" (Johnstone and Rivera, 1965).

About the same time that the Johnstone and Riveria study was being completed Cyril Houle, was also eagerly investigating individualized learning activities of adults. The Inquiring Mind, (1961) summmarizes the findings of this in-depth study of "why" twenty two adults engaged in continuing education. This was reviewed and findings reported in the previous section, Adult Learning.

Malcolm Knowles, at the University of South Carolina expanded his generic interest in adult learning to focus on self-directed learning. He speculates that as an individual matures his need and capacity to be self-directing, to utilize his experience in learning, to identify his own readiness to learn, and to organize his learning around life problems, he increases steadily from birth to adolescence and beyond (Knowles, 1978).

Allen Tough, a doctoral student of Houle's, turned his attention to self-directed learning and is now considered by many to be the pioneer in systematically researching self-directed learning of adults. Certainly his work has contributed the most thorough and definitive findings about the frequency and nature of adults' self-directed learning. He described self-directed learning as,

Bibliography

Brookfield, Stephen D. *Self-Directed Learning: A Critical Guide to Theory and Practice*. London: Kogan Page, 1985.

Candy, Philip C. *Self-Direction for Lifelong Learning: A Comprehensive Guide to Theory and Practice*. San Francisco: Jossey-Bass, 1991.

Cross, K. Patricia. *Adults as Learners: Increasing Participation and Facilitating Learning*. San Francisco: Jossey-Bass, 1981.

Knowles, Malcolm S. *The Modern Practice of Adult Education: From Pedagogy to Andragogy*. Chicago: Follett, 1980.

Knowles, Malcolm S. *Self-Directed Learning: A Guide for Learners and Teachers*. Chicago: Follett, 1975.

Mezirow, Jack. *Transformative Dimensions of Adult Learning*. San Francisco: Jossey-Bass, 1991.

Tough, Allen. *The Adult's Learning Projects: A Fresh Approach to Theory and Practice in Adult Learning*. 2nd ed. Toronto: Ontario Institute for Studies in Education, 1979.

> The learner retains the major responsibility for the day-to-day planning and decision making. Advice may be sought from various people and a variety of materials and resources used, but the learner retains the responsibility for deciding what activities to try next, what to read and what skill or knowledge should be next in sequence (Tough, 1971).

Tough subsequently built the learning project model as a measurement of self-directed learning projects. This model served as the impetus for the current study and will therefore be discussed at length in another section of this literature review.

Patrick Penland (1977) also adopted Tough's investigative model and conducted a massive self-directed learning study. He choose a representative sample of over one thousand United States adults aged 18 years or older, and his findings provide excellent comparative data of self-directed learning participation. Since this study utilized the learning project model these results will be reviewed in the learning project section of this review.

The principles of self-directed learning seem to fit with the inherent nature and tendencies of adult learners, and, therefore are considered by some to be effecient and effective learning methods. Self-directed learning studies have documented the usefulness and importance of this method for adult learners.

Physicians and Continuing Education

One of the characteristics that distinguishes and separates a "profession" from a trade or technical skill is the continual need for learning in order to improve one's professional practice. It has long been recognized that continuing learning is implicit in the responsibilities of a health profesional. However, recent attention to lifelong learning as a part of professional education has esclated interest in this area. Three major factors have spurred the recent attention to physicians' continued learning.

A major concern in continuing medical education is professional obsolescence. Obsolescence is generally taken to mean "a deficiency of knowledge such that an individual approaches problems with viewpoints, theories, and techniques less effectively than others currently use in his field of specialization" (National Science Foundation, 1969). Competence in medical practice has moved from a largely internal professional issue to become more a matter of public concern. Society is no longer content with having delegated the responsibility of physician competence to the medical profession. The public is demanding competent health care providers who are well prepared, well equipped and devoted to serving and understanding peoples health care needs. The proliferation of malpractice suits strongly suggests that the health care consumer is increasingly challenging the knowledge and performance of physicians. And they intend to

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hold physicians accountable for their performance.

Secondly, the accelerated growth and expansion of knowledge and technology has dramatically affected medical science and the practice of medicine. The factual information learned in medical school and residency training serves physicians for a shorter period of time than in the past when the pace of discovery was considerably slower. The need to keep up-to-date with scientific and technical information which doubles every 5.5 years presents a huge challenge to physicians. Obstacles of time, economics and educational access complicate the physician's ability to maintain a current knowledge base.

The third factor which has recently received more attention in continuing medical education relates to the question of learning effectiveness. Does acquisition of credits, certifications and passing licensing examinations assure the competence of physicians? There is increasing concern as to whether the "system" is able to evaluate physician competency and performance. Medical schools and continuing medical education sponsors assume learning results from their teaching activities, yet evidence is lacking as to whether this knowledge is utilized and affects medical practice. The key to competent medical practice is whether the practicing physician can appropriately apply the knowledge and proficiently perform a task or procedure which was recently learned. The mere documenting of knowledge acquisition or testing to prove it has been learned at a

[illegible]

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certain point in time does not ensure competent performance. Physicians must be self-motivated to monitor their own performances, to upgrade, reinforce and improve their clinical skills as they themselves deem appropriate.

Continuing Medical Education

Continuing medical education, the last and longest of the three phases of the medical education continuum encompasses a wide variety of activities. CME is generally of two types; 1) that which is remedial and directed towards repairing educational deficiences and 2) that which advances new knowledge and skills to the practitioner. The latter type is usually self-sought and self-identified as the physician personally determines his/her needs for new information. The remedial CME is often not self-proclaimed and mechanisms such as peer review, audits and authority monitoring identify these needs. Both types are important in assuring competent physician performance and effective patient care outcomes.

> Continuing medical education of the physician is the most important single problem facing medical education today. The gap between scientific knowledge and application grows wider each year and the problems are nationwide. Practical methods exist to meet physician's CME needs using knowledge and tools from the fields of medical education, the behavioral science, and communication technology (Dryer, 1962).

There has indeed been advancing interest in continuing learning for physicians and this has resulted in substantial changes in the policies and practices of continuing medical education. One of these changes has been the see-saw trend

Continuing Medical Education

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of mandatory CME. That is, the installation by some states and licensing organizations for mandatory CME while other states or organizations are retracting their mandatory requirements.

An increasing number of malpractice cases, the concern that some physicians lack a personal learning motivation, and recent legislative changes have accentuated physician accountability and have stimulated the dramatic move towards mandatory CME. Certainly the impetus for mandating continued learning was in the mutual desire for improved physician performance as well as assuring high-quality patient care. However, the unknown benefits and illusive evaluation of formal CME activity has caused continued confusion about the merits of such requirements. Some view mandatory CME as a system for displacing incompetent physicians while others see course attendance and acquisition of credit as inadequate to assure physicians' competence.

To complicate the picture further, there is little, if any, confirmation that mandatory CME improves patient care or rids the system of incompetent physicians. A continuing debate on the effectiveness of CME programs has emerged in recent years. Richards (1983) suggests that the merits of CME were rarely addressed in the CME literature prior to the 1960's, since the value of attending CME programs was considered self-evident. However, today the literature cites many reports of skepticism about the effectiveness of CME. Some declare that its effectiveness has not yet been proven

and its benefits can't be measured, but its value is no less essential (Manning, 1980).

Others avidly proclaim that CME does not work. "Programs of continuing education in medicine are less than optimally effective" (Scott, 1976).

> A general review of CME demonstrated that the current CME system is not able to perform the tasks assigned to it. Many CME efforts are of doubtful quality, are not always relevant to needs and are often inaccessible to physicians. In addition, statistical evidence to either support or refute these statements is embarrassingly sparse and very scattered. The reasons for the current difficulties with CME are multiple, and include the multiplicity of sources, a lack of coherent funding and physician motivation (Competence in Medical, Professions,1976).

Physicians themselves have documented their beliefs that many formal CME courses offer so little educational value that they often choose not to attend (Kotre, Mann, Vanselow, 1971).

LLoyd and Abrahamson likewise suggest that evidence regarding CME effectiveness is in short supply. They cite a couple of reasons: (1) the evaluation of CME is a relatively new and not yet well developed science, and (2) efforts to evaluate the effectiveness of CME add to its already rising cost (Lloyd & Abrahamson, 1979).

Haynes and Davis, in their review of 248 articles in the CME literature, report that only one CME study which measured patient outcomes demonstrated any CME benefits towards improved patient care. Their concerns are reflected in a concluding statement, "those who promote or subscribe to CME

on the basis that patient care will be improved must do so on faith at present" (Haynes & Davis, 1984).

The importance of and need for continuing learning has taken an increasingly visible position in the medical education arena. Social and technological changes have accelerated the necessity and importance for physicians to be lifelong learners. Unfortunately, the policies and practices of CME have not answered nor completely addressed the concerns of physician competency. It is possible that a broader look at physicians' continued learning will expand this picture of educational participation and personal motivation.

CME Learning Activities

The most desirable instructional methods for CME programs have long been debated and there is little verification in the literature to assert the optimal means of CME delivery. Most of the research about teaching and learning has been in elementary and secondary education and findings are mixed and conflicting. Certainly in adult education there is an obvious lack of research about the most effective teaching and learning methods for adults.

Greenberg and Jewett (1983) designed a study comparing two teaching formats to determine presentation effectiveness. They contrasted the traditional lecture with the case presentation to determine which technique was the most effective in CME. Findings report that physicians attending

CME Learning Activities

The most desirable instructional methods for CME programs have long been debated and somewhat little actual action in the literature to assert the optimal CME delivery. Most of the research about teaching and learning in elementary and secondary education and training and coaching. Certainly in adult education, there is an urgency to research about the most effective teaching and learning methods for adults.

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case presentation sessions were more likely to increase their cognitive knowledge than physicians attending the lecture sessions. However, retention of knowledge was only slightly higher for the case presentation group than the lecture group.

In traditional CME course offerings the predominant learning format is primarily teacher-directed and is a classroom activity. This has changed only slightly over the past twenty or thirty years. The use of electronic equipment and elaborate technology may have enhanced and "jazzed up" the presentation of material, yet teacher-directed formats are basically unchanged. Richards (1981) reports that the majority of CME efforts are teacher-oriented, using traditional pedagogical educational methods and focus primarily on the transmission of medical knowledge.

Critics of CME presentations have condemned the heavy reliance on lectures and have urged the use of other teaching methods considered more appropriate for adult learning. There is growing concern about the emphasis given to passive learning when lecture formats are used. On the other hand, lectures have long been accepted, even desired, by both teachers and physician learners. They are considered easier to construct and they portray the teacher as the medical expert. Lectures were reported as the most common CME method utilized, but ranked only ninth in effectiveness in a national survey of CME program directors (Ribble, Burkett, 1981).

The process of change is often a slow and delayed process. This is certainly true with regard to changing CME instructional formats. Even though the sponsors of CME programs are knowledgeable and capable of providing and encouraging assorted types of instructional methods, the majority of courses primarily use a lecture format. The struggles of getting faculty to change their teaching style is sometimes insurmountable. Teaching by the case-method, for example, takes increased faculty preparation time as well as more self-confidence on the faculty's part.

In looking further at CME learning activities it is noticeable that involvement of the learner in program planning is a rare phenomenon. Castle and Storey looked extensively at physician needs and interests in CME.

> To improve the quality of patient care, continuing medical education must be oriented to the individual physicians practice and must be related to his particular interests and needs (Castle & Storey, 1968).

Historically, CME programs have emphasized the content of the learning with less concern for the delivery of programs. There has been minimal consideration towards matching the learning styles of physicians to the learning needs or preferences. Miller states:

> Categorical content programs do not change behavior. Continuing education should mean continued self-education, not continued instruction. If this desirable goal is to be accomplished, there must be movement away from the content model, which encourages dependence upon teachers, to a process model, which demands a significant measure of self-reliance; a shift away from a preoccuption with courses and methods, towards an augmented concern for educational diagnosis and individualized therapy (Miller, 1967).

Pennington (1975) studied continuing professional education planners and reports that only 2.9% of those cases studied showed the planner using instructional method suggestions from learners.

Physicians' Self-Directed Learning

It is encouraging that in the past few years medical educators have devoted increasing attention to the individualized and self-directed learning interests of physicians. This attention has stimulated a number of physician self-directed learning studies, looking at a wide variety of learning activites.

While this literature review generically discusses the advantages of self-directed learning, there are specific advantages for physicians which deserve mentioning. Self-directed learning, by definition is proactive and relies on individual learner initiative. An attractive feature is that learning interests are tailored to meet individual learning needs; resources are easily accessible and the content is timely for busy practitioners. The health professionals' work life is oriented towards clinical and administrative problems which demand relatively quick solutions. Thus the professional must be adept at learning on his/her own in order to solve frequently occuring problems (Allis 1980). The value of self-directed learning for the health profesional is further emphasized by Suter who states:

Unsupervised Learning

> to meet the responsibility of learning as a professional, the health practitioner should substitute a predominantly independent, self-directed learning mode for an institutionally dominated educational experience. Self-directed learning seems particularly suited for strengthening inquiry and problem solving and for relating learning to practice experience (Suter, 1981).

In a report titled Continuing Education of Physicians: Conclusions and Recommendations (1979) the Association of American Medical Colleges highlights the importance and advantages of self-directed learning for physicians. This report advocates:

> the practicing professional is able to utilize existing experienes and competencies as a basis for continuing education. The professional has maximum flexibility in choosing and negotiating favorable time, places and activities for learning. Practitioners can select educational activites best suited to meet their own personal cognitive and learning styles. Self-directed learners select only activities which will meet the needs they have identified in their practices. Perhaps most important, the educational activities are based on the individuals own need and desire to change; the critical factor of motivation is present and the probability of effecting change is very high (AAMC,1979).

Numerous medical education researchers have called for research and practice in the application and validity of self-directed learning with physicians (Castle & Storey, 1968; Manning, 1980; Murchland, 1981; Richards, 1985). However, there are a number of barriers that may be inhibiting further development of self-directed learning in CME. Knox (1973) cites three reasons: (1) the image of continuing education is one of formal programs which

are highly specialized within a particular area, and unresponsive to the ways in which adults learn most effectively. (2) there is a heavy reliance on CME provider organizations such as universities, associations, the pharmaceutical industry, and underutilization of local hospitals, internal resources and other educational opportunities closer to clinical practice. And (3) most CME providers do not have a trained staff to encourage and assist individual physicians with their self-directed learning.

Unfortunately, because self-directed learning is not as easy to observe and validate as is group learning it has not been at the forefront with the proliferation of mandatory CME. However, at a turtle-like pace the literature documenting the value of self-directed learning for physicians is gradually gaining momentum and attention. Leonard Fenninger (1968), Director of the Bureau of Health Manpower, suggests that the solution to the problem of updating information and expanding careers for health professionals may be the new and improved educational methods of today, particularly those methods of self-instruction and individualized instruction.

In further exploring self-directed learning activities of physicians there are a few studies reported in the literature. An attempt was made in Utah to identify the individual learning needs of physicians (Castle & Storey, 1968). The foundation of this study rested in the authors' belief that to improve the quality of patient care, CME must

be oriented to the individual physician's practice and must be related to his/her particular interests and needs. An example of such a tailor-made educational program is the Individualized Practice Profile (IPP) developed by Meyer, at the University of Wisconsin (1973), as a method for planning personalized CME. Patient problems are presented to test physician knowledge and on the basis of test results and individualized physician information the individualized educational plan is created.

Putnam and Curry (1981) studied the Continuing Medical Education of practicing physicians in Canada. In this investigation they looked at what practicing physicians do to continue their education, what they would prefer to do, and what learning methods were the most effective with regard for the quality of health care delivered to patients. The findings confirmed the authors' expectation that most physicians prefer individualized learning methods over organized programs. 43% of the physicians cited reading, 19% courses and 15% informal discussions as the learning methods they prefer. Their conclusions cite an overwhelming preference by Maritime phyisicans for independent learning methods.

Another study investigated self-education of physicians and formulated similar findings regarding the popularity and effectiveness of individual learning efforts. Manning and Denson (1979) surveyed 158 cardiologists to explore how they learned about echocardiography, a technique in which 81% of

the physician sample had received no training in medical school, residency or fellowship. Their results pointed to the printed page and self-instruction as the major method (45%) for learning about this new technique and course instruction was second with 19%. Professional journals were the most frequent source from which physicians either heard of echocardiography, learned the principles of it, or maintained their knowledge about it. The authors of this study urge adoption of and more emphasis on physician individual learning preferences for more effective learning.

Geertsma (1982) asked 66 physicians to describe two or three specific changes they had made in their practice behavior and to identify the source(s) that had assisted or advised them in making these changes. Physicians responses cited colleagues (47%), journals (32%) and CME programs (10%) as the most frequently used learning agents.

In an Australian study of 236 Ophthalmologists, researchers investigated physicians views of how they best continue their learning, and the results again point to substantial self-directed learning preferences. 98% of the respondents believe reading is the major contributing factor in their continued education. Discussion with colleagues was seen by 60% of the respondents to be very helpful and postgraduate courses were important for 52%. Murchland who was interested in the implications of andragogy on continuing medical education concludes that "self-directed programes polled highest in helpfulness to the ophthalmologists while

programes decided by the so-called experts may well miss the mark" (Murchland, 1979).

On the contrary, another study which investigated physician learning preferences (Kotre, Mann, Vanselow 1971) reports significantly less interest in individualized learning content. Only 25% of the physicians in this study would desire a tailor made program, on any topic of his choice, as a type of CME program.

A study of information-seeking behaviors in family practice physicians further confirms the extensive use of self-directed learning in the physician population. Means (1979) found that printed materials, especially medical texts and professional jounals, represented the major sources of information used by family physicians in clinical problem solving. He further reports that an important part of nearly all information-seeking activity was for the purpose of resolving clinical problems, and involved some form of consultation with colleagues and/or others.

The American Psychiatric Association has been at the forefront with interest in physician self-directed learning. The Association published a booklet describing a CME plan of action for psychiatrists. The plan reflects a "highly individualized learning process in which each student expands his understanding, his competence, and his interests in response to his own perceived needs and his own curiosity" (American Psychiatric Association, 1972).

Fox (1984) investigated the relationship between

Chapter 25: Physiology of Learning

25.1 Introduction

Learning is the process by which the nervous system acquires new information, skills, or behaviors and retains them for future use. It is a fundamental property of the brain and underlies almost all adaptive behavior. Physiologically, learning is associated with changes in the strength and structure of synaptic connections between neurons.

25.2 Types of Learning

Learning can be broadly classified into several types:

- **Habituation** — decreased response to a repeated, harmless stimulus.
- **Sensitization** — increased response to a stimulus after exposure to a strong or noxious stimulus.
- **Classical conditioning** — association between a neutral stimulus and a biologically significant stimulus.
- **Operant conditioning** — modification of behavior by its consequences (reinforcement or punishment).
- **Motor learning** — improvement in the accuracy and smoothness of movements with practice.
- **Declarative learning** — conscious acquisition of facts and events.

25.3 Memory

Memory is the retention of learned information over time. It is commonly divided into:

- **Sensory memory** — very brief storage of sensory information.
- **Short-term (working) memory** — limited capacity, lasts seconds to minutes.
- **Long-term memory** — potentially permanent storage.

Long-term memory is further subdivided into explicit (declarative) and implicit (non-declarative) memory.

25.4 Synaptic Plasticity

Synaptic plasticity refers to the ability of synapses to strengthen or weaken over time in response to activity. Two well-studied forms are:

- **Long-term potentiation (LTP)** — a persistent increase in synaptic strength following high-frequency stimulation.
- **Long-term depression (LTD)** — a persistent decrease in synaptic strength following low-frequency stimulation.

LTP is widely considered a cellular mechanism underlying learning and memory.

25.5 Neural Circuits Involved in Learning

Several brain regions are critical for learning and memory, including the hippocampus, amygdala, cerebellum, and basal ganglia. The hippocampus is essential for the formation of new declarative memories, while the cerebellum is important for motor learning.

25.6 Factors Affecting Learning

Learning is influenced by attention, motivation, emotional state, sleep, and age. Sleep, in particular, plays a role in consolidating memories after they are initially encoded.

25.7 Summary

Learning is a complex, multifaceted process that depends on changes in synaptic strength and the activity of distributed neural circuits. Understanding its physiological basis has implications for education, rehabilitation, and the treatment of memory disorders.

physicians' self-assessed need, relevance and motivation to learn, and their actual participation in CME activities. He reports that physicians engaged in a variety of learning activities, with the most common type of learning activity was self-directed learning projects (67%).

While self-directed learning is becoming more accepted and acknowledged as a legitimate type of continued learning for physicians, there remains a gap in the CME literature as to the extent of self-directed learning and the content specifics. Physicians engage in an extensive amount of self-directed learning as a result of their natural curiosity and occupational need to respond quickly in solving patient clinical problems. This is a preferred mode of learning for many physicians. Reading and discussion with colleagues are the most prevelant types of physician learning efforts.

Learning Projects

This section will review the history and definition of learning projects, as well as the general findings of previous learning project studies. The learning project studies which relate specifically to health professionals are discussed in detail.

Learning projects are one of the avenues by which self-directed learning efforts have been studied. The learning project model has been tested in over fifty surveys and research studies, and is determined to be an appropriate measurement and assessment tool for evaluating deliberate learning efforts of adults.

A learning project is a major, deliberate effort to gain certain knowledge and skill, or to change in some other way. Some learning projects are efforts to gain new knowledge, insight or understanding. Others are attempts to improve one's skill or performance, or to change one's attitudes or emotional reactions. Some involve efforts to change one's overt behavior or to break a habit (Tough 1971).

Allen Tough, researcher and educator from the Ontario Institute for Studies in Education, is viewed as the pioneer behind the advancement of the learning project concept. The starting point of Tough's learning project approach has been the adult learner. Specifically, he focuses on the adults desire and major efforts to change, to learn better ways to do things, to gain new information and knowledge and to

Chapter 1

Introduction

Learning is defined as the avenues by which we acquire knowledge, skills, and attitudes that have been studied. The process of learning is a complex one, and it is important to be aware of the various factors that can affect it. Learning is a lifelong process, and it is important to be aware of the various factors that can affect it.

Purpose

The purpose of this study is to examine the effects of learning on the development of the individual. The study will be conducted in a variety of settings, including the home, school, and workplace. The study will be conducted over a period of one year.

Significance

The significance of this study is that it will provide information about the effects of learning on the development of the individual. This information will be useful to parents, teachers, and other professionals who work with children. The study will also be useful to researchers who are interested in the effects of learning on the development of the individual.

Definitions

For the purposes of this study, the following definitions will be used:

- **Learning**: A change in behavior that is the result of experience.
- **Development**: The process of change that occurs over the lifespan.
- **Individual**: A person who is being studied.

Limitations

The limitations of this study are that it will be conducted in a variety of settings, including the home, school, and workplace. The study will be conducted over a period of one year. The study will also be limited to the effects of learning on the development of the individual.

Delimitations

The delimitations of this study are that it will be conducted in a variety of settings, including the home, school, and workplace. The study will be conducted over a period of one year. The study will also be limited to the effects of learning on the development of the individual.

Assumptions

The assumptions of this study are that it will be conducted in a variety of settings, including the home, school, and workplace. The study will be conducted over a period of one year. The study will also be limited to the effects of learning on the development of the individual.

Summary

In summary, this study will examine the effects of learning on the development of the individual. The study will be conducted in a variety of settings, including the home, school, and workplace. The study will be conducted over a period of one year. The study will also be limited to the effects of learning on the development of the individual.

change perceptions, behavior or performance. The focus in learning projects is on deliberate learning efforts rather than on incidental knowledge which causes people to change. This is a critical distinction in the learning project definition and Tough addresses the differential between deliberate and incidental learning.

> Many changes occur in the adult as a result of developmental changes within him, factors beyond his control, his social and physical environment, his casual conversations and televison viewing, and his recreational reading. Our focus includes only highly deliberate learning efforts, not the multitude of phenomena and forces that produce changes in a person without his strong desire for learning (Tough 1971).

While developmental changes are important in adult learning, they are not categorically considered to be learning projects unless they are components of one's conscious effort to learn something specific.

A more definitive look at learning projects reveal that they include a series of related learning episodes, episodes in which the person's primary intention was to learn, and these must include at least seven hours of effort. In each episode, more than half of the person's total motivation is to gain and retain certain fairly clear knowledge and skill, or to produce some other lasting change in themselves (Tough 1971). Therefore, the foundation for a learning project is the learning episode.

Tough developed specific definitions and parameters for the concepts related to his learning project theory. The

learning episode is described as:

> a period of time devoted to a cluster or sequence of similar or related activities, which are not interrupted much by other activities. Each episode has a specific beginning and ending time. These episodes may include reading, listening or watching and can take place in many locations or environments - the classroom, home, hotel room, library or alone. Episodes all have one thing in common: an intent that remains dominant throughout the episode. The person's desire to gain and retain certain definite knowledge and skill is primary in each episode (Tough 1971).

This definition clearly excludes those episodes for which the person does not have a definite learning goal in mind.

In addition, the learning project model requires that the learner must be clear about the desirable application of this desired knowledge and skill. Episodes of learning activity which lack clear learning goals are excluded from the learning project definition, as are the entire range of non-deliberate and incidental learning (Penland, 1977). The minimal seven hour time criteria was developed to exclude scattered and unrelated learning efforts from being classified as learning projects.

The planning of a learning project emerges from the learning episode. When the desire to learn becomes strong enough, the individual will engage in a series of related episodes which compose a learning project.

Tough designed the learning project definition to include the entire range of learning efforts. Any method can be included - reading, listening, observing, attending class,

Though designed the learning project definition as
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The individual will engage in a series of
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reflecting, practicing, getting answers to questions - if the person's primary intention during that episode was to gain and retain certain definite knowledge and skill. The term "knowledge and skill" includes changed awareness, competence, habits, attitudes, sensitivity, and confidence. Self-planned learning, classroom learning, learning guided by a friend or a group of peers, and learning guided by programmed instruction are all included. Non-credit learning is included along with learning for a degree or a certificate. Learning for highly practical reasons - to make a good decision, build something, raise a child, perform some task - is included, as are learning efforts motivated by curiosity, interest, puzzlement, and enjoyment (Tough 1971).

Learning project research investigates the observable and interpersonal behavior of adults who actually design and carry out their own independent learning. This is in contrast to a more traditional approach to learning resulting from the way teachers teach (Bloom, 1956). This learning project approach focuses on learners and their recorded articulations of how they themselves planned and executed their own learning projects, rather than talking with teachers about how they believe people learn. Tough's research aided in drawing attention to adult learning and challenged the assumption that institutionally sponsored learning was purposeful and deliberate while learning outside of the institutional context was serendipitous, ineffective and wholly experiential (Brookfield, 1984).

Tough's learning project model has been the foundation of nearly fifty follow-up studies of adult learning projects. These have been conducted in a variety of countries with a number of different occupational groups. Some surveys have sampled specific groups of men and women in a particular state or country. Others have focused on groups - from university professors to the unemployed, from retired adults to factory workers, from extension agents to professionals in an affluent Canadian suburb.

Learning Projects - General Findings

The learning project section will review specific details of appropriate learning project studies. However, a brief overview of the major learning project research results will be presented first. The overall reported findings of learning project participation are remarkably consistent from one population to another. Tough states that while the numbers of reported learning efforts change somewhat, the general pattern of results are fairly constant across assorted population sectors. In fact, the significant differences have resulted within given populations rather than between populations (Tough 1978).

The general picture of adult learning indicates an overwhelming amount of learning project activity. Tough suggests that almost everyone undertakes at least one or two major learning efforts a year, and some individuals undertake as many as 10 or 15. The typical learner conducts five

Learning Projects — Day 4 Practice

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learning projects in one year (Tough, 1978).

Other significant statistics emerge in the overall review of learning project activity. The learner hours spent on learning projects is commonly 500 hours per year. Some learners spend less than 100 hours but others spend more than 2000 hours (Tough 1978).

With regard to learning planning, each study reports a similar pattern - that most projects are learner planned, although the exact figures vary slightly. Tough (1978) reports 73% of learning projects are self-planned by the learner, 14% as a group planned activity and 10 percent are planned by a one-to-one helper. The remaining 3 percent are planned by a non-human resource.

Why learn? Most learning projects are motivated from a practical perspective and with a potentially anticipated use or application of the knowledge or skill. Learning for credit in learning projects is uncommon and occurred in approximately 15 percent of all reported learning projects (Tough, 1978).

Learning Project Studies

Tough, quoted prolifically in this literature review, has spearheaded the majority of learning project studies. In 1966 he began a series of open-ended interviews about adult learning and stumbled into the notion of using learning episodes as the foundation for studying deliberate learning efforts.

Ongoing Project Updates

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> I became aware that many people plan or describe their day in terms of episodes. It became evident that focusing on episodes was the most appropriate psychological foundation for defining the phenomenon in which I was interested (Tough 1971).

In 1967 he investigated the actual ways 40 graduates taught themselves. He reports that the learner retains the primary responsibility for learning tasks while receiving help from a mean of 10.6 persons, largely acquaintances (Tough 1967).

Many learning project researchers have been interested in the motivational issues of learning. In 1968 Tough probed intensively into motivations for learning by studying the reasons adults begin and continue a project. His results identified thirteen common motives for starting and continuing projects (Tough, 1968).

Perhaps the most extensive and comprehensive learning project study Tough conducted was the 1971 study of sixty-six individuals from seven occupational groups. The overall findings in this study report an astonishing 98% participation rate and are higher figures than ever previously reported in adult learning surveys. Tough explains the factors which account for these differences.

> Our study used extensive probing by interviewers who were thoroughly familiar with the study's purposes and definitions. As a result, they were more successful than other studies at helping people recall self-planned learning efforts. Also, they interviewed the learner himself, not someone else in his household. In addition, our definition of a learning project differs somewhat from the phenomenon on which certain studies have focused (Tough, 1971).

Mastering Spaced Repetition: Scientifically Proven Techniques for Long-Term Learning

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Introduction

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Methodology

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Results

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Discussion

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Conclusion

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In both the 1968 and 1971 study the major motivations reported for learning projects were the desire to use and apply new knowledge and skills, as well as learning for the sake of curiosity.

Learning Project Participation

Several of the learning project studies have sought to identify the extent of learning project participation either among a specific population of people or in a given geographic area. In a rural Tennessee county, Peters and Gordon (1974) interviewed 466 adults and found that 91% had conducted at least one learning project during the year. McCatty (1973) studied a randomly selected group of professional men in an affulent Toronto, Canada suburb and reports this population engaged in an average of 11 projects annually and devoted 1244 hours to these learning projects. Miller and Botsman (1975) studied professionals and reports that Cooperative Extension agents averaged 12 projects annually. Johnson's (1973) findings of Florida adults indicate participation ranging from 6-29 learning projects. Johnson, Levine and Rosenthal (1977) interviewed unemployed adults in New Jersey and report that 86 of 100 recalled at least one learning project from the past year.

In 1976 Penland conducted a very large learning project study, a national survey of 1511 adults. He reports a learning project participation rate of 79%, although he included learning efforts of less than seven hours. When

Learning Project Participation

Several of the learning project studies have looked at the extent of learning project participation within a particular population of people or in a geographic area. In a rural Tennessee county, Feldman (1978) interviewed 456 adults and found that 20% had at least one learning project during the year. Penland (1979) studied a randomly selected group of 1,200 adult residents in an urban Detroit, Canada suburb and found that 70% had undertaken learning projects during the year. Tough (1979) studied professionals in seven different occupations and found that they averaged 9.1 learning projects each year. Johnson (1972) studied professionals in forty-seven different occupations and found that they averaged 12 projects each year. Zemke and Rossman (1977) interviewed 244 nurses in an urban hospital and found that 86% had undertaken learning projects during the past year.

In 1978 Tough conducted a very large learning project survey, a national survey of 1511 adults. He reports a participation rate of 79%, although he defines learning projects in such a way that they are less than seven hours long. Participation ranges from 6-29 learning projects per person, and Rossman (1977) interviewed unemployed workers in New Jersey and reports that 86% of 100 recalled efforts in the past year.

these shorter efforts are eliminated from the data, the participation rate falls to 70%. These learners had initiated from 1 to 18 projects per person, while the mean was 3.3 per respondent (Penland, 1977).

Learning Project Motivations

The interest in learning projects as a form of non-traditional and self-directed learning has, in part, resulted from the assumption that adult learners choose to learn for highly practical reasons. Therefore, a major research question in most learning project studies has explored the motivational reasons for taking on a learning project. Again, most studies report surprisingly similar findings.

> The most common motivation for a learning project is some anticipated use or application of the knowledge and skill. The person has a task - raising a child, writing a report for the boss, handling a case, teaching a class, fixing or improving something around the house, sewing a dress - and learns certain knowledge and skill in order to perform the task successfully. Less common is curiosity or puzzlement, or wanting to possess the knowledge for its own sake (Tough, 1978).

McCatty (1973) found that 55% of learning projects were motivated by work, or were job related in his sample of professional men. This included keeping up with the literature and new discoveries, as well as learning in order to handle specific cases. Both Benson (1974) and Allerton (1974) found their subjects motivated by job related reasons. Benson (1974) reports 84% of learning projects were vocational for college and university administrators, while

Learning Styles: Motivations

Allerton's (1974) minister participants devoted 62% of learning projects to their vocation. Peters and Gordon (1974) found that most learning projects were job related or recreational, with smaller numbers in the categories of personal improvement, religion and family relations.

Johnson (1977) reported that their sample of adults were motivated to learn new coping skills required by being unemployed and skills related to their efforts to find and prepare for new jobs. These findings were in constrast to what Hiemstra (1975) in Nebraska found when he interviewed 256 adults, age 55 and older. More than half of these adults' learning projects were for self-fulfillment and only a few were job related. It is likely that the age of these participants influenced this differential in findings.

Several investigators (Fair, 1975; Kelly, 1976; Miller, 1977; McCatty, 1975) have studied learning project activities of school teachers and report that they are very similar to others in their learning patterns.

Coolican (1974) looked at learning of mothers with pre-school children and reported that half of theirlearning revolved around the home and the family.

In addressing the issue of learning motivation, Penland (1977) took a slightly different approach. His interest was specifically: Why do people choose to learn on their own instead of taking a course? His findings report three predominant preferences these adults gave for learning on their own: 1) the desire to set one's own learning pace, 2)

[illegible] ... [illegible] ... [illegible] ... [

the desire to use one's own learning style, and 3) the desire to keep the learning style flexible and easy to change.

Learning Project Planners

The learning planning aspect of learning projects has been looked at to some degree in nearly all learning project studies. This refers to who does the day-to-day planning of how the projects will proceed and what will be learned. Tough offers an overall composite view of planners most often used in learning project activity.

In summary, about 20 percent of all learning projects are planned by a professional - someone trained, paid, or institutionally designated to facilitate the learning. The professional operates in a group (10%), in a one-to-one situation (7%), or indirectly through completely preprogrammed nonhuman resources such as programmed instruction or a television series (3%). In the other 80% of all learning projects, the detailed day-to-day planning is handled by an "amateur". This is usually the learner himself or herself (73%), but occasionally is a friend (3%) or a group of peers (4%) (Tough, 1978).

Learning projects of professionals (McCatty, 1973) and teachers (Kelley, 1976; Fair, 1973; McCatty, 1975) were largely self-planned while Cooperative Extension agents (Miller and Botsman, 1975) relied on workshops and experts for over half of their learning. Morris (1977) studied the learning planning steps and reports that the first step

Learning Projects

...learning projects (McCaffrey, 1975) and self-planned learning (Kelley, 1976; Farr, 1975; McCaffrey, 1975) were ... and Botsman, 1975) related on workshops and experts ... or a unit of their learning. Morris (1977) studied the ... learning. Then, and reports that the most [illegible] ...

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Learning projects of professionals (McCaffrey, 1975) and ...

generally clarifies the learning problem or issue. Secondly, there comes an awareness of the need to learn and/or the commitment to start a learning project.

Luikart (1975) conducted an in-depth study focusing on the helpers of learning projects. His findings indicate that friends of the learner provided the most help (43%) and relatives the least (20%). The majority of the helpers (64%) provided sustained help, giving information or assistance three or more times during the active phase of a learning project. Luikart reports that the kind and amount of help which learners received was directly related to differences in the size, density and composition of the learner's personal social networks.

Learning Projects for Credit

Historically, a great deal of attention has been directed towards the award of credit and certificates for learning efforts. The learning project studies which have inquired about credit motives report findings contrary to this position. In self-directed learning projects there is a distinct departure from the desire for credit. It is rare for learning projects to be carried out for credit toward a degree, certificate or license. Only 5% of all learning projects have such a motive (Tough, 1978).

International Studies

While the majority of learning project studies have been in the United States and Canada a couple of researchers have done international studies. These studies offer interesting

Learning Projects for Credit

Interpersonal Issues

The Learning Project Agreement

comparisons and are confirming of the universal nature of learning project participation. Field (1977) interviewed adults in Jamaica and Denys (1973) went to Ghana, Africa to study several groups of educated adults. Reported findings from these two international studies suggest similar findings to those studies conducted in the United States and Canada.

Summary

All of these learning project studies are relevant and pertinent in this literature review. However, the studies whose populations have specifically included health professionals are even more germane and of special interest in this review. Unfortunately, only a few of the learning project studies to date have examined learning project activity in health care professionals. The nursing field has been one of the health professions who has been most verbal about their interests in self-directed learning and learning projects.

Learning Projects and Health Professionals

Pharmacists acknowledge their involvement in learning projects, however in significantly fewer numbers of projects than the general population reports. Johns (1973) interviewed 39 pharmacists in Atlanta and reports a mean of 2.7 learning projects per year for these professionals. This was an average of 266 hours per project. As is true in the majority of other learning project studies, these professionals report

Summary

All of these learning project studies are relevant to [illegible]. However, the study most relevant to [illegible] is probably the [illegible] study. Specifically included in the [illegible] study are several more pertinent variables. Unfortunately, only a few of the [illegible] have been [illegible] to date. Any [illegible] learning project [illegible] the nursing field [illegible] professionals. The nursing profession [illegible] who has been most [illegible] learning and [illegible]

[illegible] and Health Professionals

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that a large amount (30%) of learning time was devoted to vocational subject matter. Overall, the reported percentages of time spent on vocational learning are less than other learning project studies.

Moran (1977) studied the continuing learning of 30 hospital staff nurses in an attempt to review their individualized learning activities. Using a modified version of Tough's interview schedule, she focused on the compared relationship between independent learning and participation in formal courses. Findings indicate that nurses spend significantly more hours in their independent efforts to learn than in formal courses. A mean of 469 hours was spent annually on purposeful learning of professional content.

Health care professionals were included in McCattys' (1973) learning project study of fifty-four professional men. His sample contained eight physicians, four dentists and one pharmacist. The findings are unfortunately only reported in the aggregate, making it impossible to distinguish the health professional responses from all other professionals. Overall, these professionals reported an average of 11.1 learning projects and spent 1,244 hours on them during the 12 months prior to the interview. This is slightly higher than the overall learning project average for the general adult population. Vocational subject matter comprised 55% of total learning efforts and self-planned learning was the primary (76%) type of planner mode used.

[illegible] mode used.

[illegible] and self-planned learning was [illegible] population. Very [illegible] subject matter comprised 50% of [illegible] learning [illegible] average for the general adult [illegible] rate in the interview. This is slightly higher than [illegible] and 1984 hours on them during the [illegible] physicians reported an average of 11.1 [illegible] professionals from all other professions [illegible] Overall, we find it impossible to distinguish the [illegible] The findings are unfortunately only [illegible] this sample contained eight physicians, four dentists and [illegible] (1977) learning project study of fifty-two professional [illegible] were included in Houtkyp [illegible] spent annually on purposeful learning of professional [illegible] to learn plan a formal courses. A mean of 449 hours was [illegible] significantly more hours to their independent efforts [illegible] in formal courses. Findings indicate that nurses spend [illegible] relationship between independent learning and participation [illegible] of Tough's interview schedule. She focused on the completed [illegible] motivated learning activities. Using a modified [illegible] hospital staff nurses in an attempt to review their [illegible] Mott (1977) studied the continuing learning of [illegible] [illegible] [illegible] studied. [illegible] [illegible] [illegible]

Means (1979) collected learning effort data from 41 family physicians as a component of his study on physician information-seeking behaviors. He was primarily interested in determining how sources of information assist family physicians in gaining and using new knowledge and skills. Although his study was not investigating deliberate and purposeful learning, as defined in a learning project, he did utilize a component of the learning project concept in examining how physicians design and conduct their own learning. Means focused primarily on physician information sources rather than deliberate learning efforts, yet his findings have implications with regard to the design and delivery of physicians' continuing education. A number of his findings in the area of learning methods parallel those findings of other learning project studies. That is, physicians rely heavily on printed materials, professional journals and medical texts as major sources of learning. They also use some form of consultation with colleagues to resolve clinical problems.

Means reports two main motives for engaging in learning efforts. Most frequently mentioned was the physician's desire or curiosity to learn more about a particular problem, and second was the desire to be better prepared to meet patients' needs. These findings are also congruent with reported results of other learning project studies, that is, learning projects are undertaken to solve problems and to meet practical and/or vocational needs.

These few studies of learning project efforts by the health professional presents a miniscule picture of the deliberate learning efforts undertaken by these professionals. While the formal CME activities are easily documented, self-directed learning is more difficult to quantify. It seems particularly important for medical educators and designers of continuing education programs to know the extent of self-directed learning project efforts in which physicians engage. One finding, clearly cited from a few learning project studies, suggests that adults want additional help with planning and guiding their learning. This is also likely true for the busy and problem-oriented health professional. However, the issue of planning can only be addressed after additional evidence of physician learning project activity is documented.

The more than 50 learning project studies have paved the way for future pursuits and development of learning project studies within specialized population segments. In 1974, Coolican wrote a report entitled, Self-Planned Learning; Implications for the Future of Adult Education. She broadcasts the universal nature of learning project activity. "It appears the major question is no longer participation vs. nonparticipation. Almost everyone undertakes learning projects to some degree" (Coolican, 1974).

Summary

Self-directed learning is defined as learning which

Summary

involves the individual learner's initiative and responsibility, with or without assistance, to identify, assess and set priorities for learning needs, define goals, select and organize learning activities, and evaluate outcomes in terms of performance (Knowles, 1975).

The importance of self-directed learning has been studied in the general adult population and in the health professions. Several studies illuminate the need for further investigation of self-directed learning in physician education.

Encouragement towards self-directed learning at the continuing medical education level comes from numerous sources. It has been proposed that a process model, based on adult learning research, be substituted for the teacher-directed model of CME. Others urge that learning be problem and experience centered and that physician learners be involved in setting program goals, planning and receiving feedback about their learning progress.

studied in the plane - adult population and in the hexagonal lattice. Several studies stimulate the open area of the

The importance of self-organized learning in the brain

Emergence, Swarm Intelligence and Bio-Inspired Computation

CHAPTER 3

METHODOLOGY

In this chapter the researcher describes the background of the study, the hypothesis development, the population and sample, the instrumentation, data collection and the data analysis procedures.

Background of the Study

Physician learning has primarily been studied in relationship to formal or traditional learning methods. A few studies have investigated physician self-directed learning behaviors.

The emphasis of this study was on general surgeons and family physicians, and the analysis of their participation in learning projects as a form of self-directed learning. The learning project was the concept used to measure and identify intentional and purposeful physician learning.

The distinguishing features between this study on physician learning and other studies include:

1) the focus on learning project participation as a means of categorizing physician learning efforts.

2) the population sampled consisted only of general surgeons and family physicians.

3) the findings describe the frequency and extent of individualized physician learning, cites motivations and planning modes for learning projects.

The specific objectives of this study were:

1) to determine the frequency with which physicians participate in deliberate learning efforts over 12 months.

2) to elicit the motivations for physician learning projects.

3) to investigate the learning content of physician learning projects and report "what" physicians choose to learn about when they engage in learning project.

4) to determine who the primary planner is for physicians' learning projects and report the extent to which they plan their own learning.

5) to describe the resources which physicians used during their learning projects: What sources were used for learning? What methods and situations did physicians seek out towards accomplishing their learning project goals?

6) to investigate physicians' perception of the relationship between learning participation and their behavior: To what degree did this learning project change what he/she does in life or medical practice? How enthusiastic were they about the learning and how much did others benefit?

7) to identify the extent to which credit motivated physicians to participate in learning projects: Would the award of credit affect their choice of what or how many learning projects were undertaken?

Hypotheses Development

The questions addressed in this study will explore the self-directed learning activities of physicians and

specifically the extent to which they use learning projects as a component of their continuing education. The primary purposes are to determine the frequency and amount of learning project participation and to identify the motivations and methods of learning efforts which this group of physicians have chosen to participate in over a twelve month period. It is assumed that physicians do engage in extensive amounts of self-directed and deliberate learning in addition to formalized and traditional learning activities and to informal, non-systematic learning.

The first research question, more fully stated is:

To what extent do family physicians and general surgeons engage in learning projects as part of their learning activity, and to what extent are their patterns similar to or different from general adult populations that have been studied?

The rationale for exploring this question is to identify the amount of individualized, self-directed learning projects which physicians engage in as part of their learning. If physicians spend considerably more time in self-directed learning projects than in traditional, teacher-directed educational activities, then further analysis and decision making might be done about the proportion of resources allocated to CME learning activities. It will be useful to compare the findings of physician self-directed learning

behaviors with those behaviors reported in other adult learning studies. Do physicians, as highly trained professionals, spend the same amount of time or less time in learning projects?

The relevance of this question is that the preferred and most frequent learning activities of physicians have implications for developing, planning and providing CME activities by medical educators. If it bears true that self-directed learning meets physician learning needs effectively, this could have a major impact on the planning and assessment of continuing medical education activities. If new information is gathered regarding the planning sequence of physician learning or about motivations, this could be valuable to medical educators as they assist physicians in their continuing education.

The second research question can be stated as follows:

What motivates and/or triggers family physicians and general surgeons to engage in or initiate self-directed learning activities, and how do they pursue these learning projects?

This second question is an attempt to determine physician motivations for learning and the resources they use in carrying out this learning. Various categories of motivational behavior are assessed for the physicians as a whole, and within each specialty. In this question it is

assumed that the closer the physicians motivations are to meeting his/her immediate personal needs, the more beneficial the learning will be in changing behavior.

The rationale for exploring this question is to determine the reasons why a physician chooses one subject matter over another, and what the motives are for learning a vocational related topic as opposed to a non-vocational one. Also, it would be useful to determine what resources physicians seek out and use in achieving their learning goals. Are journals, books or cassette tapes used most often, and who aids physicians in obtaining these resources?

In terms of implications of this second question, it seems apparent that specific knowledge of physician motivations and triggers for learning would assist planners, librarians and medical educators in understanding physician learning behaviors. The resources physicians cited as important and useful, might aid educators in program planning and development.

On the basis of these assumptions and subsequent reasoning about the importance and effect of learning behaviors, a series of null hypotheses will be presented and tested. They will explore the differential learning behaviors of the two physician specialities, family physicians and general surgeons, and must show a .05 alpha value for significance.

Hypotheses:

H1 There is no significant difference between the number of learning projects of family physicians and the number of projects of general surgeons.

H2 There is no significant difference between the total number of learning project hours of family physicians and hours of general surgeons.

H3 No difference exists between the number of Vocational projects and Other projects which physicians chose to learn about.

H4 No difference exists between family physicians and general surgeons in the number of Vocational projects and Other projects which they choose.

H5 No difference exists between the number of learning projects family physicians and general surgeons choose in each of the three vocational learning content categories.

H6 There is no significant difference between the major learning motivations of family physicians and general surgeons.

H7 There is no difference between the number of learning projects family physicians choose for credit compared to the number general surgeons choose for credit.

Population

The population for this study consisted of family practice and general surgery physicians who practice in one of the five counties surrounding the San Francisco Bay Area. The American Medical Association (AMA), Center for Health Services Research and Development was used as the identifying scale.

Included in this population of family physicians and general surgeons were all current AMA members who self-

identified themselves in one of these two specialities.

General surgeons and family physicians (family physicians will be used synonymously with the terms family practice physician and family practitioner) were selected as the two specialty groups for this study for several specific reasons. First, their practice environments are quite diverse from one another and could offer interesting comparisons and behavioral constrasts. Secondly, the type of information and knowledge these physicians are required to maintain in order to avoid professional obsolescence also differs. Family physicians care for a wide range of patient care problems relating to many health aspects of people. Their treatment mode is generally prescriptive and non-invasive, and they are likely to see the patient over a long period of time and on an on-going basis. This is likely to be a patient-physician relationship over the entire persons life time, or at least the longevity of one's time in that community. General surgeons, on the other hand, tend to practice with a procedural and technical orientation to patient problem-solving. Generally, patients have been referred to the surgeon for the handling of a particular problem upon the advice of another physician. General surgeons are more procedure oriented in their medical care and may have a shorter time-span relationship with the patient. These varying approaches to practice and medical care suggest that physicians from these two specialities would also approach learning differently.

Physicians from five counties around the San Francisco Bay area were chosen in an attempt to secure a representative sample of physicians from both urban and rural areas, from both university and community hospital settings. Access to learning activities and resources may vary depending on one's proximity to a large medical center or the resources available in the community hospital. Traditionally, university and medical school settings have been viewed as more favorable learning environments. However, this has changed dramatically as community hospitals have taken a growing interest in physician education and learning.

While it was difficult to discern completely whether the National Business List addresses were home or office locations, it appeared that most were office addresses given the use of suite numbers and locations in highly commercial areas.

Sample

From the AMA list of 578 a total of 115 general surgery and family practice physicians were randomly selected to receive invitations of participation. The number of physicians invited to participate had to be limited because of the extensive and lenghty nature of the interview and the anticipated time required to analyze the data received. It was determined that 25 - 40 would be the feasible and maximum number of physicians to study.

The physician names were alphabetically listed on

pressure sensitive labels according to specialty, and sorted by county. Each county's pages were numbered consecutively, starting with page one, and each full page contained 48 physician names.

The researcher started at the top of page one, and proceeded in order down the list randomly picking a physician name every five labels. This elicited a twenty percent sample of physicians from each specialty, within each county. The 115 physicians whose names were derived from this selection process were mailed a letter requesting their participation in this learning activity study. (refer to Appendix A) Although the letter was a form letter, it was typed on a Lexitron word processing machine, thereby allowing for personalization of the address and saluation. The letter distinctly appeared as an individually typed letter. Additionally, in an attempt to assure a larger response rate the letter was placed on University of California, San Francisco letterhead and signed by the physician Director of Continuing Medical Education.

Included with the letter of invitation to participate was a response sheet and a return envelop, addressed and stamped. The response sheet (refer to Appendix A) requested a reply and offered two specific responses and one open ended response. It also solicited the phone number of the physician so that follow-up phone calls could be made to either schedule an interview or further discuss the physicians participation in the study.

The invitation to participate was mailed on a Tuesday in anticipation that it would arrive on the physicians desk mid-week (Wednesday or Thursday) and not be received on a busy Monday or a hectic Friday. This strategy was intended to maximize the return rate by having the invitation reach the physician at an optimum time for their favorable consideration.

Thirty-five physicians, a 30% response rate, responded to the invitation to participate by returning a response form. Three physicians had checked the "need more information" section on the form and they were phoned to answer their specific questions. Two of these three agreed to participate once their questions were answered, and one declined to participate when the 1 and 1/2 hour time commitment for an interview was mentioned as a criteria to participate. Two physicians returned the form saying they did not wish to participate in the study. Another form indicated the physician was retired and one physician was deceased. One physician was very elusive and unavailable, thus an interview could never be successfully scheduled. The final number of physicians who completed interviews was twenty nine.

Developing the Interview Protocol

The survey interview used in this study was adapted from the "Interview Schedule of Some Basic Characteristics of Learning Projects in Several Populations". This instrument

was originally developed in September 1969 by Tough and his associates, and has been used to investigate learning project participation in a number of other populations. This version is taken from the fourth revision of the instrument (Tough, 1971) and was revised slightly for the specific purposes of this study.

During the process of development, the instrument was pilot tested with two adult education colleagues and four physicians. This was intended to critically examine the instrument in light of actual interview experience. A few suggestions were made by the physician pilot group regarding the confusing use of educational jargon during the interview. Also, they suggested a critical appraisal of the amount of time used to probe each learning project. Three of the four physician pilot interviews lasted between 1 and 1/2 to 2 hours. This was determined to be too long for one setting, especially if the interview would be conducted during the physician's practice hours. Additionally, constructive suggestions were made regarding the use of more medically related examples on the probe sheets. These suggested changes were made and the final version of the schedule was prepared. (Refer to Appendix B)

The second instrument used in this study was a demographic form to collect information about the physicians age, type of practice, year of graduation from medical school, etc. This would provide common data about factors in the sample which may or may not relate to physician learning

behaviors. (Refer to Appendix B)

One of the major objectives of the interview was to acquaint the physician with the learning project concept. Therefore, the interview process attempted to shatter old stereotyped concepts of learning (i.e. that it only occurs in schools or classroom settings). This objective accounts for the somewhat lenghthy background dialogue by the interviewer at the beginning of the interview.

Only the principal researcher was involved in conducting all the interviews. This researcher had previous experience in conducting interviews. Therefore, no particular interview training was initiated prior to interviews. The researcher reviewed pertinent material related to interviewing techiques, (i.e. the importance of setting a proper climate for interviewing, clarification of definitions to be used, and recording of data) and used the pilot interviews to refine her interviewing skills.

From Tough's (1971) experience with this interview technique it was evident that a very important objective in the development of the interview instrument was the evolution of effective probing questions and techniques. The use of effective probing assured a more thorough interview and increased the likelihood of uncovering as many of the physicians' learning projects as possible in the time allotted. Obviously a major outcome objective of this probing interview was to feret out as many learning projects as physicians were willing to discuss.

The validity of this instrument as a data collection instrument is determined to be valid given its extensive previous use by Tough and others. Over fifty studies have now employed versions of this interview schedule to determine the extent of learning project participation by various populations.

Procedures for Data Collection

The thirty physicians who agreed to participate in this study were phoned to set up an interview appointment. It was stressed in the conversation, which was frequently with the office nurse, that the inteview should be scheduled in a time and place most convenient for the physician. However, one specification was essential that the interview be uninterrupted. Scheduling of interviews was extensively time consuming since it was rare that the researcher spoke with the physician personally, and the nurse had limited authority and flexibility in regards to scheduling.

The data from the interview questions would be hand recorded by the researcher on data collection forms during the interview. These pre-printed worksheet forms (refer to Appendix B) allowed for efficient retreival and interpretation of the data. Some of the interviews were tape recorded with the physicians permission. In other cases the physicians did not want the interview recorded, or the positioning of the recorder inhibited getting a useable recording. In other cases the recorder was inadverently

not taken to the interview. Originally, the tape recording was seen as information back-up if all the interview information could not be collected by hand written notes of the interviewer. In fact, this was not a problem. The physicians spoke at a speed appropriate for writing the necessary information on the data collection forms.

Interviews were conducted over a period of six weeks during November and December, 1982. All but two interviews were conducted in the physician's office, and these two were held in physicians homes.

Data Collection

At the beginning of each interview an effort was made to establish rapport and to create an open and relaxed atmosphere. The physician was assured that all responses and interview information would remain confidential. Following these introductory remarks, the interview began with the researcher saying " My research is about how physicians learn. How they learn in general, but specifically how physicians keep pace with changes in clinical practice, keep up with what's new in medicine, or re-acquaint themselves with things they've forgotten". (refer to Page 1 of the Interview Protocol)

After a brief introduction to the study, the researcher paused to give the physician time to think about their own deliberate learning efforts. Then, repeated oral probes were used in an attempt to urge their thinking about learning

Data Collection

Field Observations Summary

Interviews were conducted over a period of [illegible] during November and December, 1987. All but two [illegible] were audio-taped with the permission of the participants. Notes were taken during the interviews, and were [illegible] after the interviews were completed. [illegible] were transcribed verbatim.

Interview Schedule

The interview schedule was developed to explore the following areas: (1) the respondent's perceptions of the [illegible] in the community; (2) the respondent's perceptions of the [illegible] in the community; (3) the respondent's perceptions of the [illegible] in the community; (4) the respondent's perceptions of the [illegible] in the community; (5) the respondent's perceptions of the [illegible] in the community; (6) the respondent's perceptions of the [illegible] in the community; (7) the respondent's perceptions of the [illegible] in the community; (8) the respondent's perceptions of the [illegible] in the community; (9) the respondent's perceptions of the [illegible] in the community; (10) the respondent's perceptions of the [illegible] in the community; (11) the respondent's perceptions of the [illegible] in the community; (12) the respondent's perceptions of the [illegible] in the community; (13) the respondent's perceptions of the [illegible] in the community; (14) the respondent's perceptions of the [illegible] in the community; (15) the respondent's perceptions of the [illegible] in the community; (16) the respondent's perceptions of the [illegible] in the community; (17) the respondent's perceptions of the [illegible] in the community; (18) the respondent's perceptions of the [illegible] in the community; (19) the respondent's perceptions of the [illegible] in the community; (20) the respondent's perceptions of the [illegible] in the community; (21) the respondent's perceptions of the [illegible] in the community; (22) the respondent's perceptions of the [illegible] in the community; (23) the respondent's perceptions of the [illegible] in the community; (24) the respondent's perceptions of the [illegible] in the community; (25) the respondent's perceptions of the [illegible] in the community; (26) the respondent's perceptions of the [illegible] in the community; (27) the respondent's perceptions of the [illegible] in the community; (28) the respondent's perceptions of the [illegible] in the community; (29) the respondent's perceptions of the [illegible] in the community; (30) the respondent's perceptions of the [illegible] in the community; (31) the respondent's perceptions of the [illegible] in the community; (32) the respondent's perceptions of the [illegible] in the community; (33) the respondent's perceptions of the [illegible] in the community; (34) the respondent's perceptions of the [illegible] in the community; (35) the respondent's perceptions of the [illegible] in the community; (36) the respondent's perceptions of the [illegible] in the community; (37) the respondent's perceptions of the [illegible] in the community; (38) the respondent's perceptions of the [illegible] in the community; (39) the respondent's perceptions of the [illegible] in the community; (40) the respondent's perceptions of the [illegible] in the community; (41) the respondent's perceptions of the [illegible] in the community; (42) the respondent's perceptions of the [illegible] in the community; (43) the respondent's perceptions of the [illegible] in the community; (44) the respondent's perceptions of the [illegible] in the community; (45) the respondent's perceptions of the [illegible] in the community; (46) the respondent's perceptions of the [illegible] in the community; (47) the respondent's perceptions of the [illegible] in the community; (48) the respondent's perceptions of the [illegible] in the community; (49) the respondent's perceptions of the [illegible] in the community; (50) the respondent's perceptions of the [illegible] in the community; (51) the respondent's perceptions of the [illegible] in the community; (52) the respondent's perceptions of the [illegible] in the community; (53) the respondent's perceptions of the [illegible] in the community; (54) the respondent's perceptions of the [illegible] in the community; (55) the respondent's perceptions of the [illegible] in the community; (56) the respondent's perceptions of the [illegible] in the community; (57) the respondent's perceptions of the [illegible] in the community; (58) the respondent's perceptions of the [illegible] in the community; (59) the respondent's perceptions of the [illegible] in the community; 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(90) the respondent's perceptions of the [illegible] in the community; (91) the respondent's perceptions of the [illegible] in the community; (92) the respondent's perceptions of the [illegible] in the community; (93) the respondent's perceptions of the [illegible] in the community; (94) the respondent's perceptions of the [illegible] in the community; (95) the respondent's perceptions of the [illegible] in the community; (96) the respondent's perceptions of the [illegible] in the community; (97) the respondent's perceptions of the [illegible] in the community; (98) the respondent's perceptions of the [illegible] in the community; (99) the respondent's perceptions of the [illegible] in the community; (100) the respondent's perceptions of the [illegible] in the community.

which fit this learning definition.

Most physicians were able to think of at least one or two deliberate learning efforts they had engaged in over the past twelve months, however a few could not. Even with oral probing there came a point when no (or no more) deliberate efforts could be thought of, and at this time the physician was given a written probe sheet. (Refer to Page 1A of the Interview Protocol) The probe sheet contained a random listing of some things which adults choose to learn about and was used as a memory jogging mechanism. It contained both vocationally and non-vocationally related probes. Again, when no more projects could be recalled, the physicians were given another probe sheet which was medically oriented. (Refer to Page 1B) A further probing sheet was given to the physician in the form of a list of some of the ways that adults learn. (Refer to Page 1C of the Interview Protocol)

In the early stages of the interview many of the physicians discounted and gave little emphasis to informal, non-traditional learning activities. They seemed to focus on teacher-directed, group educational experiences in which they had participated. Many equated course attendance with learning and several physicians were eager to show (or tell about) the number of Category I CME hours they had achieved. As the interview progressed, and with the help of probe sheets, physicians were able to recognize and report a wide variety of learning activities which they had not originally considered. Most physicians were eager to talk about their

learning and seemed to surprise themselves at the number of deliberate learning efforts they were able to list. This phenomena of "suprise" was also reported by other researchers who conducted similar interviews (Tough, 1971; Coolican, 1974; Johns, 1973).

In a few cases the researcher felt other learning projects could have been identified if time had permitted. The one hour limit on the appointment posed somewhat of a artificial time constraint. It was necessary to move along in the interview if all the components of the study were to be covered in the time allowed.

Once all learning efforts were identified, the interviewer asked the physician to focus on vocationally related learning and to describe their motivation for pursuing each particular learning project. "Do you remember if there was one specific reason or several reasons that you initiated this learning project?" (Refer to Page 2 of the Interview Protocol) Each medically related project was discussed to identify what spurred the physician to choose this particular subject matter. The procedure was then repeated to gather data on those projects that were not job related. This motivation category was important in that it played a major role in determining whether the learning described could be classified as a learning project. The definition of a learning project requires that the learning be attached to a specific goal, objective or outcome. Some learning was cited which did not meet the criteria to be

considered as a learning project.

Next, the issue of learning methods was explored for each learning project. Physicians were asked to describe how they went about learning within each topic area. What resources or sources did they seek out to accomplish their learning efforts? At this particular point of the interview the interviewer needed to be very alert since physicians often had difficulty responding to this question. Perhaps the self-directed learning methods are so innate and/or natural that they had to be brought to a conscious level for description. Eventually, with probing, the subjects were able to tell how they proceeded in seeking out the sources and/or methods for their learning efforts.

As the interview continued, the concept of a measure of learning time was introduced. Now, focusing on all learning efforts the amount of time in hours was estimated for each effort. This time was to include the planning and preparing for the learning as well as the actual learning itself. These also were difficult estimates for physicians to make, but when pressed by the interviewer they were able to give their best guesses. Some physicians appeared very conscientious in their time determinations while others were more flippant in their responses. A probe sheet assisted in explaining the parameters of the time spent question. (Refer to Page 1D of the Interview Protocol) This component of the interview was also determined to be significant since a time minimum of seven hours had to be devoted to the learning

effort in order for it to meet the learning project criteria. Some learning efforts were cited that did not meet the seven hour minimum, and, therefore, were not counted in the data as a learning project.

The next portion of the interview asked physicians four general questions about each of their learning projects. (Refer to Page 3 and 4 of the Interview Protocol) These questions included:

1) Is the learning project definitely active or not very active? For those projects described as completed, discontinued or spending much less time on it than previously, the project was determined to be not active. Conversely, for those projects which physicians were spending time on and continued to be involved in, the projects were considered active. Definite descriptions of active versus not very active were read to the physician and he/she made a determination about each project.

2) How much knowledge, information and understanding did you gain as a result of each learning project? Physicians were asked to specify the degree to which they perceived they had learned or changed. There were three categories of response for each learning project. a) learned a large amount, b) learned a moderate amount, c) learned a little. This was not a seemingly difficult question for physicians to respond to. Obviously, each physician determined for themselves the definition of large versus moderate versus little. The

unspecificity of these responses limit their validity, however a general indicator of the amount of learning was the objective here.

3) How enthusiastic are you about having this new knowledge and/or skill? Again, three choices were given: a) very enthusiastic, b) quite enthusiastic, c) not especially enthusiastic.

4) Who benefits from this learning? Specifically, to what extent did the knowledge and skill you gained provide some benefit to people other than yourself? The three response options were: a) large extent, b) medium extent, c) small extent.

These four questions purposed to explore physicians self-perceptions about learning efforts. There are limitations of generalizability of the responses given the lack of definition in the answer choices. However, the general indicators from physicians about their own view of their learning offers some interesting and potentially useful questions for further research.

Continuing on with the interview, physicians were asked to categorize each learning project as a credit or non-credit project. Physicians were asked what part, if any, of their motivation for beginnng the learning project was related to the achievement of credit. When 50% or more of the total motivation was to recieve credit toward a certificate,

diploma or degree the learning project was classified as a credit project. (Refer to Page 3 of the Interview Schedule)

The last section of the interview related to the planner component of each learning project. Physicians were first asked to identify the planner (person, group, or object which made the day-to-day decisions regarding what and how the physician learned) for each learning project. Secondly, the physician categorized the planner into one of four categories. These categories were a) self, b) one-to-one, c) object, d) group. These categories were described on a probe sheet which was handed to each physician during this question. (Refer to Page 1E of the Interview Protocol)

In a few cases the end of the interview became interrupted and rushed. Either a planned phone buzzer would sound or an office staff person would knock on the office door to inform the physician of problems or his next appointment. In only three interviews were interruptions made during the interview and these were slight. In one instance no learning project could be culled from the discussion and so the interview protocol was not followed to completion, as there were no projects to relate the later part of the interview questions to.

At the conclusion of the interview physicians were thanked and informed that a summary of the studies findings would be mailed to them upon request. The average interview lasted 61 minutes, and the range was 55 to 90 minutes. Following the interview the researcher reviewed the interview

[illegible]

[illegible]

[illegible]

notes to clarify what had been reported and recorded. The findings were then tabulated and recorded for further analysis.

Analyzing the Data

This study was an exploratory-descriptive study in that it attempted to explore general parameters of learning efforts as well as to identify significant relationships and differences between specific variables. The study will provide findings that can enlighten medical educators and researchers about the frequency and characteristics of physicians' learning projects as well as offer statistical comparisons between the two specialty groups.

The survey instrument was designed to gather empirical information which could be used to explain physician learning project activities. For the purpose of this study, the analysis included the use of descriptive narrative reporting, two statistical tests, and frequency and percentage distributions.

Statistical tests were calculated for six of the major study variables that were being investigated. The remainder of the variables were felt to be adequately analyzed through narrative descriptions and percentage distribution tables.

T-Tests and chi-square contingency procedures are the statistical tests utilized. These techniques provide measures of frequency, statistical significance, variance accounted for, and contrasts between the two specialty

groups. These statistical procedures were chosen because they allowed for the analysis of the relationship between the two specialty groups on several parameters, and because they present the data in frequency tabulations and percentages which are used to measure response trends. An alpha of .05 will be the level of significance for all the hypotheses.

Summary

In this chapter the methodology used to investigate physician learning project participation was presented. This study is an outgrowth of previous self-directed learning project studies by Tough (1971) and investigations of non-traditional physician learning by Richards (1979). The focus is on the physicians' participation in deliberate learning efforts.

The measures used in this study are quantatative in nature. The analysis of the data is both descriptive and inferential in that it attempts to identify relationships and differences between learning project participation for the two specialty groups. Statistical tests include T-tests and chi-squared contingency procedures.

Summary

CHAPTER 4

RESEARCH FINDINGS

Introduction

This chapter will present the findings of the learning project study. These summary findings will be presented both descriptively and statistically. The research hypotheses, will be presented within the text of the findings, as appropriate. A total of eight sections are included in this chapter and each section reviews specific findings.

The first section contains descriptive data on family physicians and general surgeons who participated in this study. A descriptive profile of the participating physicians offers baseline characteristics of the physicians and their medical practice.

The second section examines the extent of learning participation of the twenty-nine physician learners. This presents the frequency of participation, both in terms of the number of learning projects reported and the number of hours physicians participated. This is done collectively for both physician specialties as well as separately in order to provide a comparative review of participation for each specialty.

The learning content of physician learning projects will be examined and reported in the third section. The focus of

this section is to explore the extent of physician learning within each learning orientation group and to classify the content of physician learning. In this respect projects are reviewed from two perspectives. First they are categorized according to general categories: 1) projects of a vocational nature and 2) those with a non-vocational relationship to the physicians life. Secondly, learning content is examined via learner orientation groups.

Fourth, learning motivators, or the "why" of learning is reviewed. The emphasis is to dissect physician learning project participation in relationship to their learning motivation(s). That is, describing the triggers or critical incidents which motivated physicians to choose a specific learning activity. Like the learning content data these learning motivation responses are also classified according to the learning orientation groups.

The fifth section will examine the numerous subject matter sources cited in physician learning projects. Subject matter sources refer to the resource(s), methods and situations which physicians sought out, encountered and used in their search for information and knowledge to accomplish their learning goals.

Likewise, the sixth section also deals with the subject matter from a different perspective. This section will summarize and review physician responses to four general questions in the affective domain, and are an attempt towards eliciting physicians' perception of their learning

participation. This section looks at the possible relationship between expressed learner enthusiasm and outcome benefit from intentional learning activities.

The seventh section reviews physician learning participation in relationship to the desire for credit. To what extent is the wish for credit a motivator in the learning projects cited? An effort is made to determine any variance by specialty of this credit issue. Additionally, learning project hours are evaluated in relationship to credit and non-credit projects.

Lastly, the learning planner is discussed. Physicians identified the learning planner(s) for each of their learning projects. This section examines the role of the planner and who it is that physicians cite as principally responsible for planning learning projects. Planners are looked at both collectively by planner type and separately by specialty. They are also reviewed with respect to credit and non-credit learning projects.

Physician Characteristics

The twenty-nine family physicians and general surgeons who participated in this study each have unique personal and practice characteristics which are important to consider in light of this study on learning behaviors. This section describes some of these characteristics. A profile of the physician is presented with regard to: 1) medical education,

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2) average hours of work per week, 3) age, and 4) type of practice arrangement. The specific questions which physicians responded to are shown in Appendix B.

The age variance of physicians who participated in the study was in a range from 35 to 69. The majority of the respondents, 65%, were forty-six years of age or older, while only 3% were thirty-five or younger. The average age of physicians who participated was fifty-two years old. Table 1 shows a summary of physicians age.

TABLE 1

LEARNING PROJECT PARTICIPANTS
PHYSICIANS BY AGE

AGE GROUP	NUMBER	PERCENTAGE
35 or younger	1	3%
36-45	9	31%
46-55	7	24%
56-65	8	27%
66 or older	4	14%

Seventeen (59%) physicians graduated from medical school between 1941 and 1961 with only 17% graduating in 1971 or later. The range of years for graduation from medical school was 1941 to 1977.

Physicians were asked to recall the approximate number of hours they spend in practice each week and the majority reported between 41 and 60 hours. 17% of physicians spent 61 or more hours in practice. The range of hours spent in

practice was 20 to 100 hours per week. Table 2 shows the range of hours physicians reported.

TABLE 2

APPROXIMATE NUMBER OF HOURS IN MEDICAL PRACTICE / PER WEEK

Number of Hours	Number of Physicians	Percentage
20 - 40	6	21%
41 - 60	18	62%
61 - 80	4	14%
81 or above	1	3%

Another issue that is likely to have an impact on learning opportunities, either for time off or interaction with colleagues, is the practice arrangement. Physicians were asked to describe their practice arrangement. A large number (55%) of physicians who participated in this study were in individual or solo practice. 31% were in a group practice of four or more partners, and 14% were in groups of four or fewer.

Four other general questions were asked of physicians regarding their learning. With the coming of the computer age and the potential to facilitate learning via computer applications, physicians were polled to determine their current use, if any, and their potential use of computer educational applications. 52% said they were unsure whether they would use the computer for CME applications. 31% responded with yes, and 17% said no they would not use a computer for learning.

In terms of current ownership of a computer, the majority (59%) do not own a computer at home or in the office. 17% owned one for home use, 14% for practice and 3% in both home and the practice.

The question regarding mandatory CME and its effect on CME course attendance provided interesting results. Physicians were asked to determine how they might change their behaviors if this mandate was reversed. 69% said it would make no difference, that they would attend the same number of courses. 14% said they would attend more and 10% would do fewer. 7% were unsure of the effects of repealed mandatory CME.

Lastly, the question of physicians' perception of learning was answered. The results indicate overwhelmingly that continued learning most certainly affects the way physicians care for patients. 97% said "yes" learning changed their care of patients and 3% said it changed care "somewhat".

Learning Project Participation

Physicians were asked to describe their deliberate learning efforts. These efforts were determined to meet the learning project criteria or not. This section describes the learning which was categorized as learning projects.

These summary findings comprise the basic database towards answering one of the major questions which this study was designed to investigate. The question, relevant to this section on learning participation, is phrased in two parts:

1) To what extent did the sixteen general surgeons and the thirteen family physicians participate in intentional learning projects? This refers to both the number of hours and the number of projects.

2) What was the range of time and duration spent in these learning projects and what were the average amounts of time allocated to the learning projects for the twenty-nine physicians interviewed?

Collectively, the twenty-nine subjects engaged in 190 learning projects over the twelve month period as is indicated in Table 3.

TABLE 3

LEARNING PROJECT PARTICIPATION
NUMBER OF LEARNING PROJECTS

	TOTAL PROJECTS	MEAN # OF PROJECTS
FAMILY PHYSICIANS	99 (52%)	7.6
GENERAL SURGEONS	91 (48%)	5.7
TOTALS	190	6.5

T-tests were conducted to compare the relationship of learning project participation for family physicians and general surgeons. It was hypothesized that no significant difference exists betwen learning project participation of these two specialty groups.

H1 There is no significant difference between the number of learning projects of family physicians and the number of projects of general surgeons.

No statistical difference was found and hypothesis 1 was retained. ($t=1.89$, $df=27$, $p > .05$) While no statistical difference was found at .05 there is a trend (significant at .10) showing that family physicians in this study did participate in significantly more learning projects than general surgeons.

Individually physicians reported a wide variance in the number of projects which they participated in. The initial overall look at physician participation in learning project activity was evaluated by reviewing the number of learning projects for each physician. This was tabulated as to the frequency with which each individual physician reported the same number of projects. These compiled results are shown in Table 4.

TABLE 4

NUMBER OF PHYSICIAN LEARNING PROJECTS

# OF PROJECTS	# OF PHYSICIANS	# OF PROJECTS	# OF PHYSICIANS
0	1	8	4
1	1	9	4
2	1	10	2
3	3	11	0
4	3	12	0
5	2	13	1
6	3	14	0
7	3	15	1

The range of learning projects which physicians reported was 0 to 15. Only one physician failed to meet the criteria established for a learning project. Thus it was determined that he had not participated in a learning project during the past twelve month period. In most interviews learning project discussion continued frantically for the entire visit and after 55 to 90 minutes the interview was terminated, more because of time constraints rather than a lack of learning projects to discuss. If time had permitted, it is believed that most physicians would have identified additional learning projects.

This data indicates that a considerable amount of self-directed, intentional learning was carried out by these physicians, and that there is a wide variance in the number of learning projects each physician pursued.

Certainly, the complete extent of learning participation is not known until the measurement of time is also examined.

The hours spent in learning projects were self-reported based on the physician's recollection. Physicians were asked to estimate the number of hours they believed they spent learning about a particular subject matter.

The hours spent by each individual physician in their learning project participation was calculated. Table 5 describes the total and mean number of hours for each specialty.

TABLE 5

TOTAL HOURS OF LEARNING PROJECT PARTICIPATION

	TOTAL	MEAN
FAMILY PHYSICIANS	2150 (41%)	165
GENERAL SURGEONS	3105 (59%)	194
TOTAL HOURS	5255	181

General surgeons spent nearly 20% more time (59%) than family physicians (41%) on learning projects, even though surgeons had a fewer number of projects. The average number of hours spent on learning projects varied considerably for these two groups. General surgeons expressed more intensity in their learning project involvement, that is, they appeared to seek more depth or perfection from their learning. This may account for the greater number of hours spent by general surgeons.

Statistical tests were computed to test hypothesis 2.

H2 There is no significant difference between the total number of learning project hours of family physicians and hours of general surgeons.

T-tests were used to determine if there was a significant difference between the number of hours family physicians spent in learning as compared to the hours of general surgeons. Hypothesis 2 was retained as there was no significant difference when comparing learning project hours for these two specialty groups. ($t=.52$, $df=27$, $p > .05$)

In addition, the frequency with which physicians were alike or different from other physicians, in terms of hours spent, is shown in Table 6. Hours are represented by a block of 50 hours.

TABLE 6

HOURLY COMPARISON OF LEARNING PROJECTS BY SPECIALTY

# OF HOURS	# OF PHYSICIANS	# OF HOURS	# OF PHYSICIANS
0 - 50	3	250-300	0
50 -100	6	300-350	2
100 -150	6	350-400	2
150 -200	6	400-450	1
200 - 250	2	600-650	0
		700-750	1

In an overall look at hours of participation it is evident that most physicians (62%) participated in learning projects consisting of between 50 and 200 hours.

Only three physicians had participated for less than 50 hours and only one had more than 650 hours.

The average number of hours spent on learning projects varied considerably among the two specialty groups studied. Family physicians averaged 165 hours per learning project and general surgeons averaged 194 hours per project.

The physician who had the largest number of learning project hours also reported a slightly larger number of projects than most physicians. He reported 667 hours for his 9 learning projects, and participating in 9 projects puts him 2.5 above the average number of projects for this sample.

The second highest and third highest number of hours reported were 420 and 397 hours respectively, with 8 and 7 learning projects identified. Again, it is worthwhile to note that those physicians reporting the largest participant hours are all general surgeons. The largest number of hours reported by a family physician was 329 hours, also for 9 projects.

Learning Project Length

Additionally, in the area of participation, the length of an individual's learning project was further analyzed. Learning project length is defined, for the purpose of this review, to be the total number of hours physicians were engaged in intentional learning during this twelve month period. Certainly some of the learning projects may have been of an ongoing nature, that is, started or continued

Project

Each [illegible] was [illegible] Jay Bowers [illegible]

[illegible] Bowers [illegible] Jay Bowers [illegible]

[illegible] Bowers [illegible] Jay Bowers [illegible]

[illegible] Bowers

outside of this 12 month period. However, for the purpose of consistency and to stay within the designated 12 month time frame, these hours are not included in these findings.

In an attempt to review learning project participation from several angles, this analysis will look at both the projects themselves and the specialty classification of physicians participating in projects, with regard to project length.

First, let us examine the projects themselves. For the purpose of calculating a mean, the length of each individual project was recorded at straight hour value and the mean was computed by dividing the total number of hours by the total number of projects.

The total hours spent in learning projects was 5255 for the 190 learning projects of the 29 physicians. Therefore, the average learning project was 27.7 hours in length. A further breakdown by specialty reveals that for family physicians the mean length was 22 hours as compared to a mean of 34 hours for general suregons. Table 7 shows the distribution of project length in hours for the total 190 projects, as well as a dissection of project length by specialty.

TABLE 7

LENGTH OF LEARNING PROJECTS - IN HOURS

LENGTH OF LEARNING PROJECT HOURS	GENERAL SURGERY	FAMILY PRACTICE
0-25	58	72
26-50	23	24
51-75	4	2
76-100	2	-
101-125	-	1
126-150	-	-
151-175	-	-
176-200	3	-
201-225	-	-
226-325	1	-

More than 93% of the projects were 50 hours or less in length, and 68% of the projects were less than 25 hours. A closer look at specialty reveals that 89% of the General Surgery projects were less than 50 hours, while 96% of Family Practice projects were 50 hours or less. The longest time spent on one individual project was 300 hours and the least number of hours spent on one project was seven hours.

The extent of learning participation was also reviewed by focusing on the mean length of learning project time for each individual physician. The average length was computed by dividing total learning project hours into the number of learning projects reported by each physician. In this analysis the length differential between family practice and general surgery physicians is very minimal. The distribution of these means are illustrated in Table 8.

TABLE 8

MEAN LENGTH OF LEARNING PROJECTS
(IN HOURS)

MEAN LENGTH OF LEARNING PROJECTS	GENERAL SURGERY	FAMILY PRACTICE
0-15	3	1
15-30	8	11
31-45	1	1
46-60	3	-
61-75	1	-

As illustrated, 23 physicians (79%) reported learning projects averaging less than 30 hours in length. Other mean lengths point out the wide variance in the amount of learning time physicians reported. General surgeon means were somewhat more diverse than family physicians. 68% of general surgeons averaged 30 hours or less while 92% of family physicians averaged 30 hours or less. Obviously, learning project lengths varied widely among this sample of physicians.

The first way of reviewing the learning project length (dividing total hours by total projects) revealed a 27.7 mean that was not substantially different from the 25.6 mean arrived at when the mean length of individual projects were calculated.

Summary

This section reviewed the results of learning project participation of the 29 physicians who were studied.

Participation was measured in two ways and included:

1) the total reported number of physician learning projects and the variance for the two specialities.

2) the hours physicians spent in learning projects - the totals, means and variance for both specialities.

The analysis of findings indicate that physicians in this sample spent a tremendously large amount of time in intentional learning. There were 190 learning projects identified for an average of 6.5 projects per physician. Family physicians reported slightly more (52%) learning projects than did general surgeons (48%), although there was no significant difference evident.

The hours physicians spent in learning projects averaged 181 hours overall, with general surgeons reporting a mean of 194 hours per project and family physicians with a mean of 165 hours. General surgeons reported a larger number of hours while initiating a fewer number of projects.

When projects are looked at individually each learning project averaged 27.7 hours in length. This also varied by specialty in that the family physician mean was 22 hours and general surgeons reported a mean of 34 hours.

Overall, the findings illustrate that these physicians participated in large amounts of intentional self-directed learning activities.

Learning Content

This section examines the learning content of physician learning projects. These findings comprise a major and important component of this study's findings since "what" physicians choose to learn about is as significant as "why" and "how much" learning is accomplished.

Following the interviews each intentional learning experience, which the physician had reported and which met the learning project criteria, was evaluated according to its learning content. Learning projects, identified in this study, were categorized in relationship to the learners intention and learning motivation rather than by specific learning content. Therefore, in the process of classifying learning projects no subject or content restrictions were imposed. That is, when a learning activity met the basic definition criteria for a learning project it was counted as a learning project regardless of the topic or learning content. Since this study seeks to identify the amount and type of physicians' intentional learning, physicians were asked to recall any and all intentional learning activities they had participated in over the past 12 months, regardless of whether it related to their job, family, hobbies, recreation, religion, personal development or any other area of their life.

In other studies focusing on learning projects authors have reported subject matter findings according to specific

topic classifications. Many have classified according to Johnstone and Rivera's (1965) subject matter categories. However, the nine categories identified by Johnstone and Rivera (vocational, hobbies and recreation, current events, home & family life, personal development, academic and general education, religious, farming, and miscellaneous) did not appropriately classify the learning content areas cited in this study.

Consequently, for the purpose of reviewing this study's results, learning projects were analyzed in two general ways. First, the projects were categorized ad hoc in a tri-part scale resembling the model Houle developed (1972) for classifying learner orientations. Specifically, these groups duplicate the categories Penland (1977) used to study self-planned learning content. The three categories (hereafter known as Learning Orientations) to which learning projects were assigned for analysis include:

1) Formal topics - those with a knowledge orientation

2) Practical topics - those with a problem solving orientation

3) Intra-self topics - those with a personal development orientation.

The process used for assigning learning projects to one of the learning orientation categories is explained below. Secondly, they were classified according to whether or not the learning project was vocational or non-vocational,

hereafter known as other. The specific definitions for vocational and other projects will be given later in this chapter.

Learning Orientations

The learning orientations are used as a way to classify and group the learning content of physicians' learning projects. They are each described in detail and data findings for each category are included.

Formal Topics

Formal topics are those projects wherein the learning intention is specifically to gain more or new knowledge about a particular subject. Generally, each learning experience in this category is driven by a "desire to know" or the "itch to learn". These learning projects were described as either an intention to acquire general knowledge or some specific information about a subject. Projects were classified as formal when the physician expressed their learning purpose as the need to acquire information in order to feel more competent in a specific subject matter. These projects included both very specific patient care learning and non-vocational, general interest learning. This category seemed to capture the "intellectual curosity" component of a physicians learning style.

An example of a formal project would be the physician who said she wanted to learn more about the diagnosis of

Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at https://www.iso.org/obp
- IEC Electropedia: available at https://www.electropedia.org/

depression in women. She was invited to give a talk/workshop at a community college and this restimulated her interest, as this topic had long been a general concern and interest of hers. So she began a learning project on the issue.

Practical Topics

Practical topics are those learning projects which physicians selected for the purpose of solving a particular problem in their life. When the learning intention was cited as primarily and foremost problem solving, the learning project was classified as practical. Practical learning topics are generally those sought to accomplish fairly clear-cut objectives or to solve a specific problem confronting the physician. Learning projects in this category are more likely to begin with the conscious realization that a learning need exists, or that a specific interest has been identified. Additionally, the learner is mindful of the usefulness of the learning outcome. This was especially true in the vocational realm where practical topics were sought to assist the physician in treating patients more competently and confidently. These were projects for which the physicians identified the learning content they needed in relationship to an immediate problem they desired to solve.

One physician described his need to learn about heart irregularities. He was concerned about a patient he was following and was desirous of confirming the correctness of the patient treatment he had selected.

Intra-Self Topics

The third category, Intra-self topics, are learning projects of a personal development nature. Personal development is considered to be those things which enhance and affirm the personal growth of physicians, either vocational or other. These learning projects were generally more difficult to classify since the learning intentions tended to be less dramatic and were often clouded and combined with several outcome purposes. Frequently the reasons cited for chosing intra-self learning content were only partially related to the learning content. An example will clarify the intra-self topic area.

One physician said he set out to learn how to be a better tennis player. He was interested in improving his game so he would not make the same silly mistakes each game.

Learning projects which fell into this category generally included several different intentions for the learning content and frequently included the search of a social milieu.

In assigning the learning project to one of these learning orientation categories, the main criteria used was function or purpose specific. The learning content of each learning project was closely evaluated in relationship to the purpose for learning. In other words, what the learner cited as their primary reason for initiating the learning activity was used as the catalyst for classification. For example, if

Overall, the practical learning orientation category - that with a problem solving orientation - was the predominate one cited by physicians in this sample. The formal and intra-self categories were less noteworthy in relationship to overall learning activity. Formal topics, those with a knowledge orientation, were cited second in occurance to practical topics and just slightly more often than intra-self learning projects.

The excessive amounts of learning activity in practical learning projects portrays the tendency of these physicians to select intentional learning activities related to problem solving and their vocational interests. These findings are congruent with other studies in adult education which report that the major impetus for continuing learning is to solve problems facing the learner (Houle, 1980; Tough, 1971; McCatty, 1973).

The second largest number of learning projects fell in the formal area of learning orientations. These projects, associated with knowledge acquisition, comprised 19% of the total learning projects in this sample. The content of formal learning projects, as described by most physicians, was seen as most compatible with their "natural curiosity" for learning. For the most part formal topics were primarily related to vocational learning. Physicians frequently said, I just wanted to know; I was curious about; I couldn't figure it out; I wonder why?".

The intra-self topic area, those learning activities

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The intra-self topic area, those learning activities

with a personal development orientation, was the smallest in number and comprised 13% of the total learning project activities for this physician sample. This may reflect the fact that talking about personal development learning activities with a stranger during a short interview session is less comfortable than discussing work and/or medicine. The interviewer felt that in those interviews where personal rapport was easily and quickly established there was more of a willingness to share learning efforts in this intra-self category. Also, given that most all interviews took place in the professional environment, physicians were more prone to recall and discuss learning efforts related to their profession.

One question which seemed pertinent was whether there was any relationship between the physician specialty and the extent of learning participation in a particular learning orientation category. Both groups of physicians showed a surprisingly large amount of participation in practial problem solving projects. There was a slight variance by specialty as is evident in Tables 10 and 11.

TABLE 10

GENERAL SURGERY

NUMBER AND PERCENTAGE OF LEARNING PROJECTS IN 3 LEARNING ORIENTATIONS

TOPIC AREA	NUMBER OF LEARNING PROJECTS	PERCENT OF LEARNING PROJECTS
FORMAL	16	17%
PRACTICAL	65	72%
INTRA-SELF	10	11%
	91	100%

TABLE 11

FAMILY PRACTICE

NUMBER AND PERCENTAGE OF LEARNING PROJECTS IN 3 LEARNING ORIENTATIONS

TOPIC AREA	NUMBER OF LEARNING PROJECTS	PERCENT OF LEARNING PROJECTS
FORMAL	21	21%
PRACTICAL	64	65%
INTRA-SELF	14	14%
	99	100%

In further review of these findings it is evident that family physicians had slightly fewer projects in the practical area than did general surgeons. Conversely, family physicians exhibited more learning activities in both the formal and intra-self orientations than did general surgeons.

In all of the learning orientation categories, the percent variance was minimal. The practical learning orientation category contained the most variance (7%) between specialties. While the significance of this variance was not calculated statistically, it is obvious that both groups of physicians in this study engage in large amounts of practical learning projects. In the remainder of this section the two general categories of learning projects, vocational and other will be reviewed in relationship to learning content.

Categories of Learning Participation

The two categories of participation are labeled vocational and other. Vocational projects were those determined to be job related or in some manner connected to the physicians' practice of medicine. All projects for which the physician cited his/her learning motivation as affecting medical knowledge, skill or behavior were categorized as vocational. The second category, other, included all learning projects not related to the physicians acquisition of medical knowledge, skill or clinical behavior change. Table 12 illustrates the extent of participation for both categories.

TABLE 12

LEARNING PROJECT PARTICIPATION
VOCATIONAL AND OTHER

	VOCATIONAL	OTHER	TOTALS
FAMILY PHYSICIANS	66(67%)	33(33%)	99
GENERAL SURGEONS	76(84%)	15(16%)	91
TOTALS	142(75%)	48(25%)	190

Three-fourths of the learning projects reported dealt with vocational learning for the group of physicians as a whole. The large emphasis on vocational projects (75%) is significant within this sample.

T-test calculations revealed a statistically significant relationship between the number of vocational projects and other projects which physicians chose. ($t=5.3$, $df=28$, $p < .001$)

H3 No difference exists between the number of vocational projects and other projects which all physicians choose to learn about.

Hypothesis three was not retained. Physicians in this study were more likely to participate in vocational projects than in non-vocational.

Participation by Specialty

In reviewing these findings by specialty, the largest number of vocational projects were reported by general surgeons. They reported nearly 20% more vocational related learning than did family physicians. Conversely, family

physicians reported more than twice as much learning participation in the other category than did general surgeons.

Overall, these two specialities exhibit quite diverse responses to learning activity choices. Chi-squared tests were employed to calculate the relationship between family physicians and general surgeons in their choice of vocational and other learning projects.

> H4 No difference exists between family physicians and general surgeons in the number of vocational projects and other projects which they choose.

There was a statistical difference between the number of vocational or other learning projects which family physicians and general surgeons choose ($x2=6.26$, $df=1$, $p<.05$) and the hypothesis was not retained.

Vocational Projects

The vocational category refers to learning projects where the learning content focused on knowledge and/or skills for application in the professional practice of medicine and care of patients. Some business skills and business knowledge were determined to be vocational, depending on the significance and relationship to patient care. Basically, vocational learning projects related directly to physicians care of patients and their day-to-day work in the practice of medicine. The determination of whether a learning project

was in the vocational or other category, evolved from reasons the physician cited for initiating learning. When the learning related to some aspect of the business or profession of medicine it was classified as vocational.

One-hundred forty-two of the learning projects identified in this study were determined to be vocational in origin. This is 75% of the total learning projects. Several physicians (38%) cited only vocational related learning projects, and no intentional learning activity in the non-vocational areas. Conversely, only one physician, a general surgeon cited no vocational projects. (He has been retired from medical practice for eight months). Of major significance is the fact that 17 physicians, 59% indicate participation in one or no learning projects in the other category.

Vocational Project Classifications

The vocational learning projects of physicians were classified into three major sub-groups with regard to what knowledge or skill physicians sought through these learning projects. These sub-groups are: 1) learning updates, 2) focused learning, and 3) special interest learning. These classifications include attention to both the specificity of learning content and the generality of learning applications.

Learning projects were classified into one of these three groups as a result of "what" the physician choose to learn about. However, it is important to note that the

classifications were also partially determined with regard to "why" the physician chose a particular subject matter. For example, if a physician chose to learn about new antibiotics, this project would be put into one of the sub-groups according to: 1) what was the intended application of learning? 2) why was he/she learning about antibiotics? 3) was their immediacy for the learning?

Learning Updates

The Learning Update sub-group was the largest group, both in number of learning projects undertaken as well as the number of hours spent. Learning projects in this sub-group were generally of a review nature, a re-introduction or update in an area of medical information the physician previously had exposure to or interest in. Learning updates resulted from the physicians' desire to become competent or in something he/she had known at one time, or that which had been only partially pursued at an earlier time in training. This type of learning was typically more than just a brief overview of facts about "what's new", rather it was a more comprehensive and in-depth exposure to a particular area of medicine. This group of learning projects tended to include more general learning information than the other two groups and most often built on the physicians previous knowledge or information about the subject. Also, these projects were ancillary to other learning interests and not as immediate in nature as the focused learning sub-group.

Learning updates were more likely to have learning outcomes the most clearly defined and were more structured in their learning methods. This type of learning project, though inclusive of several complex motivating factors, served the physicians' needs for a "desire to know" and their general interest for more knowledge. Learning of this type is associated with one's generic pleasure for learning, with challenging the intellect and remaining in command of one's learning skills.

An example of a learning update project is the physician who mentioned his desire to learn about sports medicine. He worked as team coach for the local high school teams and just had a special personal interest for sports medicine.

Learning update projects included 42% of the total learning projects reported and 41% of the learning project hours. (Refer to Table 13 and 14)

Focused Learning

The second vocational sub-group was the Focused Learning group. Focused learning refers to the subject matter physicians sought for the purpose of acquiring specific medical information and skills. Projects in this group were generally focused towards a specific purpose, and often included the expedient review of current information in a particular area of medicine.

Focused learning was the second most frequently mentioned subject matter in this sample of physicians. The

indications for this are partially answered by the fact that information changes or is updated very rapidly in medicine, thus there is an overwhelming amount of information for physicians' to continually recycle. It is not uncommon for a patient problem to present only once every few hundred patients, thus there is a need to become reacquainted with certain medical material. As medicine continues to be specialized, physicians seek more consults and the need arises to competently interpret and respond to consultation results. Medical media also pushes physicians to "be informed" in every medical area possible. As a result, focused learning met physicians needs to reach personal and social goals within their vocational realm. It complemented their desire to gain knowledge or skills in order to be a contributing member of society.

Most often focused learning was motivated by a physicians' desire to solve an immediate patient care problem. Generally, once this patient problem was handled the learning project became inactive and was finished. However, the application of this knowledge was likely of an ongoing nature, useful and applicable on many occasions throughout the physicians day to day practice.

An example of a focused learning projects was cited by the physicians who wanted to learn more about low back pain. He said many of his patients had this complaint and he'd like to know if he was doing everything to help them. He feels it relates to his long term interest in neurology.

Thirty-seven percent of the learning projects documented from this physician sample were in the focused learning area. (Refer to Table 13) For family physicians this sub-group contained the largest number of hours spent and for general surgeons it was the smallest number of hours spent. (Refer to Table 14)

Special Interest Group

The third sub-group within vocational learning content is the special interest group. Special interest learning included more universal learning content and most often were learning activities not directly related to patient care. This learning content frequently dealt with subject matter that physicians had little or no previous knowledge of. In most cases physicians felt a need to learn or understand this subject matter because of a task(s) being encountered, because it was seen to be in their best personal or business interest, or because of a crisis they had encountered.

Learning projects in this area were often general in subject matter content with the learning outcome being somewhat vague and lacking in specificity. These were usually not updates, but complete new areas of learning, and although they impacted the physicians practice of medicine, the impact was of a less direct nature.

These learning projects did not have the same extent of universal application to the medical practice as learning in the other two groups did. In many cases a change of job,

personal responsibility, appointment to a medical/hospital committee, or new technology in the field were the impetus for these learning activities. These learning projects appealed to the physicians desire to take part in personal and or professional sociality needs. This includes the desire to participate in an activity/situation because it is enjoyable for its own sake and perhaps because it serves the profession. Learning activities in this sub-group appealed to the physicians desire to explore new areas of interest or study in their vocation. Specifically, it served their desire to move out of an activity or situation which was or was becoming monotonous, unpleasant or tedious.

One physician described his desire to learn more about quality assurance in hospitals. He felt it was an important aspect towards assuring physician competency, and alsoh he had just been appointed to the QA committee of his hospital.

Special interest projects were third in occurance for the total overall number of projects, however second with regard to the number of hours spent in learning projects.

TABLE 13

LEARNING CONTENT/VOCATIONAL
NUMBER OF LEARNING PROJECTS IN 3 SUB-GROUP

	FAMILY PHYSICIANS	GENERAL SURGEONS	% OF TOTAL PROJECTS
LEARNING UPDATES	26 (18%)	34 (24%)	60 (42%)
FOCUSED LEARNING	33 (23%)	20 (14%)	53 (37%)
SPECIAL INTEREST	7 (5%)	22 (15%)	29 (20%)
			142

TABLE 14

LEARNING CONTENT/VOCATIONAL
NUMBER OF HOURS IN 3 SUB-GROUPS

	FAMILY PHYSICIANS	GENERAL SURGEONS	% OF TOTAL HOURS
LEARNING UPDATES	496 (36%)	1153 (44%)	1649 (41%)
FOCUSED LEARNING	539 (39%)	381 (15%)	920 (23%)
SPECIAL INTEREST	339 (25%)	1079 (41%)	1418 (36%)
			3987

These findings regarding learning content specifics of physicians vocational learning projects were statistically evaluated and hypothesis 5 was tested.

> H5 No difference exists between the number of learning projects family physicians and general surgeons choose in each of the three vocational learning content categories.

The findings varied significantly for the two specialties and the hypothesis was not retained. ($x2=8.52$, $df=2$, $p<.05$)

Other Learning Projects

The Other category refers to learning projects in which the learning content is not specifically related to the primary professional affiliation and generally not related to the practice of medicine. Other learning projects were those learning activities physicians described in personal

development, hobbies, recreation, current events, home and family life, community service, physical fitness, etc. As mentioned earlier in the section, projects were classified as either vocational or other depending on the reasons physicians cited for initiating the learning project.

The six sub-groups which these other projects were classified into included learning activities related to 1) physical fitness, 2) hobbies, recreation and entertainment, 3) personal development, 4)community/professional sociability, 5) financial management and 6) general interest. Each of these sub-groups will be described briefly.

Physical fitness projects were those which physicians sought in order to be in better physical shape, stay healthy and take care of themselves. In two cases physicians indicated that learning from this project had spilled over into their medical practice since they were urging patients to pay attention to preventive health, as they were now doing.

Hobbies, recreation and entertainment included learning activities related to outside interests for a playful, enjoyable and entertaining purpose. These were leisure time and cultural pursuits which physicians put time and energy into developing, and frequently were efforts to escape the pressures and demands of work. For both specialities this was the predominate group where other learning projects occurred. This is true with regard to both the number of projects and the hours spent. General surgeons were far more active in

this sub-group of learning activity than were family physicians.

A third area, personal development, includes learning projects which physicians chose in order to handle a personal problem or situation. These projects were generally of a very practical nature and were initiated in order to "do something better or different" in their personal life. Family physicians were considerably more interested in projects of this type than were general surgeons.

Community and professional sociability refers to that learning sought in order to better understand and serve the physician community and profession. These activities were both medically and non-medically related, described as philanthropical in nature, and included a sincere generosity for giving to others. Family physicians were involved in a large number of projects in this group while general surgeons had none.

The fifth group, financial management was the category where learning projects of a financial nature were grouped. These projects related to investments, money management, estate planning and capital gains. This was an area of project interest for both general surgeons and family physicians.

The last sub-group is the general interest or miscellaneous group which included only two projects. Specifically, these projects were oceanography and digital

records from computer tones. Both projects were those of family physicians, thus general surgeons had no projects in this category. Tables 15 and 16 show a breakdown, by specialty, of the number of projects and hours within each of these six sub-groups.

TABLE 15

LEARNING CONTENT/OTHER
NUMBER OF LEARNING PROJECTS IN 6 SUB-GROUPS

	FAMILY PRACTICE	GENERAL SURGERY
Physical Fitness	4 (12%)	---
Hobbies, Recreation Entertainment	8 (24%)	11 (73%)
Personal Development	7 (21%)	1 (6%)
Community/Professional Sociability	8 (24%)	---
Financial Managment	4 (12%)	3 (18%)
General Interest/Miscellaneous	2 (6%)	---

TABLE 16

LEARNING CONTENT/OTHER
NUMBER OF HOURS IN 6 SUB-GROUPS

	FAMILY PRACTICE	GENERAL SURGERY
Physical Fitness	108 (14%)	---
Hobbies, Recreation, Entertainment	1997 (25%)	395 (80%)
Personal Development	177 (23%)	7 (1%)
Community/Professional Sociability	190 (24%)	---
Financial Management	85 (10%)	90 (18%)
General Interest/Miscellaneous	19 (2%)	---

Forty-eight of the 190 learning projects fell in the other category. This is 25% of the total learning projects identified. Eleven of the physicians reported no learning projects from this category and six mentioned one. Therefore, 59% of physicians participated in one or less intentional learning activity outside of the vocational sphere.

Vocational and Other Learning Project Hours

Specialty played a major part in the variance of learning hours for family physicians and general surgeons. This was true for both vocational and other learning projects. General surgery physicians spent 84% of their learning project hours on vocational learning, while family

physicians spent 64% of their learning project hours on vocational content.

However, family practice and general surgery physicians showed some similarity. Collectively they spent the majority of their learning project hours on vocational related learning (3987 out of 5255 - 76%). Table 17 shows the total distribution of vocational and other learning project hours for both physician specialities.

TABLE 17

LEARNING PROJECT HOURS
VOCATIONAL AND OTHER

	FAMILY PHYSICIANS	GENERAL SURGEONS	% OF TOTAL
VOCATIONAL	1374 (64%)	2613 (84%)	76%
OTHER	776 (36%)	492 (16%)	24%
	2150	3105	

Additionally, a comparison was made of the learning hours each individual physician spent in vocational and Other learning. Table 18 illustrates, by specialty, the learning project hours for both vocational and other.

TABLE 18

LEARNING PROJECT LENGTH
TOTAL HOURS/INDIVIDUAL PHYSICIANS

TOTAL LEARNING PROJECT HOURS	GENERAL SURGERY		FAMILY PRACTICE	
	VOCATIONAL	OTHER	VOCATIONAL	OTHER
0-50	3	14	3	7
51-100	5	1	4	2
101-150	2	-	4	3
151-200	3	1	1	1
201-250	-	-	-	-
251-300	-	-	1	-
301-400*	2	-	-	-
401-500	-	-	-	-
501-600	1	-	-	-

*Increment changes to 100

Summary

This section has been a description of the learning project content which the 29 physicians who participated in this study engaged in. Certainly a noticeable feature of the subject matter reported was its tremendous diversity. The 190 projects were evaluated two ways; 1) into learning orientation groups, and 2) in terms of vocational or non-vocational content.

The 142 vocational projects made up the largest component of learning for physicians in this study. The 48 other projects comprised one-fourth of the learning projects reported. In a specialty breakdown a significant difference

is noted between the extent of learning project participation for family physicians versus general surgeons. General surgery choose vocational projects 84% of the time while family practice choose vocational 67%.

A further review of vocational learning projects described three sub-groups which classified vocational learning projects. There was a statistically significant difference between the vocational learning content which general surgeons chose as compared to family practice learning content.

Three learning orientations of all learning projects were cited, based on the purpose and application of learning and were dissected by specialty to illustrate differences. Practical learning projects comprised 68% of all learning projects, with formal and intra-self significantly lower, 19% and 13% respectively.

Overall, the learning content of physicians learning projects was primarily related to their work and a practical application for their learning.

Learning Motivation

This section will discuss learning motivations of the physicians who identified learning projects in this study. Primarily, it will focus on the "reasons" physicians gave for choosing their learning activities. A particularly important question which this study is investigating is "why" do physicians choose to learn about one particular topic versus another. These findings tell the "why" for these twenty-nine physicians.

Learning motivations are defined as those complex variables which stimulate physicians to seek out an intentional learning activity. It is the driving force(s) which causes one to actively pursue a goal rather than passively thinking about pursuing it.

In this study physicians were asked to tell what motivated them to pursue the particular knowledge or skill they were describing. What were the critical incidents or triggers that pushed them from passive to active in this learning? Why was this something they choose to learn about at this particular point in time?

While motivational roots are a relatively complicated characteristic to dissect and determine, it is possible and useful to review the major reasons physicians in this study cited for learning.

Numerous other studies have investigated learning motivations and have reported similar results. Burgess

(1971) did an elaborate investigation of learning activity motivations and subsequently identified seven basic orientations for learning participation. While some of the reasons he identified matched with the reasons physicians in this sample cited, Burgess' motivators were more generic than desired by the author of this physician study. Therefore, this study will describe motives and purposes of physicians according to physicians reporting.

Six motivational categories were formed to describe these learning project purposes. They are: 1) specific patient problems, 2) intellectual curiosity, 3) peer associated, 4) personal interests, 5) professional development, 6) keeping pace with new technology, 7) sociability and entertainment, 8) economic advancement.

These categories offered a classification mode for the 190 learning projects describing why a particular subject matter was selected. In some instances physicians cited several (3 or more) reasons. When this occurred the motivation was classified according to the first reason given. In other words, when a physician said, "I learned about hypertension because I've had lots of patients with this problem recently, because I was curious about new treatments, or because my colleagues talked about it over lunch", the motivation was classified in relationship to the first reason given, - to solve a specific patient problem. This makes the assumption that the first reason cited is the foremost and major motivational reason.

Further elaboration on the six motivational categories is offered below.

Learning Motivation Categories

Learning motivated by specific patient problems was the most frequently mentioned reason. These were learning activities choosen because they related specifically to learning more about or solving a patient problem. In these projects a particular goal was established and the physician learned in order to achieve that goal.

Intellectual curiosity was another reason for initiating learning and is defined as a general desire to learn what's new, to know the latest, or seek information about a particular content area. These motives were described as a thirst for knowledge, often for one's own sake and with a desire for potential applications.

The peer associated category was that which physicians described as "tuning in" to what their colleagues were talking about and the desire to keep up with what others know and practice. It also included associations with peers outside of medicine, those projects sought in order to foster sociability with peers. This category contained a motivation flair of "what am I missing?"

The fourth motivational category, personal interest, included those projects selected because of a sincere general interest in the subject matter, though for a complex variety of reasons. This category is similar to the definition of the

intellectual curiosity category. However, this motivation had a historical component - "something I've always been interested in or wanted to do". This included many projects from the non-vocational realm. These projects met many personal needs for learning and included physical fitness, oceanography, and photography.

The professional development category related to motivations in social, community and personal activity. There was a desire to learn something because they could in turn make a contribution to the community, the profession or society at large. This included teaching activities, serving on medical and hospital committees and involvement with community service activities.

The sixth category, keeping pace with new technology relates to those motivations which are driven by a desire or need to stay on the crest of new technology influences, both in medicine and outside of medicine. This category included physicians who were motivated to learn when they "heard something new was being developed in this subject area" and wanted to be one of the first to have this new knowledge.

Seventh is the sociability and entertainment category. These learning projects were primarily from the non-vocational area, though some physicians cited sociability as a partial reason for entering into vocational learning activity. While this category is fairly self-explanatory, the major motivation for these projects was entertainment, fun, enjoyment purposes or for an opportunity to interact

with peers, colleagues and friends.

Lastly, the category of economic advancement provided a surprising number of motivations for learning activities. This category included all those activities undertaken for the purpose of improving one's economic situation and all learning which related to economic advancement. This included systems and procedures organization which ultimately effected a physician's ability to have a more efficient (thus income producing) practice or to keep better track of money matters. This included learning about investment opportunities and integrating new financial systems into one's professional and private life. See Table 19.

TABLE 19

LEARNING MOTIVATIONS FOR
190 LEARNING PROJECTS

	PRACTICAL	FORMAL	INTRA-SELF	TOTALS
SPECIFIC PATIENT PROBLEMS	40	–	–	40(21%)
INTELLECTUAL CURIOSITY	20	14	–	34(18%)
PERSONAL INTERESTS	14	9	11	34(18%)
KEEPING PACE WITH NEW TECHNOLOGY	31	2	–	33(17%)
PROFESSIONAL DEVELOPMENT/SERVICE	7	9	3	19(10%)
ECONOMIC ADVANCEMENT	12	1	1	14(7%)
SOCIABILITY AND ENTERTAINMENT	1	1	8	10(5%)
PEER ASSOCIATED	4	1	1	6(3%)
				190

The primary and most frequent motivation cited for learning projects was the need to solve a specific patient problem. This was the reason given for 40 learning projects, or 21% of the time. The next two most frequently mentioned learning motivations were intellectual curiosity and personal interest. Each of these two categories had 34 projects cited, thus 18% of the learning projects were initiated for one of these primary purposes.

The next two most often cited motivations were keeping pace with new technology (17% of learning projects) and professional development (10% of learning projects). The other three motivational categories, peer association, sociability and entertainment, and economic advancement were less than 10% of the learning projects cited.

A further breakdown of learning motivation is illustrated in Tables 20 and 21 which indicates motivations for the indivudual specialties.

TABLE 20

LEARNING MOTIVATIONS

FAMILY PHYSICIANS

	PRACTICAL	FORMAL	INTRA-SELF	TOTALS
SPECIFIC PATIENT PROBLEMS	26	–	–	26(26%)
PERSONAL INTERESTS	11	5	5	21(21%)
INTELLECTUAL CURIOSITY	10	6	–	16(16%)
KEEPING PACE WITH NEW TECHNOLOGY	10	1	–	11(11%)
PROFESSIONAL DEVELOPMENT/SERVICE	2	6	1	9(9%)
SOCIABILITY AND ENTERTAINMENT	–	1	7	8(8%)
ECONOMIC ADVANCEMENT	4	1	1	6(6%)
PEER ASSOCIATED	1	1	–	2(2%)
				99

TABLE 21

LEARNING MOTIVATION

GENERAL SURGERY

	PRACTICAL	FORMAL	INTRA-SELF	TOTALS
KEEPING PACE WITH NEW TECHNOLOGY	21	1	-	22(24%)
INTELLECTUAL CURIOSITY	10	8	-	18(19%)
SPECIFIC PATIENT PROBLEMS	14	-	-	14(15%)
PERSONAL INTERESTS	3	4	6	13(14%)
PROFESSIONAL DEVELOPMENT/SERVICE	5	3	2	10(11%)
ECONOMIC ADVANCEMENT	8	-	-	8(8%)
PEER ASSOCIATED	3	-	1	4(4%)
SOCIABILITY AND ENTERTAINMENT	1	-	1	2(3%)
				91

The primary motive for initiating learning projects for family physicians was the desire to solve specific patient problems. Conversely, this was listed as the third motivator for general surgeons. The major reason general surgeons cited for learning projects was keeping pace with new technology (24%) while this was fourth for family physicians, or 11%. Hypothesis 6 tested for learning motivation differences between family physicians and general surgeons.

H6 There is no significant difference between the major learning motivations of family physicians and general surgeons.

Chi-squared calculations indicate no statistical significance in learning project motivation between specialities. The hypothesis is rejected. ($x^2=7.65$, $df=3$, $p<.02$)

Summary

In summary, the learning motivations cited by physicians in this study are very diverse in nature. However, certain logical patterns are evident since the largest motivating reasons are related to better patient care and updated knowledge of medical technology. These results definitely confirm that physicians initiate substantial self-directed learning in order to maintain their professional competency and skills. While the triggers and critical incidents which spurred any of these learning projects are complicated and multi-dimensional it is possible to speculate that physicians, like other adult learners, seek to learn new things primarily for practical and immediate solutions to problems. This is true for both vocational and other learning projects.

Summary

In summary, this research has studied by [illegible]
this study are very diverse in nature. However,
[illegible] studied the [illegible]
[illegible] are related to better [illegible]
knowledge of [illegible]
could [illegible]
[illegible]
[illegible]
[

Subject Matter Sources

When a physician becomes aware of a personal learning need, he/she must assess whether the topic is a learning priority. This assessment may be done at either a conscious or subconscious level. If the learning need is given priority for action the physician proceeds to select learning activities which accomplish this learning. This section describes the learning activities of physicians and the sources they selected to achieve their learning goals.

Each physician was asked to describe the resources they used when pursuing their intentional learning activities. These subject matter sources, as used here, are broadly defined to be the supplier of information or learning resources.

This inquiry was seeking to identify how physicians accomplish their learning once they have determined what intentional learning effort to pursue. Because this question was targeted towards gathering general information about physician learning sources, physicians did not necessarily identify or prioritize the resources they preferred or most often used. Rather, this is a general description of twenty subject matter sources physicians actually used. This discussion will describe the variety of learning activities physicians cited as learning project resources.

Learning Resources

A diverse and assorted collection of learning resources were described in the 190 projects reported in this study. In fact, nearly all learning projects cited more than one source of learning. Therefore, in order to illustrate and describe these various sources, twenty general classifications have been identified as representative of the subject matter sources used by these physicians. These classifications include: 1) attending formal instruction, 2) reading, 3) investigation, 4) informal discussion, 5) experimentation, 6) observation, 7) consultation, 8) suppliers of goods and services, 9) note taking, 10) media, 11) family, 12) demonstration, 13) library resources, 14) serving on committees, 15) mentorship, 16) home study, 17) own writing, 18) programmed text, 19) teaching, 20) professional and social organizations.

The majority of these classifications are umbrella - like categories. That is, they are collective categories which group together several specific learning resources and learning activities. The resources and activities physicians described are included below in the discussion of all twenty subject matter source categories.

Formal instruction included several types of learning resources. These were learning sessions of a fairly structured nature, were usually other-directed and taught by an instructor. These activities included seminars, courses,

meetings and individual lessons.

The reading category also included a wide variety of learning activities. Physicians cited journals, textbooks, package inserts, old notes, course syllabus, The Medical Letter, assorted magazines, advertisements, flyers, borrowing brothers study materials and scanning the file system as the sources for their reading. Reading was the most frequently mentioned learning resource and included the greatest variety of learning sources.

Investigation as a source of learning was mentioned in several ways by physicians. Investigative learning included visits to other hospitals, reviewing patient charts, seeking out information on new modalities, and phoning graduate program directors at a university. Discussion was an important source of learning for physicians. The two general categories for describing discussion as a learning activity are group and one-to-one discussions. One-to-one discussions included informal conversation with colleagues and other professionals. This included both incidential conversation and specific information gathering discussions. It included purposeful conversation with other individuals, casual asking of advice, and incidential conversation with respected physicians. These discussions were sometimes described as informal advice seeking and were mentioned as occurring with both physicians and other health professionals (i.e. lab technician, dietitian, social worker, etc.). Such one-to-one discussions frequently occurred with non-professionals and

these too were considered to be learning situations. Additionally, a discussion with a patient who was extremely well read and informed of his/her disease was mentioned by one physician as a stimulating learning discussion. One-to-one discussions were mentioned more frequently than were group discussions as a specific learning activity.

Group discussions were situations where the physician participated in a discussion with two or more people and where he/she considered it to be a learning activity. Again, these discussions took place both with professionals and with non-professionals, though they tended to be more professional in nature. Group discussions included activities such as hospital staff meetings, grand rounds, case presentation sessions and weekly meetings of the practice group.

Discussion was only mentioned as a learning activity if the physician was on the receiving end of the learning. In other words, no physician in the study mentioned being sought out as an information source was a learning experience for them. It was only learning if they initiated the discussion, not when they were the supplier of information.

Discussion with colleagues and consultation with colleagues are considered to be different learning sources. As mentioned, discussion is defined by its informal and casual nature, whereas consultation is generally characterized by more specific and formal information seeking behaviors. Discussion, while it is intentionally sought information, was much less formal and usually less detailed.

Another learning source frequently mentioned was that of experimentation. Experimentation was the direct participation in activities or events which contributed to intentional learning. These activities were described as "try it out" or "see what I can learn by doing". Examples of this were assisting in surgery, taking pictures and then analyzing them, going to the dog lab to practice techniques or learn new ones, and trying out capabilities of new equipment.

A sixth type of learning source mentioned was observational learning. This was described as "watching what another colleague does and comparing it to what I'd do in a similar situation". Observatory learning was frequently described in connection with experiential learning. That is, when observation was seen as the learning source, experimential learning was frequently associated. Examples of observational learning included watching a procedure being performed and then discussing it, or learning the whole of it while being walked through "how to do it". In addition, going to an exhibit or vendor show to observe the usefulness of a particular piece of equipment was described as an observational learning source. General surgeons mentioned this type of learning more frequently than did family physicians.

Another learning source frequently cited was that of consultation. Consultation was considered to be the formal and specific information seeking interactions with another

professional. A major learning component of formal consultation included those conversations and written reports from other physicians who saw their patients. This type of consultation primarily included one-to-one discussions with another physician rather than group interaction. Formal consultations tended to be gathering very specific information. This was true for both learning within medicine and outside of medicine. One physician indicated he had learned through consulting with a staff member in his clinic, whom he had hired, and who had extensive practical knowledge about office management. Both specialties used formal consultation frequently to more confidently handle a patient care problem.

Suppliers of goods and services were mentioned as a source of learning. This included physicians talking to salespersons and technology representatives about either current, new or old products. It involved listening to the sales pitch, experimenting with samples and reading the detail sheets sales people distributed. A specific example of this source of learning was one physician who phoned a catheter manufacturer to gather more information about its uses and implications.

Note taking was also mentioned as a source of learning. It has similarities to other self-instructional types of learning, yet is more personal in nature. Physicians talked about note taking as a way to pursue their own critical thinking and to focus their thoughts in learning. It was

described as "pulling pearls from certain articles I've read" or "preparing for a case I'm presenting".

Another learning source was audio-visual media and included the use of audio-tapes, instructional record albums and television. Audio-tapes were those resources most often mentioned, and no physicians indicated video-tape usage. Four physicians subscribed to an audio tape service for an on-going supply of professional learning tapes. Media as a learning source was more frequently used by family practice than by general surgery physicians.

The family was also mentioned as an avenue for learning. This included any family member who contributed in some way to the physicians intentional learning objective. Specifically, sons and wives were mentioned and other "family" in general. This source was largely cited for other learning projects rather than vocational projects.

Demonstration, similar to observation, was also mentioned in the identification of physician learning resources. Demonstration can be described as a more advanced step in a learning effort where the learner has done previous reading or learning about a topic. They are now ready to watch someone else perform a skill or handle a problem while at the same time being talked or guided through the specific steps and principles of the procedure. Demonstrations are more structured and detailed as a learning type than observation and were more frequently mentioned by general surgeons than family physicians.

Library resources were frequently a part of physician learning. This included asking the librarian to do literature searches on specific topics and ordering journal articles or books a physician needed. The library was mentioned in general as a place to read and research topics.

Serving on committees was also suggested as a source of learning for this group of physicians. Physicians cited numerous examples of times they had learned something while participating in committee work. This included hospital staff committees as well as community and professional organizational committees.

Mentoring was a learning resource mentioned by a few physicians. This learning was described as direct personal coaching from a colleague. Mentoring was used for both vocational and other projects, though was more common in the vocational realm.

Home study as a source of learning was described to be learning aids, materials or activities which are specifically developed to be used "at home" or independent from formal instructional settings. Specifically, this included instructional workbooks and assorted study materials mailed to physicians on their request.

The use of one's own writing as a source of learning was describing the work physicians performed when writing an article or publication. It also included writing for a class they were teaching, for a lecture they were preparing or for a committee report. One physicians example of learning was

writing the new nutrition protocol for the hospital.

The use of programmed text as a learning source was also cited, though infrequently. This was described as specifically seeking out a programmed and structured textbook in order to learn specific information. A programmed text was sought because it offers a question-response type of learning that some physicians find beneficial. Usually these were texts recommended by another colleague or an instructor.

Teaching was considered to be a learning source because it requires developing a specific segment of information into a presentable framework. This generally means reviewing, framing, sorting and highlighting components of whatever subject matter is being taught. Physicians frequently mentioned learning while researching a topic they were presenting, while preparing a lecture or talk, when writing a course outline and while preparing a teaching case to present.

Lastly, the involvement in professional and social organizations was felt to be a source of learning. Physicians mentioned these affiliations as a positive learning influence in general, but also felt they used this source (the people, the publications, and the meetings) as resources for gathering specific subject matter information. Examples are serving on committees, attending sectional meetings, and receiving organizational literature and publications.

These subject matter sources which categorized physician

learning were similar for both vocational and other learning projects. The only two learning sources not mentioned for other learning projects were note taking and through one's own writing. Otherwise, all other sources were cited for both types of learning projects within both specialties.

There was, however, a difference in the specific kinds of instructional materials chosen for vocational and other learning project activities. In reading, for example, other projects frequently made use of how-to-do-books, magazines and pamphlets as compared to vocational projects which primarily made us of journals, textbooks, package inserts, course syllabi and old notes.

There are other interesting comparisons regarding learning sources for vocational versus other projects. Vocational learning projects were much more likely to include a component of formalized instruction and teacher-directed learning than were other learning projects. Other projects frequently included individualized instruction and/or some type of private lesson towards reaching a specific learning goal. This was preferred to learning through group seminars or courses for non-vocational projects. The use of informal discussion and consultation was mentioned less often in other learning projects, and frequently in vocational projects. The classifications that were used least in other projects were teaching, serving on committees, mentorship, media, consultation and programmed text.

Summary

In summary, the subject matter sources identified by the physicians were very diverse and illustrate the resoursefulness physicians exhibit in seeking out what they need in accomplishing their learning goals. It was the rare physician who cited only one learning source for the project he/she was describing and most generally there were three or four sources suggested. In a few cases as many as five and seven sources were mentioned. Overall, the findings are congruent with other studies investigating physician informational sources, which suggest that physicians keep up to date by reading, informal discussion, formal consultation and attending courses.

Project Status, Amount Learned, Learning Benefit and Enthusiasm for Learning

This section reviews physician responses to four general questions about their learning efforts. These questions were seeking to elicit information from the physician about his/her motivations for intentional learning activity and their perceived outcome from this learning. These questions were asked of physicians after they had cited all the learning projects they could think of, or after all there was time to discuss. All four of these questions were answered for each learning project identified.

The general substance of the questions will be described here. However, the specific wording of the questions, as they were asked of physicians, is available in Appendix B.

The first question inquired about the current active or in-active status of the learning project. Physicians were asked to state whether this project was definitely Active or Not Very Active at the present time. The definitions of active and non-active, for the purposes of this study, were described to the physician as part of the interview protocol. Not very active meant that the learning project had been dropped, completed or set aside for awhile. Active meant that the learning project was still in process and that time was currently being devoted to it.

Secondly, there was a question seeking to identify the amount of knowledge gain or change of behavior physicians

perceived in themselves as a result of the learning projects. They were asked to evaluate and reveal the extent to which their skills had improved or to what degree their attitudes had changed since the learning project. Physicians were given three response choices for identifying their perception of the degree of knowledge, skill or information they had gained.

The purpose of this question was to determine how physicians perceived the learning benefit resulting from learning projects. Do physicians feel that such self-initiated learning allows them to learn what they need and want? And, it there a relationship between the amount learned and the benefit to others? It may be possible to draw some general conclusions from these findings if physicians frequently say they learned only a little, or conversely if they learned a large amount.

The third question related to learning enthusiasm. Physicians were asked to declare the degree of enthusiasm they had for their learning projects. Again, by selecting one of three response choices physicians indicated how enthusiastic they were about having new knowledge and skill. All the responses in this section were strictly an individually perceived assessment by each physician as to the learning project outcome.

This question invited physicians to share whether the learning they had engaged in could be associated with various degrees of enthusiasm. Is there a correlation with

enthusiasm and delight in learning, to the amount of learning? Or, can any relationship be drawn between enthusiasm for learning and perceived learning outcome? It has been suggested that high levels of enthusiasm and motivation are associated with more learning results and a successful outcome.

Lastly, there was a question about the benefit to others as a result of the learning project. Physicians were asked to focus on the amount of benefit to others as a result of their intentional learning of a particular subject matter. Like the previous two questions, there was a three choice response answer. Having momentarily put aside their own benefit from learning, physicians were asked to indicate the learning benefit to others. Responses indicate that they are generally aware of how their learning benefit themselves and others.

These general questions were searching for the physician's perceived outcomes from the learning project and from this method of individualized learning. Other educational research studies have suggested that when an individual learner takes personal charge of his/her learning activity there is more enthusiasm for learning, more benefit gained, and a higher quality of learning that occurs. In addition, general adult education principles indicate that adults are more likely to learn or transfer information to practice when they are actively involved in the learning process, when the learning directly relates to a specific

learner need, when the learning is of a practical nature, and when the learner is enthusiastic about learning. The four questions just discussed address these principles and assumptions.

The responses to these four questions have been tabulated and are displayed in Table 22. The results of all 190 learning projects, from both specialities are included.

TABLE 22

AMOUNT OF LEARNING, ENTHUSIASM, LEARNING BENEFIT AND PROJECT STATUS

	FAMILY PHYSICIANS			GENERAL SURGERY		
	LG.	MED.	LITTLE	LG.	MED.	LITTLE
AMOUNT OF LEARNING	44	44	11	40	40	11
ENTHUSIASM	35	58	6	39	48	4
BENEFITS	21	40	38	33	30	28
PROJECT STATUS						
ACTIVE		52 (53%)			56 (62%)	
IN-ACTIVE		47 (47%)			35 (38%)	

In terms of project status there was a minimal difference between specialties. Overall, 57% of all projects were cited as active at the time of the interview. Family physicians cited 53% of their projects as active while general surgeons indicated 62% were active. Physicians did say that learning projects had a definite beginning and end,

and this was primarily related to the initial learning motivation, the reason for which the project was started. Specifically, physicians said that if a project impetus was to solve a patient problem, the project would usually become inactive once enough information was gathered to solve this particular problem. If the learning was motivated by intellectual curiosity the project may linger longer and have a more tapered and gradual ending. Projects motivated by personal interests were also active longer. Keeping pace with technology projects and professional development/service projects were more specific in length and physicians were distinctly aware of when these projects became inactive.

In both the amount learned category and the enthusiasm for learning category we see that both family physicians and general surgeons report similar responses.

It is in the benefit to others category where we see the most variance between specialty responses. Family physicians indicate that 21% of their projects had a large benefit to others, whereas general surgeons said 36% of their projects had a large benefit. Conversely, in the "little benefit to others" category, family physicians cited this category for 38% of their responses and general surgeons said 30% of their projects were in this group. These findings suggest that physicians view their learning to be primarily of intrinsic value.

In order to analyze these findings in more detail the four question responses were tabulated according to the vocational or non-vocational status of the learning project. This was done separately for both specialities in an attempt to determine whether there were substantial differences in responses for work related projects versus recreational projects. Table 23 and 24 illustrate these findings.

TABLE 23

LEARNING PROJECTS - VOCATIONAL

AMOUNT OF LEARNING, ENTHUSIASM, LEARNING BENEFIT AND PROJECT STATUS

	FAMILY PHYSICIANS			GENERAL SURGERY		
	LARGE	MEDIUM	LITTLE	LARGE	MEDIUM	LITTLE
AMOUNT OF LEARNING	31(46%)	29(44%)	6(9%)	35(46%)	31(41%)	10(13%)
ENTHUSIASM	24(36%)	37(56%)	5(7%)	32(42%)	41(54%)	3(4%)
BENEFIT	17(26%)	32(48%)	17(26%)	30(40%)	25(33%)	21(28%)
PROJECT STATUS						
ACTIVE		31 (47%)			43 (57%)	
IN-ACTIVE		35 (53%)			33 (43%)	

TABLE 24

LEARNING PROJECTS - OTHER

AMOUNT OF LEARNING, ENTHUSIASM, LEARNING BENEFIT AND PROJECT STATUS

	FAMILY PHYSICIANS			GENERAL SURGERY		
	LG.	MED.	LITTLE	LG.	MED.	LITTLE
	LARGE	MEDIUM	LITTLE	LARGE	MEDIUM	LITTLE
AMOUNT OF LEARNING	13(39%)	15(45%)	5(15%)	5(33%)	9(60%)	1(6%)
ENTHUSIASM	11(33%)	21(64%)	1(3%)	7(47%)	7(47%)	1(6%)
BENEFIT	4(12%	8(24%)	21(64%)	3(20%)	4(27%)	8(53%)
PROJECT STATUS						
ACTIVE		21 (64%)			13 (86%)	
NON-ACTIVE		12 (36%)			2 (15%)	

Overall, vocational learning projects, for both specialities, were predominately in the Large category regarding amount of learning. This is a positive indicator that physicians believe their learning projects resulted in significant learning. The physicians' perceptions of both learning enthusiasm and benefit to others from their learning projects is principally optimistic. Perhaps most surprising is the "little benefit" category, where the results suggest that physicians are less than optimistic about assessing the extent to which their learning effects others.

It is apparent from these findings that there is little difference between family physicians and general surgeons responses regarding learning enthusiasm, benefit, or amount

of learning. Neither the amount learned nor the enthusiasm for learning was striking for either category of learning projects. In the benefits category general surgeons were more optimistic about their learning as a benefit to others and indicated a larger amount of benefit for the majority (40%) of their learning projects.

A closer look at the Other project results documents that enthusiasm for learning was chiefly in the large and medium category. There appears to be a predominately self-beneficial outcome from Other projects, since nearly 60% of all physicians' projects were of little benefit to others. Therefore the relationship between enthusiasm for learning projects and self-beneficial outcome is a strong one. Among Other learning projects the amount of learning resulting from Other projects is also reported to predominately be of a large and medium amount.

In summary, this section has presented the responses to four general questions regarding physicians learning projects. In general, physicians cited a predominance of active learning projects and a large amount of learning benefit. Little generalization can be made from the enthusiasm and amout of knowledge learned data. This discussion suggests that physicians overall perceive benefit from their self-initiated learning activities.

Credit and Non-credit Projects

Another variable which was considered in this study was the role of credit as a motivator for learning. Physicians were asked whether receiving formalized credit of some nature affected either their decision to learn about a particular subject or their motivation to learn.

Specifically, physicians were asked " In any of your learning efforts listed so far, was credit any part of your motivation? Did you hope to use any of your learning efforts towards certification or a degree? Was any of your learning directed towards passing a test or examination, completing an assignment for a course, or toward some requirement or examination related to your job?"

When physicians responded with a yes to these questions about credit, they were asked to expound further on their motivations regarding credit. The interview stated, "I'd like you to think for a minute of all the reasons for this particular learning effort. Was your desire for credit about one-quarter of your total motivation for learning, or about one-half, or ninety percent, or what portion was it?" This urged the learner to be very clear about the extent to which credit played a role in their learning project. It also defined the degree to which their learning and credit motivations were related.

This question of learning for credit was of interest since in recent years continuing medical education credit has

[illegible]

[illegible] the role of credit as a motivator for learning. [illegible] were asked whether credit should be given for [illegible] affected either their motivation to learn about a particular subject or their motivation to learn.

Spectatorship. Participants were asked "In any of your learning [illegible] was credit any part of your motivation? [illegible] Was any of your learning [illegible] towards recognition [illegible]? Was any of your learning [illegible] directed toward a test or examination, either [illegible] assigned for a course, or was learning [illegible] motivated by a desire to [illegible] or [illegible] Mike Pearson: [illegible] to a yes to [illegible] [illegible] [illegible]

been increasingly required for renewal of licensure or membership in professional societies.

This study did not compare responses of credit and non-credit to patient or practice benefit, rather it reviewed two basic aspects of the credit question. Primarily this study reviewed the number of intentional learning activities which were motivated by a desire for credit versus those for which credit was not a factor. And, it compared the responses for the two specialities. Additionally, this question evaluated any differences in the length of projects related to the motivation for credit.

Table 25 reveals the results of all projects which were in any way motivated by a desire for credit. Also, it illustrates the number of projects with absolutely no association to credit, and the reported differences by specialty.

TABLE 25

CREDIT AND NON-CREDIT PROJECTS

	FAMILY PRACTICE		GENERAL SURGERY	
	CREDIT	NON-CREDIT	CREDIT	NON-CREDIT
VOCATIONAL	14	52	19	57
OTHER	2	31	0	15
TOTALS	16(16%)	83(84%)	19(20%)	72(79%)

The results indicate that overall 82% of all projects were initiated without motivation for credit. Family

been interesting [illegible] to observe in [illegible]

membership to provide [illegible]

This [illegible] does suggest [illegible] that [illegible] credit to practice deserve, rated it reviewed two basic aspects of the credit question. Primarily [illegible] reviewed the number of [illegible] earning activities [illegible] were motivated by a desire for credit versus those [illegible] credit was not a factor. And, it compared the responses [illegible] the two scenarios. Additionally, this question [illegible] any differences in the length of projects related to [illegible] motivation for credit.

Table 25 reveals the results of all projects which [illegible] in any way motivated by a desire for credit. Almost [illegible] illustrates the number of projects with absolutely no association to credit, and the reported differences by [illegible] operating.

TABLE 25

CREDIT AND NON-CREDIT PROJECTS

	FAMILY PHYSICIAN		GENERAL SURGERY	
	CREDIT	NON-CREDIT	CREDIT	NON-CREDIT
VOCATIONAL	14	52	19	34
OTHER	2	31	0	16
TOTALS	16(16%)	83(84%)	19(20%)	77(80%)

One results indicate that overall 82% of all projects [illegible] were motivated by [illegible] reduction [illegible] family

physicians stated that 84% of their projects were not related in any way to credit, while general surgeons reported 79% of their projects not for credit.

Overall, when comparing the two specialties there are no significant differences with regard to credit motivation. ($t=.07$, $df=27$, $p<.05$) Therefore hypothesis 7 is retained.

> H7 There is no difference between the number of learning projects family physicians choose for credit compared to the number general surgeons choose for credit.

Eighteen percent of all learning projects identified, or a total of 35 projects, had some relationship to credit learning. These 35 projects can be analyzed even further by reviewing the degree to which credit was a motivator for physicians. As mentioned earlier, physicians who responded yes to the desire for credit were asked to declare what percent of their motivation related to this desire. Twenty of the projects were awarded credit of some nature but this was in no way a motivator to the physician for initiating the project. The remaining fifteen projects were determined to be motivated by a desire for credit and this motivation ranged from 5% to 50%.

In both specialties the number of physicians who declared over 20% credit motivation for any project was slight and only three said there was more than 50% motivation in their desire to apply the learning project towards a credit related activity. Specifically, seven family

Ground Floor Plan — Scale 1:50

Entrance Hall
Reception Desk
Waiting Area
Consultation Room 1
Consultation Room 2
Treatment Room
Physiotherapy Gym
Changing Rooms
Accessible WC
Staff Room
Kitchen
Plant Room

Dimensions are in millimetres unless otherwise stated.
All dimensions to be checked on site before construction.
Do not scale from this drawing.

Rev A — Issued for Planning — 14.03.24
Rev B — Consultation Room 2 enlarged — 02.04.24
Rev C — Accessible WC added — 18.04.24

physicians indicated credit as a 5 - 50% motivating factor and ten general surgeons mentioned a similar percent range.

The findings of this study with regard to the length of learning projects and the relationship to credit or non-credit are also interesting. Armstrong (1971) reported that non-credit projects are longer than credit projects. However, this study shows quite different results. Table 26 illustrates the mean number of hours for both specialties related to credit and non-credit projects.

TABLE 26

CREDIT AND NON-CREDIT PROJECTS
MEAN HOURS

	CREDIT	NON-CREDIT
FAMILY PHYSICIANS	25 HRS.	21 HRS.
GENERAL SURGEONS	70 HRS.	25 HRS.
ALL PHYSICIAN PROJECTS	49 HRS.	23 HRS.

Overall, there were thirty-five learning projects for which physicians indicated a desire of credit. These totaled 1730 hours, for a mean of 49 hours per credit project. The non-credit projects totaled 3525 hours, which is a mean of 23 hours per project. There is evidence of an even more distinct difference between hours spent on credit or non-credit learning projects when the two specialities are compared.

General surgeons indicated 19 learning projects were related to a credit motivation and that 1327 hours were

physicians. Interns earned 33 % less median salary than

and 52 % fewer than attending physicians (BLS, [illegible]

The findings of this study may [illegible] to the [illegible]

learning objectives and to credit-hour [illegible] credit or non-

credit are also interesting. Whereas [illegible] expected that

non-credit projects are longer than credit projects, [illegible]

Honeyat, Inc., study shows quite [illegible] results [illegible]

illustrates the mean number of hours for both subjects

related to credit and non-credit projects.

TABLE 2A

CREDIT AND NON-CREDIT PROJECTS
MEAN HOURS

	CREDIT	NON-CREDIT
FULLY PHYSICIANS	25 HRS.	21 HRS.
GENERAL SURGEONS	20 HRS.	25 HRS.
OUT PHYSICIAN PROJECTS	44 HRS.	17 HRS.

However, there were six-five learning projects in which physicians ous hours a degree of credit. There [illegible]

1230 hours, for a mean of 25 hours per credit project. The non-credit projects totaled 200 hours, which is a mean [illegible]

hours per project. There is evidence of an even more [illegible]

difference between hours spent on credit or non-credit learning projects when the two specialties are [illegible]

Table 2 displays that 19 learning projects were [illegible] and that four hours were

spent. This is an average of 70 hours per credit learning project and all of these were vocational projects. This is a considerably higher average than non-credit projects (25 Hrs.)

Family physicians reported 16 learning projects were undertaken with some motivation for credit or 16% of their total learning projects. They spent 403 hours on these projects, or an average of 25 hours per project. This is slightly more hours per project than those in the non-credit category. Family physicians reported 14 of these 16 projects to be of a vocational nature.

There is a striking difference between the average length of credit learning projects for family physicians and general surgeons. General surgeons spent longer on credit projects than do family physicians. Examples of projects general surgeons cited were learning surgical techniques and procedures and a general surgery update. Again, the uniqueness of a surgery practice and skills required by surgeons contribute to these differences.

In summary, credit as a motivator for conducting a learning project was not a large factor for the physicians in this study. Only 20% indicated they were interested in credit of some type for the learning project activities. Overall, both specialties of physicians indicated that the majority of their projects, both vocational and other, were conducted free of a credit motivational factor. No statistical significance was noted when comparing the two specialties for credit motivation.

Learning Planners

There is another important variable to consider when looking at physicians' self-directed learning, and that is the planner aspect of such learning. This portion of the interview was seeking to determine who helps physicians plan their learning once they have chosen a learning project. This knowledge could be potentially helpful in determining the degree of independence physicians exhibit in carrying out their learning activities. Therefore, this section reviews the helpers in planning learning projects, the frequency with which planners are used, and whether planners are used differently in credit versus non-credit projects.

A learning planner is considered to be that person(s) or object which aids the learner in either focusing and/or carrying out their learning intentions. A planner can play a number of roles with the learner and may be very involved in the learning or involved only slightly. By definition a planner is the resource which may organize a series of learning activities, make suggestions for the learner curriculum, may actually plan a particular segment of the learning, or may serve as an instructor or individual tutor in a specific learning situation.

Learning planners in this study were determined to be of four major types. The types include: learner, group, one-to-one, and object. For the purpose of clarification and definition these four learning planner types are described

briefly.

In learner-planned learning, the learner assumes primary responsibility for planning and conducting the learning project. In group learning, the major amount of planning of the learning is conducted and organized by a group or its leader. One-to-one learning means that the learner relates to the instructor on a one-to-one or individual basis. When an object is described as a learning planner the reference is to some non-human resource (i.e. cassette tape, programmed book or machine).

The interview did suggest a fifth type of learning planner, although it is minimally discussed here. This was termed "mixed" planner and referred to planning conducted by a mixture of planners from two or more of the four types, with no one planner responsible for more than 50% of the planning.

Descriptions of the four planner types were read to the physicians and they were then asked to specify the planner type used in each of their projects. They were not restricted to choosing only one planner type for each project since it was believed that each project would contain several learning activities. Therefore, potentially different planners for each activity. Consequently, the findings report all planners physicians cited for the 190 projects.

Table 27 points out the types of planners which physicians reported used in their learning projects. Both numbers of projects and percentages of projects for each

specialty and each planner type is shown.

TABLE 27

LEARNING PLANNERS UTILIZED *

	FAMILY PRACTICE		GENERAL SURGERY		
	CREDIT	NONCREDIT	CREDIT	NONCREDIT	TOTALS
LEARNER	13(81%)	68(81%)	18(94%)	71(98%)	170(89%)
ONE-TO-ONE	7(43%)	59(71%)	5(26%)	40(55%)	111(58%)
GROUP	10(62%)	28(33%)	13(68%)	11(15%)	62(33%)
OBJECT	5(31%)	26(31%)	3(15%)	12(16%)	46((24%)
MIXED	8(50%)	60(72%)	17(89%)	40(55%)	125((66%)

*
Some physicians cited more than one planner for each learning project.

In reviewing the frequency with which all physicians chose self-planned learning it is obvious that this type of planner dominated in the majority (89%) of projects. This confirms similar findings McCatty (1973) reports in his review of learning project planners. Learner planned projects were mentioned for 89% of the learning projects in his study. However, it is apparent that in this study family physicians used learner planned to a lesser extent overall than did general surgeons.

One-to-one learning planners were used second in frequency. This included one-to-one with another

Learning Planner Guidance

Credit	Numerical	Credit	Nonetheless
Learner	1,512,178	84,863	1,738,2
One-to-one	748,32	94,122	810,223
Groups	10,054	28,022	1,000
Projects	31,31	34,51	12,164
Mixed	8,302	61,122	1,084

Some planners find planning difficult because they don't know what they're aiming for. Learner planning is about making progress towards learning goals. However, it is also important that study plans are flexible, responding to the learner's needs and circumstances. Adult learners typically report in-person planning sessions as more helpful than online ones, although both can be effective.

Some physicians cited more than one planner for each learning project.

professional as well as one-to-one with a friend or relative. Fifty-eight percent of all learning projects used one-to-one planners.

The third most frequently mentioned planner type for all learning projects was the group planner. This referred to both groups with a professional leader or instructor and peer group learning activities. Overall, group planners were mentioned for 33% of learning projects.

In looking at group planners within each specialty we see they were used much more often for credit related projects. Family physicians used group planning almost twice as often for projects where credit was a motivator, while general surgeons used group planning almost four times more often in similar circumstances. These findings suggest that physicians use group methods much more often if they are learning for credit. Another possible explanation is that credit learning activities generally employs group teaching methods.

The object or non-human resource as a learning planner was used to a limited extent and mentioned least overall. This also parallels the findings of McCatty (1973) regarding the use of this type of this planner type. Twenty-four percent of physician learning projects were associated with this type of planner. This included the use of tapes, programmed instruction, computers, and technical and laboratory equipment. With regard to specialty, family physicians used this type of planner twice as often as

general surgeons.

The mixed planner category indicates the frequency with which physicians reported having several planner types as a part of their learning projects. Overall, the mixed planner category was mentioned in 66% of the projects.

In general, physicians exhibited a substantial and varied use of learning planners. Eighty-four percent of projects included more than one learning planner which highlights that learning projects are not isolated nor completely individualized learning efforts. Only twenty-five projects, or 13% cited learner, self-planning as their only planning mode. Conversely, four projects, of 2% used all four types of planners.

Chapter 14 — Flavour

Flavour wasn't in Protein's job description. She was a biochemist, not a chef. Nobody had told her that her job was to make food taste good, and nobody had told her that it wasn't. She figured it out on her own, the way she figured out most things: by trying it and seeing what happened.

The first thing she learned was that umami was the key. Not salt, not sugar, not fat — though all of those mattered too. Umami was the savoury, deep, lingering taste that made you want another bite before you'd finished the first one. It came from glutamates, and glutamates were everywhere in protein-rich foods.

Protein ran her first experiment on a Tuesday afternoon. She cooked a batch of plain rice and a batch of rice with a pinch of monosodium glutamate, or MSG, dissolved in the cooking water. She served both to Ember, who ate them without comment. Then she asked which one he preferred.

"The second one," he said. "It's more... something."

"Umami," Protein said.

"Whatever you call it," Ember said, and went back to his bowl.

Protein wrote down her findings in a notebook she'd found in the kitchen drawer. The paper was thick and cream-coloured, and the pages were numbered in gold ink. She filled it with observations, measurements, and sketches of molecular structures. It was the most beautiful thing she'd ever owned.

Over the next few days, she ran more experiments. She discovered that adding a pinch of MSG to almost anything made it taste better, that cooking vegetables in their own juices preserved more flavour than boiling them, and that a little bit of fat — butter, oil, or cream — carried flavour to the parts of the tongue that tasted sweetness and bitterness, not just the parts that tasted savoury.

Ember watched all of this with mild interest. He ate everything she put in front of him, but he never asked for seconds or complained when she served him something bland. Protein found this frustrating. She wanted feedback, not indifference.

One morning, she made him a dish she was particularly proud of: mushrooms sautéed in butter with garlic, thyme, and a splash of soy sauce, served over rice with a fried egg on top. She set the bowl in front of him and waited.

He ate the whole thing in silence. Then he looked up at her and said, "This is the best thing you've made."

Protein felt a warmth spread through her chest that she didn't have a name for. She had been called smart, she had been called fast, she had been called thorough. But this was the first time anyone had called her flavourful.

"Thank you," she said.

Ember shrugged and went back to his bowl.

CHAPTER 5

INTERPRETATIONS AND IMPLICATIONS OF STUDY FINDINGS

This chapter will draw together various components of the study and provide an overview of major findings. This will include: 1) describing the major learning project activities and citing their relationship to physician continued learning, 2) comparing these results with other findings in the literature, 3) presenting implications for individual physicians, providers of medical education programs and other researchers, 4) citing limitations of the study, and 5) discussing recommendations for future research.

Learning Participation

Number of Projects

Physicians reported considerable participation in learning project activity. Twenty-eight of 29 physicians had participated in at least one learning project during the previous year. An average of 6.5 projects per year were initiated by these physicians.

Previous learning project research, with other adult populations, reports participants engaging in a wide range of learning projects. The two studies which report larger number of learning projects were also studies of professionals. Miller and Botsman (1975) studied professionals and report

that their subjects averaged twelve learning projects per year. McCatty (1973) also sampled a group of professional men and he determined that eleven projects are the annual average. In comparison to these studies, the average of 6.5 projects reported in this study is a lower incidence of participation.

Two other major learning project studies investigated general adult populations and these findings are applicable here. Penland (1977) reports an annual average of 3.3 projects per respondent. Tough (1978) suggests that the typical learner conducts five distinct learning projects per year. Obviously, these findings illustrate the wide variance in the number of projects adults undertake. Considering the studies just cited it is apparent that the amount of physician learning project participation is relatively midpoint to other study findings.

The major premise in this study, that physicians employ self-directed learning activities as part of their continued education, is confirmed by the findings. Additionally, it should be noted that the data reported here refers only to purposeful and intentional learning, not casual learning or learning without activities of at least seven hours duration. Therefore, the total learning time for these physicians is not reported here, only the learning project time. Since physicians would also be engaged in other learning, some of less than seven hours and where intentional purpose is not expressed, it is important to note that other learning time

part [shape] ...

...

and participation was occuring.

The explanation for the extensive participation in learning projects among this group of professionals is varied. However, the high level of educational achievement and the elevated socio-economic status of these populations is a major factor. The occupational status of participants in this study substantiates their desire to be high achievers and eager learners. Tough's 1975 study tested this speculation about professionals and learning project activity. He reports that professors and teachers cited more learning project participation than did learners from lower socio-economic status.

Another factor in explaining the number of learning projects reported relates to the direct one-to-one interview with the physician learner. Face-to-face interviews are more likely to effectively gather information than are questionnaires, phone calls, talking with family members and peers.

Additionally, since a physician's livelihood and reputation depend significantly on his/her ability to practice the most up-to-date medicine and stay informed of the lastest medical developments, the motivation for learning is escalated.

Another variable that must also be considered, when looking at the amount of learning activity these findings reveal, is the rigorous training program which physicians experience. From their earliest desires to be doctors they

have been required to exhibit accomplishment in extensive learning activities. This training establishes a proclivity towards learning and encourages the challenging of one's mind.

Implications of Learning Project Numbers

These findings on physicians' participation in learning projects have obvious implications within medical education. Given that a major part of physician learning activities are self-directed, the medical education system could assist physicians with more effective development of self-directed learning objectives and skills. While the current focus in medical education is primarily towards medical content, it may be beneficial to re-examine learning methods and give attention to physician preferences for learning.

The physician learner, like other adult learners, go after learning when it is most useful and practical. The value to the learner is knowing how to learn, not merely what to learn. From the vocational perspective, the nature of medical practice does not allow the physician the luxury of waiting for a course to surface in order to solve specific patient care problems. The time when a physician most likely recognizes knowledge deficiency and needs to learn is when a patient is sick and when he/she is called upon to solve a problem.

Project Hours

The mean number of learning project hours per physician

is 181 hours. Learning projects ranged in length from 7 to 300 hours. Project lengths varied distinctly for each individual physician and also varied by specialty. On the average general surgeons spent more hours per project than did family physicians.

The variance of learning project hours between the two specialties was not statistically significant, yet there was a wide variance in percentage of hours reported. Forty-one percent of the total learning project hours reported were by family physicians; while 59% of hours were from general surgery projects.

A partial explanation for this variance by specialty may relate to practice patterns and specialty issues. Family physicians are required to maintain competence in a large number of areas within medicine since their breadth of practice problems are extremely extensive. Consequently, family physicians report engaging in a greater number of projects but devoted less time to each project. Another factor which may account for time variance is cited by Means (1979) in his study of family physicians. He suggests that family physicians are likely to encounter heavier patient loads than specialists, and this plays a role in restricting their time away from practice to engage in learning.

General surgeons, given the technical nature of their practice, are often required to focus intensively on a specific skill or procedure. Therefore, they may spend longer with a particular learning objective. In addition,

findings suggest that surgeons do more experimentation and demonstration learning than family physicians and this method is likely more time consuming.

Implications of Project Hours

The hours physicians spend in learning project activity substantiates the importance of self-directed learning activity as a component of continuing medical education. Time is a precious resource, particularly for physicians whose vocational priorities pull them in several directions.

It is likely that sufficient allocation of time to learning is a problem for many physicians. Because the planning, initiating and seeking of resources for learning projects is very time consuming, this limits the number of learning projects physicians pursue. Medical educators may become more active in learning project planning and in assisting physicians in the tasks associated with carrying out a learning project.

Learning Content

Physicians, like other adults, seek out learning and specific content to solve practical problems, both in their work and personal life.

The content of physician learning projects was similar for all physicians. The learning orientation groupings indicate that both physician specialities reported the majority (68%) of their learning projects to be practical

Learning Content

and of a problem solving nature. One-fifth of the projects related to knowledge acquisition (formal) and the remainder (13%) pertained to personal development (intra-self).

The popularity of practical learning projects fit with the physicians frequent need to employ problem solving behavior. Physicians often seek out learning to more confidently and competently treat a patient. Practical learning efforts may be "a given" in the medical profession - every patient presents with a different problem, thus the occupation naturally demands good problem solvers and the continuous need to sort problems and recommend solutions.

Another suggestion for undertanding this finding relates to the overwhelming time demands on a physician in one day. Physicians may choose to prioritize the work related or practical learning as primary needs and never quite find the time or energy for learning in other non-practical areas.

The formal learning preferences, second in occurence of learning participation, seem to be a logical and natural extension of physicians' learning needs. The rapid and changing nature of medical knowledge requires physicians to seek specific information and skills to keep up-to-date. These projects, associated with knowledge acquisition accomplished such goals.

This is particularly true for family physicians who encounter a wide array of medical problems and who may see a specific disease only once every few hundred patients. They have a very definite need for formal learning.

Chapter 7: Physiology and Medical Terminology

Physiology is the study of how the body and its parts work and function. Understanding physiology requires knowledge of many medical terms that describe normal processes and disorders.

The word "cardiology" comes from the Greek words for heart and study. Cardiologists are physicians who specialize in diseases of the heart and blood vessels. Pulmonology is the study of the lungs and respiratory system.

Medical terminology can be overwhelming at first glance. Many terms are long and unfamiliar. However, most medical words are built from smaller parts: prefixes, roots, and suffixes. Learning these word parts makes it much easier to understand and remember new terms.

For example, the prefix "hyper-" means above or excessive, and "tension" refers to pressure. Therefore, hypertension means excessive pressure, usually in the blood vessels. The prefix "hypo-" means below or deficient, so hypotension means low blood pressure.

Physicians often speak Latin when naming anatomical structures. The femur is the thigh bone, and the humerus is the upper arm bone. The radius and ulna are the two forearm bones. Knowing these terms helps students communicate precisely about injuries and conditions.

Abbreviations are also common in medical charts and notes. "BP" stands for blood pressure, "HR" for heart rate, and "SOB" for shortness of breath. Nurses and doctors use these shorthand forms to record observations quickly during busy shifts.

Pharmacology, the study of drugs and their effects, is closely related to physiology. Many medications work by affecting specific physiological processes, such as reducing inflammation or lowering blood pressure.

The third learning orientation group, Intra-self was reported least frequently by general surgeons. Intra-self learning refers to learning of a personal development nature which enhances one's growth. As reported earlier, surgeons were much more serious in their interviews and were more inclined to talk business. Learning content was also evaluated according to learning association or usage. These were vocational and other categories. Seventy-five percent of learning projects in this study were vocational. These findings concur with what other studies report about adult choices for learning content.

There are a variety of explanations for the large reporting of vocational learning projects in this sample. The interview began with the premise that all learning would be discussed, however physicians appeared more eager to discuss medically related learning. As the interview got underway almost all physicians described their first learning project as a vocational one. Most physicians could more easily recall learning projects related to medicine.

Generally, physicians tend to manifest a work-oriented and compulsive personality, perhaps related to enduring a long and rigorous training program. It has been suggested that physicians develop, or bring to the profession, strong habits and driving attitudes regarding work-related (practical problem-solving) learning. To strengthen these habits, medical school training emphasizes problem solving and focuses on finding practical answers to clinical

problems.

Secondly, this group of professionals as a whole, are an occupational group at the upper edge of the socio-economic scale and as a result have a compulsive or driving desire to maintain this status, thus they must continue their competency in the practice of medicine. Additionally, physicians may simply be very enveloped in their work, given the paramount focus it has in their life.

All but two interviews were conducted in the physicians office, thus the environment itself fostered a work association. Another consideration is that the letter of invitation to participate in the study referred to continuing medical education and learning. During the interview some physicians overtly mentioned traditional CME and questioned whether that was the type of learning they should describe. A few physicians were eager to show the interviewer their CME certificates as proof of their learning.

An added explanation for the predominance of attention to vocational learning is that the profession of medicine is generally an all consuming one. Medicine dominants the life of many practicing physicians' and consumes the largest part of their energy. There is often little time left over to devote to other learning efforts. Even social life and vacations not infrequently include some association with medicine and medical professionals.

There was a large variance in physicians choice of vocational and other projects, and these results varied

significantly between the two specialities. Family physicians spent 67% of their time in vocational learning while general surgeons spent 84% of their learning projects in a vocational related area.

The variance of learning content choices by specialty is likely related to the practice arrangements and specialty issues previously discussed in the learning project hours section. The practice model and the type of medical care delivered by the two specialities is diverse enough to create learning content differences for the two groups. There is a glaring absence of non-vocational learning by general surgeons and this is attributable to a couple of general factors.

In general, general surgeons appeared to be much more intense about their work and its all-consuming nature in their lives. They were much more serious during the interview and dogmatic in their response to questions. They gave the impression of quickly getting down to business with the disucssion of learning activities. These observations suggest that general surgeons may in fact do most all of their learning in medicine, or rather they may have been less willing to discuss non-work issues with the interviewer.

Non-vocational projects comprised 25% of total learning projects. Overall, the largest number (40%) of these projects were in the hobbies, recreation and entertainment category. The three most frequently mentioned categories were personal development (17%), community/professional

sociability (17%), and financial management (15%). Physicians interest in these four areas has a logical explanation. Given the demanding and high stress profession of medicine, physicians obviously enjoy and make efforts to balance their lives by participating in hobbies, recreation and entertainment activities. Generally their socio-economic status both allows for spending money on such activities and encourages this participation. The presence of a work hard - play hard attitude is evident in this category.

In addition, physicians demonstrated an interest in taking care of themselves through personal development learning, as well as offering time to their community and profession. Many physicians in private practice are theoretically self-employed and managers of their own financial accounts. Therefore the interest in financial management is certainly necessary and prudent.

Implications of Learning Content

The choices physicians make about "what" to learn has important implications for medical educators. This study's findings show that practical, problem solving learning dominates physician self-directed learning activities. The fact that they seek to learn about patient problems as they happen indicates the immediacy of their learning application.

In general, physicians are active not passive learners, are goal driven, critical of inefficiency, and not tolerant of time wasting and incompetence. Medical education must

capitalize on the learning needs, motivations and interests of physicians as they design and plan educational programs. Learning must be targeted to practical problem-solving activities, and at the same time be effective and timely. Experimenting with self-directed learning strategies which meet the practical learning needs of physicians will be the challenge to medical educators who take on this task.

Learning Motivations

Learning motivation looked at the reasons physicians choose certain learning activities. Collectively, the majority (21%) of learning projects in this study were motivated by the need and desire to solve specific patient problems.

The next two most common learning motivations were intellectual curiosity and personal interests, both claiming 18% of learning projects. Physicians, by necessity, are seeker learners - that is they have immediate and multiple motivations for seeking out knowledge and their high interest in pursuing areas of intellectual curiosity confirms this. Physicians by and large are curious about the world and what creates the multitude of complex medical problems they see.

Keeping pace with technology was the third (17%) motivational reason cited. Certainly, most physicians are motivated to have knowledge of new techniques in medicine if they desire to treat patients effectively and respond to their medical needs.

By specialty, learning motivations were quite varied though no statistically significant difference was found amount family physicians and general surgeons. There were two major differences cited. General surgeons mentioned keeping pace with technology as their most frequent reason for learning while family physicians listed this reason fourth. General surgeons are quite likely to encounter new technology in their operating procedures. Rapid changes occur in surgical materials, procedures and instruments. Conversely, family physicians cited the desire to solve specific patient problems as first priority and this was third for general surgeons. Again, the uniqueness of their practice arrangements and patient loads may explain family physicians motivation to focus on specific patient problems.

These findings confirm what other studies have reported in terms of learning motivations. Tough (1978) indicates that anticipated benefits constitute a significant portion of the persons total motivation for learning. In fact, the most common motivation is the anticipated use or application of knowledge and skills. A person begins a learning project because he/she anticipates several desired outcomes or benefits that are interrelated.

The Educational Testing Service national study of continuing education (Houle, 1980) provided a comparison of the learning motivations of professionals and the total population of their study. Professionals were less interested in getting a new job and more interested in

advancing on their present job than were the total group of respondents.

McCatty (1973) reports his respondents as motivated by job-related learning which included keeping up with the literature and new discoveries, as well as learning in order to handle particular cases.

Implications of Learning Motivations

Learning motivations that are largely driven by a vocational need, as was evidenced in this study, have implications for the professions, society at large and educators. The medical profession and consumers of medical care are certain to benefit from the 75% of learning projects which physicians were motivated to learn in relation to their occupation. Educators could work towards the development of systems, programs or other innovations which would complement the large amount of physician vocational learning.

The use of the computer in medicine and medical practice is predicted to be a feasible and efficient educational instrument for physicians in the not too distant future. Such systems could assist physicians in learning about vocational related areas, i.e. drug interactions, lab results, treatment protocols, etc.

Subject Matter Sources

The investigation of the subject matter sources in physician learning projects clearly illustrates the

Chapter Twenty-Four

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individuality and creativity physicians employ in their learning efforts. Subject matter sources or learning resources which physicians used to accomplish their learning were classified into twenty resource categories.

Nearly all learning projects were reported to utilize one or more learning resource. Reading, informal discussion, formal consultation and attending meetings are the primary and most frequently mentioned resources for physician learning. These findings parallel the results reported in other studies which have investigated the manner in which physicians seek information.

Means (1979) reports that print materials, especially medical texts and professional journals represent the major source of information used by family physicians. Second and third importance was interpersonal contact with colleagues and formal educational activities respectively.

Coleman, Katz and Menzel (1966) report that the most significant factor causing physicians to prescribe a new drug relates to their colleague relationship with other physicians (peers).

Outside the field of medicine these same general trends with learning resource choices exist. A study by Margulies and Raia (1967), reports that scientists and engineers found interaction with colleagues as the second most useful learning learning resource.

The four resources these physicians most often used results from a variety of individualized and complicated

reasons. However, there are a few factors which relate to their large use. First, these methods are dependable and have historically proven to be useful to physicians as they seek out learning. Secondly, all four of these resources are fairly accessible to physicians in their everyday life. They can easily tap these resources without difficulties or long delays. Lastly, is the value of close proximity to the physician, in that these resources are handy and easily available for use.

Implications of Subject Matter Sources

The resources which physicians utilize are important factors in learning. Educators who are aware of the major learning sources physicians prefer could offer encouragement assistance to physicians in locating these resources. Additionally, there are implications for hospitals and medical centers who desire to encourage and foster the continued learning of physicians. Learning centers and libraries should be designed and maintained to promote efficient access to learning resources. Ideally, these centers would be staffed with educational facilitators who could assist physicians with selecting and locating appropriate learning resources. The facilitators could aid in the planning of projects and suggest learning strategies. Generally a large amount of time is spent on locating references or subject matter content, and then sorting through numerous texts, books and journals. These tasks

could be streamlined for the physician if a knowledgable learning facilitator offered assistance. It is true that librarians often function in a facilitator role, however they most often merely order or locate the reference, rather than suggest other activities or resources.

The access to computer learning systems would also be a useful learning resource for physicians. Software for physician learning and clinical applications is rapidly becoming available. Certainly medical centers will desire that physicians be comfortable with and have knowledge of computers as they are increasingly being used in the overall operations of medical institutions.

Another important finding that must be incorporated into teaching principles is that physicians predominantly have a learning orientation towards practicality. This is especially true in the vocational realm. Their learning efforts relate largely to problem solving situations and this certainly has implications for program design.

Learning Project Status

Overall, the majority (57%) of learning projects were cited as active projects at the time of the interview. There was a minimal difference (9%) between the specialties, with family physicians having more active projects.

Physicians indicate that for the most part the active versus in-activity of a project is related to the speed of

Section 4 Test Review

Directions: Read the passage and answer the questions that follow.

Passage 1

Line 5 Line 10 Line 15 Line 20 Line 25 Line 30 Line 35 Line 40 Line 45 Line 50 Line 55 Line 60 Line 65 Line 70 Line 75 Line 80 Line 85 Line 90 Line 95 Line 100 Line

solution to the problem being solved. Therefore, since three-fourths of learning projects were vocational and many patient related, this may explain the large number of active projects.

Projects motivated by personal interest also tended to be active longer. A specific personal outcome from learning may include several components of learning and thus last longer.

Physicians Perception of Learning

Physicians were asked three questions which addressed their self-perception of learning during learning project activity. Responses were similar for family physicians and general surgeons in the amount learned and enthusiasm for learning category. The question regarding benefit to others showed a sizeable difference between the two specialties. Family physicians reported 21% of their projects as having a large benefit to others, while general surgeons said 36% of their projects resulted in large benefits.

Again the differences unique to each type of medical practice is likely an explanation for these findings. General surgeons generally do more procedural medicine and may get more dramatic results from "operating to cure" rather than long term treatment. Patients more quickly notice they are well again after surgery. Also, general surgeons may get more stroking and feedback from patients as a result of the type of medical treatment they perform.

Credit and Non-Credit

There was a striking lack of importance for credit as a learning motivator. One-fifth of physicians reported projects with a relationship to credit. Specifically, 89% of projects were motivated by a specific credit award. There were no significant differences between the two specialty groups with regard to credit motivation. However, the length of credit projects was very different for the two specialities. General surgeons averaged 70 hours on credit projects and family physicians averaged 25 hours.

These findings are in agreement with what other learning project studies have reported. Tough (1978) suggests that learning for credit toward a degree or certificate is rare and that this occurs in about 5% of all learning projects. McCatty (1973) reports almost no credit learning in his study, and only three of the participants had been motivated by credit for any projects. Means (1979) suggests that the need to accumulate credit was of minor importance to the physicians he interviewed.

In most states physicians are required by state law to earn a specific number of credits each year in order to document their continued medical learning. This study suggests that credit had little relationship to the learning porject activity of physicians in this sample. It is worth noting that many physicians mentioned their CME credits and wanted to discuss them during the interview. This mention of

CME credit took two general directions. In one aspect there were physicians who wanted the interviewer to know they really did learn, that they were interested in learning, and this might be proven by waving their course certificates. Others wanted to elaborate about how confusing, wasteful and disorganized the credentialing system was. These physicians vented their disgust with courses, learning methods, the faculty and all aspects of the CME credit process.

By and large physicians in this study indicated that a small portion of their self-directed learning was linked to credit awards. The expanded length of credit projects for general surgeons likely results from some of the unique aspects of this specialty. Perfecting the skills for surgical procedures, as well as learning new skills, requires substantial time and effort. General surgeons cited "learning new surgical procedures" as the predominant projects for which they receive credit.

Implications for Learning Credit

While traditional courses and credit earning learning will continue to enroll in courses and receive credit, yet it is likely that credit will be a bonus of side effect rather than a main issue or motivation.

It will be important for the continued evalation of state and specialty society licensure rules regarding credit requirements. Accrediting organizations have begun to consider a wide variety of experiences as worthy of credit,

Implications for Learning Credit

Work that does not earn credit may still contribute to learning in other ways, but it is likely that credit will be a factor at some point in the student's career.

If will be important for the continued evaluation [illegible] than a mere record of activity.

[illegible] Institutions may begin requiring students to [illegible] demonstrate learning rather than merely [illegible] Students who plan to transfer or pursue graduate study should [illegible] CME credit does not automatically [illegible]

Implications for Learning Credit

Work that does not earn credit may still contribute to learning in other ways, but it is likely that credit will be a factor at some point in the student's career. Students who plan to transfer or pursue graduate study should [illegible] CME credit does not automatically [illegible]

By and large physicians do not think about the CME credit process in terms of learning. Rather, they think about it in terms of "how many credits do I need?" and "how can I get them?" Physicians want to know what is required of them, and they want to know that they are getting credit for what they do. Physicians want to be told what to do, and they want to be told that they are getting credit for what they do. Physicians want to be told what to do, and they want to be told that they are getting credit for what they do.

thereby making physician access to filling these regulations reasonable. This direction of acknowledgement and awareness should be continued.

It has been suggested that physicians who are responsible professionals will continue their learning, with or without mandates, while non-accountable physicians will in no way be forced to learn and stay attune to the latest medical practices.

Learning Project Planners

Physicians overwhelmingly reported that the majority (89%) of their learning projects were self-planned. Second in occurance were one-to-one planners, followed by group planners, and object planners respectively. Physicians exhibited a substantial and varied use of learning planners in their learning projects.

The report of self-planned projects is in agreement with the findings of Tough (1978) and McCatty (1973). Tough suggests that the learner plans 73% and McCatty reports 76% of projects in the learner planned category.

A number of studies in the medical education literature have discussed and documented the importance of learning via physician peer consults, case studies and patient discussions. Physicians rely heavily on their professional colleagues for input, suggestions and feedback in may areas of their work. This networking is an important information source as well as a sociable relationship, so learning

Examination Guidance

Marks: [illegible]

Please note that [illegible] may be required to [illegible] and [illegible] where [illegible] or without [illegible], while [illegible] a candidate of [illegible] [illegible] behaviour [illegible] [illegible] [illegible]

planners can more easily become an extension of these well formed relationships.

The one-to-one and group planners were reported as second and third most helpful to physicians in this study.

The object or non-human resource, as a learning planner, was used to a limited extent and mentioned least overall.

The mixed planner category is minimally discussed as there is little knowledge about this type of planner activity. This is learning activity for which no single planner is dominant. However, it should be mentioned that 66% of the learning projects in this study cited some type of mixed planning method.

Implications of Learning Planners

The planning sources for physicians learning projects clearly state the importance of self-learner planning. It would be useful for both general education and medical education to consider and pay attention to the planning sources continuing learners employ.

Tough (1971) suggests that adults want more help planning their learning projects and may become disillusioned or frustrated if they do not find help in planning learning projects. Morris (1977) studied the learners' planning steps in great detail and he reports the most common problems and difficulties in planning. They included 1) setting objectives - how to start, 2) scheduling time to learn, 3) knowing whether or not they were progressing.

Limitations of the Study

There are several limitations of this study and these are discussed in this section. One major limitation was sample size. The sample was limited to twenty-nine physicians who are currently in medical practice or had been at sometime during the previous twelve months. It included only physicians with an M.D. degree and did not include D.O. degrees. While no attempt was made to generalize beyond the findings of this specific population of physicians, this sample is a microscopic picture of the physician population as a whole.

Secondly, there were only two physician specialities used in this study. Family physicians and general surgeons were selected in order to discern comparisons and differences among physician specialities with regard to learning patterns. However, no further generalizations about learning patterns of other medical specialities can be concluded from this study.

A third limitation relates to the self-selected nature of the sample population. While a random sample method was used to invite physicians to participate in the study, only those who agreed to be interviewed were used. Therefore, it is probable that only physicians interested in this research project, CME or general research would volunteer their time to participate.

I never use it.

Physics publication 3 — minor.

Physics quiz, (1) Explain in a few logical physical terms why a bicycle does not fall over when in motion.

Secondly, state why it is physically impossible to ride a bicycle on the moon. Justify physical and mathematical reasoning in detail.

I find statistics taught in the self-serving way that they are usually taught: as a subject with no apparent connection to anything else in the world. Why a random sample should be representative of the population it is drawn from, and why the standard deviation should have anything to do with the amount of error in estimates based on that sample, are mysteries to most students who manage to learn how to calculate them. Unless they are specifically interested in the subject, they rapidly lose sight of the fact that statistics is supposed to tell them something about the real world. Statistics are becomes a kind of mathematical game played with numbers that have become detached from their referents.

Physics: Induction 3 — minor.

Physics quiz, (1) Explain in a few logical physical terms why a bicycle does not fall over when in motion.

Secondly, state why it is physically impossible to ride a bicycle on the moon. Justify physical and mathematical reasoning in detail.

Induction Dec. Induction. Write an induction proof that $1 + 2 + \cdots + n = n(n+1)/2$ for all $n \geq 1$. Then, explain in your own words why induction is a valid method of proof. Induction only applies when a statement has been proved for a base case and a general case. Explain why both are necessary.

Physics quiz, (1) Explain in a few logical physical terms why a bicycle does not fall over when in motion.

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Physics: Induction 3 — minor.

Physics quiz, (1) Explain in a few logical physical terms why a bicycle does not fall over when in motion.

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This study included physicians from a limited geographic area. All physicians were in practice within less than an hours drive from two large university hospitals and several major medical centers. While this geographic area included both semi-rural and extremely urban settings, these physicians have access to unlimited educational resources if they desire. These physicians are not isolated and would not be forced to rely on any one specific educational source. They certainly have access to numerous learning activities and resources. Additionally, there were a vast number of physicians and medical specialists with whom they could seek a consult or refer patients.

The fifth limitation of this study was the definite time limitation of the interview session. The interviewer had requested one hour of the physicians time and most all physicians had allowed only that specific amount of time in their schedule. Most were seeing patients before and after the interview and were therefore anxious to stay on schedule. On occasion the nurse would signal the 60 minute time limit with a phone buzz or a knock on the office door. It is likely that additional learning projects could have been recalled and cited if interviewing time had not run out.

The location of the interview may also have created a bias and limitation in this study. All interviews, except two, were conducted in the medical office of the physician. They were all done during the work day, therefore the

and ended it with a flourish. The man had not run out.

The solution to the mystery may also have been the key to the physicians' escape. All information in this study, except for the medical records of the physicians, was destroyed.

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[illegible]

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that until [illegible] [illegible] could have been [illegible]

and ended it with a flourish. The man had not run out.

environment was a vocational and medical one. It may have been easier for physicians to recall learning related to medicine and their vocation since this is what the interview surroundings reflected. An interview in their home or non-medical setting may have produced a different emphasis on vocational and non-vocational learning.

Another limitation of this study was that the initial letter, sent to physicians inviting them to participate was signed by a physician who's title included direct association with traditional CME. This may have influenced participants image of this research project and thus they spoke more often about vocational and medical related topics. Or, they believed the interviewer wanted to hear about their traditional and formal continuing medical education activities. Perhaps this information effected their responses to the inquiry about credit for learning.

The fact that the physicians' memory was the only means used to recall learning experiences can also be considered a limitation. There was complete reliance on the physicians' memory to recall what had intentionally been learned over the past year. Over this period of time many of the specifics and details of learning activities may have decreased. While the intensely probing interview stirred up learning experiences, it is possible that some learning was forgotten or facts were confused. A second and perhaps shorter interview might reveal additional learning projects. Even a follow-up phone call might produce other learning activities.

Another invitation of this sort was that to participate in a physicians' meeting to be held in Boston, Massachusetts, and to present a paper. The paper was to be on the subject of my experiences in the field of psychiatry. I was to be given a generous honorarium, and all my expenses were to be paid. I was also invited to be the guest of honor at a dinner party to be given by the physicians who were sponsoring the meeting. I was very much interested in the invitation, and I wrote a letter to the physicians accepting the invitation. I told them that I would be glad to present a paper on the subject of my experiences in the field of psychiatry. I was also interested in the honorarium, and I told them that I would be glad to receive it. I was also interested in the dinner party, and I told them that I would be glad to attend it. I was also interested in the expenses, and I told them that I would be glad to have them paid. I was also interested in the guest of honor, and I told them that I would be glad to be the guest of honor. I was also interested in the meeting, and I told them that I would be glad to attend it. I was also interested in the physicians, and I told them that I would be glad to meet them. I was also interested in Boston, and I told them that I would be glad to visit it. I was also interested in the invitation, and I told them that I would be glad to accept it. I was also interested in the letter, and I told them that I would be glad to write it. I was also interested in the physicians' meeting, and I told them that I would be glad to attend it. I was also interested in the paper, and I told them that I would be glad to present it. I was also interested in the honorarium, and I told them that I would be glad to receive it. I was also interested in the dinner party, and I told them that I would be glad to attend it. I was also interested in the expenses, and I told them that I would be glad to have them paid. I was also interested in the guest of honor, and I told them that I would be glad to be the guest of honor. I was also interested in the meeting, and I told them that I would be glad to attend it. I was also interested in the physicians, and I told them that I would be glad to meet them. I was also interested in Boston, and I told them that I would be glad to visit it. I was also interested in the invitation, and I told them that I would be glad to accept it. I was also interested in the letter, and I told them that I would be glad to write it.

The hours of learning project activity reported were most always general estimates. Physicians were asked to define, in a matter of seconds, how much total time they recalled spending on a given project. These self-reporting time estimates may be biased and could contain either high or low estimates.

The tenth limitation to this study was that only a very specific type of learning was recorded or discussed during the interview. Only learning which fit the learning project criteria was discussed with physicians. Additionally, the time limit factor which established seven hours as a minimum amount of time spent on intentional learning, eliminated the review of other important learning which physicians had also done. Most likely there was more learning that occurred than is reported here.

Finally, choosing to focus on the amount of learning rather than the value or quality of learning is a limitation. The quantity of physician learning received the primary attention in this study. And, while the interview did briefly investigate the learning benefits, enthusiasm and amount of learning, these questions were of a general nature. There was no attempt to evaluate or measure the actual changes occuring from learning and therefore there was no assessment of physician behavior change. If these factors were qualitatively measured it may be possible to correlate quality of learning with quantity.

Recommendations for Further Research

Despite numerous advances, there are still many unknowns about physician learning. This study has examined a number of specific questions about how much, what and why physicians learn. However, many unanswered questions about physician learning still remain. The more questions that were answered in this study, the more questions there were which came up. This section will include suggestions for additional research in physician learning.

Additional in-depth interview studies of the same two specialities could be repeated. Since only twenty-nine physicians participated in this study, it is difficult to make generalizations or draw conclusions about all physicians. How does the amount of learning of family physicians and general surgeons, with similar demographic descriptions, compare with this study's findings? How many hours are spent? What percent of their projects are vocational? What resources did they use and are they interested in credit? It would be interesting to study physicians from georgraphic areas which were different from those in this study. Is there a difference in learning project participation for physicians in very remote areas? This study included only two women in the sample population and there was no analysis made of this as a factor in learning. This gender factor should be explored further and specifically analyzed.

Recommended Further Reading

Despite numerous advances, there is still much disagreement about physiology. It is not uncommon for a study to find a number of specific responses about how much, what and why physiology learn. Typically, many unanswered questions about physiology learning still remain. The more questions that are answered, the more questions there's more that remain. In this study, we ...

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Additionally, physicians of other specialties should be studied. There were only two specialties in this study and it would be useful to compare findings about other specialties. Would cardiologists indicate different learning patterns?

The quality or value of what physicians learn was minimally evaluated in this study. It would be useful to study the quality of learning in relationship to physician learning projects. Specifically, what was the personal value of the learning to the physician? Who did the learning primarily benefit? What behavior modifications resulted? If the major purpose of continued learning is a behavior, cognitive, or attitude modification, it would be appropriate to study self-directed learning projects with the purpose of investigating such change outcomes. Once these benefits were identified, comparisons with the various specialities or planner groups could be made.

Physicians who participated in this study were of a wide age variance. Age and its relationship tolearning activity should be analyzed in detail to determine its impact. Even though learning methods have not changed significantly over the last 20-30 years there may be a variation in learning patterns of younger versus older physicians. It would be helpful if educators could discern whether age played a factor in one's learning choices. Do younger physicians participate more or less in individualized self-directed learning than older physicians? Are younger physicians more likely to be curious or do they merely have more to learn?

Do older physicians participate in more non-vocational projects than younger physicians?

The interviewing environment is likely to be an influencing factor for physicians as they search their memory for learning projects. All but two of the physicians in this study were interviewed in their private office. A study should be conducted which would arrange for the interviews to be held out of the physicians' office. When physicians are in a vocational environment there may be a proclivity to recall projects which primarily relate to that environment. In this study it was often felt that the physician had just been with patients and they were still in their mind, or they were aware that patients were scheduled and waiting after the conclusion of the interview. It would be useful to assess whether the amount of vocational learning changed significantly in a study where the interviews were held in a more neutral territory.

This study sought to identify only those learning activities which took place in the twelve month period prior to the interview. While this criteria did allow for the comparison of findings with other studies using the same time interval, it did limit the projects which physicians cited. Studies of physician learning which were not time limited may produce quite different results.

The twelve month time frame also raises concerns as to the accuracy of physician recall over this extended time period. How accurately does one remember things learned over

an entire years time? Perhaps there were other learning project activities which physicians did not recall given the twelve month time span. An investigation of projects at several short intervals over the twelve month time period may be more accurate in presenting project numbers. The interview might be conducted four times, or every three months throughout the year. This would assure a higher degree of recall for specific learning activities and the project hour estimates are likely to be specific and highly accurate.

A study of physician learning projects which used a learning diary or learning planner in advance or in conjunction with the interview may produce more accurate recall of projects. This study relied on long-term memory recall in terms of physicians citing learning projects. Without any written records to assist in the recall of learning project activities there is an element of guessing that occurs. Physicians thus cite the activities they can most easily remember. Since probing often triggered other activities there is reason to suspect that additional learning activities may not have been remembered or triggered during the interview.

The large amount of vocational learning reported here raises a number of other interesting research hypotheses. Do all physicians spend the majority of their time learning about vocationally related subjects? How much time? Why do physicians spend more time learning in the vocational realm? Are the planners different for vocational learning?

Of interest to behaviorists would be the issue of learning motivations which were reviewed only briefly in this study. When physicians stated their reasons for learning about a particular subject matter that response was merely recorded and not explored in depth. Therefore, it is unclear why a physician chooses to research and study one patient problem and not another. How do these motivations effect a physicians' decision to a learning project?

Learning planners were also explored only briefly in this study. What needs do physicians have when planning their learning? Educators and resource facilitators could be considerably more helpful to physicians if they were aware of the specific tasks physicians need help with in their learning activities. To whom do physicians refer when they indicate group planners assisted them? And who are the one-to-one planners? How often are these planners used on each project? Does the use of planners vary among specialities? What specific activities do these planners aid physicians with? A study which focused on physician learning planners would have utility for both medical educators and physician learners.

The subject matter sources which physicians reported were merely descriptive in this study and not quantitative. An investigation of the specific learning resources which assist physicians in learning and the extent to which these resources are used would be useful. As an example, reading was the most frequently mentioned resource used in physicians

Dr Julie Sel

Physicians: Were you surprised by the
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projects yet there is no distinction about what specifically was read or how many hours were spent reading. What do physicians read most in their search for knowledge? How is access to these sources changing? To what extent is habit a factor in selecting a learning resource?

The only learning considered in this study was that which constituted at least seven hours of intentional learning time. Learning which consumed less than seven hours was not included and should be investigated. Certainly much valuable learning comes from projects of less than seven hours. A look at shorter learning would be of interest also.

Is it vocational learning? What is the subject matter content of shorter learning?

Credit as a learning motivator should also be reviewed in more detail. It would also be useful to determine whether credit learning is seen as more beneficial and effective in changing behavior than non-credit learning projects. When do physicians choose credit learning over non-credit learning?

The specific use of technology in learning projects should be investigated. As our society becomes more information intensive and geared up to technology this is an area of education that needs exploration. How do physicians use computers, video-recorders, and other media as part of their learning?

All of these implications for further research could expand the information base of physician learning and offer more insight into the self-directed learning activities of physicians.

CHAPTER 6

SUMMARY

Introduction

The purpose of the study was to examine self-directed learning activities of family physicians and general surgeons. The emphasis was on physician learning project participation, as this was the method used for investigating these learning behaviors. The study findings have implications for individual physicians and for planners of continuing medical education.

Medical educators have long strived to teach physicians that a part of their professional responsibility is to continue learning in a lifelong process. Indeed, physicians must gain new knowledge or refresh and reorganize current knowledge to avoid professional obsolescence. And like other adult learners, physicians employ a multitude of learning behaviors and learning resources as they go about this process of continual learning. Which of these learning behaviors are most effective in helping physicians keep up?

Many studies have examined physician learning. The majority have focused on traditional types of learning, and few have looked at the impact of non-structured educational processes by which physicians do a significant amount of learning. There is little information about how, when and to

what extent physicians use self-directed learning in their educational development and learning activities.

The purpose of this study was to investigate the self-directed learning activities of physicians. To what extent do family physicians and general surgeons engage in intentional self-directed learning as part of their continuing education? Specifically, this study focused on the major learning efforts of physicians as they attempted to change, to learn better or new ways to do things, to gain new knowledge and information, to change their perceptions, behaviors and/or performance.

The physician sample for this study included 13 general surgeons and 16 family physicians who practice in five counties surrounding the San Francisco Bay Area. Family physicians and general surgeons were chosen because these types of practices are quite diverse from one another and could offer interesting comparisons and behavioral contrasts. Physicians from five counties were selected in an attempt to secure a representative sample of physicians from urban and suburban areas, from both university settings and community hospitals.

A random sample of one hundred fifteen physicians and general surgeons (N=115) were invited by letter to participate. Thirty-five volunteer physicians responded and 29 agreed to participate in the study.

This study was exploratory-descriptive and used an investigative interview approach. The procedure used to

collect data was a structured face-to-face interview. Physicians were asked to describe their actions and preferences for acquiring information, knowledge and/or skills. In effect they were to describe in their own words how they assessed, designed and carried out their continuing learning experiences. The learning project concept, defined as a series of clearly related and deliberate learning episodes of at least seven hours, was the mechanism used for identifying these learning activities.

The interview schedule was a revised version of the original interview protocol Tough (1967) developed for studying characteristics of learning project participation. The schedule was modified slightly and supplemented with additional probes and questions in order to focus on physician learning activities and to investigate possible unique components in physician learning.

Interviews were conducted in the physicians' office and ranged in length from fifty-five to ninety minutes. One trained interviewer conducted all the interviews. The data was recorded on pre-printed worksheets for efficient retrival and interpretation. The interview questions focused on specific characteristics of self-directed learning. There were nine variables studied:

1) the frequency of learning project participation

2) the number of hours spent on learning projects

3) the subject matter content of learning projects

4) the motivations or triggers leading to a learning project
5) the major planner for each learning project
6) the types of resources used in learning projects
7) the desire for credit from learning projects
8) the degree of enthusiasm, benefit and amount learned
9) the status of the project (active or non-active)

Statistical analysis included t-tests for comparing the two groups of physicians and chi-square tests to examine the associations between variables.

Learning Project Participation

In this study 28 of the 29 physicians had participated in at least one learning project during the previous year. The range of learning project participation was 0 - 15 and the mean was 6.5 projects per physician. The amount of learning varied slightly among the specialities. The mean number of learning project hours per physician was 181. Although no statistical difference was found in the number of projects for the two specialities, there is a trend showing that family physicians participate in more learning projects than general surgeons. There is also no significant difference when comparing the number of learning project hours for the two groups.

Example 1 (Physics). Consider a system of two bodies of masses m_1 and m_2 moving under the influence of gravity. Let $\mathbf{r}_1(t)$ and $\mathbf{r}_2(t)$ denote their position vectors at time t. Newton's second law gives

$$m_1 \ddot{\mathbf{r}}_1 = -\frac{G m_1 m_2}{|\mathbf{r}_1 - \mathbf{r}_2|^3}(\mathbf{r}_1 - \mathbf{r}_2), \qquad m_2 \ddot{\mathbf{r}}_2 = -\frac{G m_1 m_2}{|\mathbf{r}_1 - \mathbf{r}_2|^3}(\mathbf{r}_2 - \mathbf{r}_1).$$

Subtracting the second equation from the first, multiplying by $m_1 m_2/(m_1+m_2)$, and setting $\mathbf{r} = \mathbf{r}_1 - \mathbf{r}_2$ yields the reduced equation

$$\ddot{\mathbf{r}} = -\frac{G(m_1+m_2)}{|\mathbf{r}|^3}\mathbf{r}.$$

Thus the relative motion is governed by a central force with gravitational parameter $\mu = G(m_1+m_2)$.

Example 2 (Biology). Let $N(t)$ denote the number of individuals in a population at time t, with per-capita birth rate b and per-capita death rate d. Then

$$\frac{dN}{dt} = (b - d)N.$$

If $b > d$ the population grows exponentially; if $b < d$ it decays; if $b = d$ it remains constant. Setting $r = b - d$ and $N(0) = N_0$ gives $N(t) = N_0 e^{rt}$.

Example 3 (Economics). Suppose a firm produces q units of a good at a cost $C(q) = aq^2 + bq + c$ and sells each unit at a price p determined by the market. The profit is $\pi(q) = pq - C(q)$. Maximizing profit requires $\pi'(q) = 0$, so $p = 2aq + b$. The second-order condition $\pi''(q) = -2a < 0$ confirms a maximum whenever $a > 0$.

Example 4 (Chemistry). The rate of a first-order reaction $A \to B$ is proportional to the concentration of A, so $[A](t) = [A]_0 e^{-kt}$ where k is the rate constant and $[A]_0$ the initial concentration. The half-life $t_{1/2} = \ln 2 / k$ is independent of $[A]_0$.

Example 5 (Computer Science). Let $T(n)$ be the number of comparisons made by merge sort on an input of length n. Then $T(n) = 2T(n/2) + n$ for $n > 1$ and $T(1) = 0$. Unrolling the recurrence gives $T(n) = n \log_2 n$ when n is a power of two.

Example 6 (Physics). The electric field at a point $\mathbf{r}$ due to a point charge q at the origin is $\mathbf{E}(\mathbf{r}) = \frac{q}{4\pi\varepsilon_0}\frac{\mathbf{r}}{|\mathbf{r}|^3}$. By the superposition principle, the field due to several charges is the sum of the individual fields.

Example 7 (Mathematics). The Fibonacci numbers F_n satisfy $F_{n+2} = F_{n+1} + F_n$ with $F_0 = 0$ and $F_1 = 1$. Their generating function $\sum_{n \geq 0} F_n x^n$ equals $x/(1 - x - x^2)$.

Learning Content

Both groups of physicians reported the majority (68%) of their learning projects as practical or of a problem solving nature. Nineteen percent were formal or related specifically to knowledge acquisition, and 13% were intra-self or related to personal development.

Findings were reviewed relative to vocational or non-vocational learning. Seventy-five percent of the projects were vocational or job related. Thirty-eight percent of physicians reported only vocational projects and one physician reported no vocational learning. There was a significant difference between the two specialities with general surgeons reporting more vocational projects.

Vocational projects were further classified with regard to the skill and knowledge physicians were seeking. Projects were assigned to categories of learning updates, focused learning and special interest which defined the learning content physicians selected. Learning updates represented 42% of projects, focused learning was 37% and special interest was 20% of all learning projects. These findings varied significantly between the two specialty groups.

Learning Motivations

The learning motivation findings indicate that these physicians primarily seek learning to solve patient related problems. Intellectual curiosity, personal interests and

keeping pace with technology were the next three most frequently mentioned learning motivations. The motivations for learning were not significantly different between family physicians and general surgeons.

Learning Planners

A learning planner is that person or object which aids the learner in carrying out their learning activity. Physicians overwhelmingly reported that the majority (89%) of their learning was self-planned. Other types of planners cited were group planners, one-to-one, object and mixed planners. Overall, physicians exhibited a substantial and varied use of planners in their projects.

Learning Resources

Nearly all learning projects included more than one learning resource, therefore twenty categories were identified to categorize the resources used. Reading, informal discussion, formal consultation and attending meetings were the primary resources physicians cited. Overall, the resources were very diverse and illustrate the resourcefulness physicians exhibit in seeking out learning.

Credit Awards

There was a striking lack of importance for credit as a learning motivator. When asked if their learning projects were motivated by a desire for credit, only one-fifth of

Chapter 3 — Dwarves

Dwarves are short, stocky folk who live in mountain halls and are famous for their skill with stone and metal. They are generally suspicious of outsiders but fiercely loyal to their clan and their king.

Dwarf Traits

Ability Score Increase. Your Constitution score increases by 2.

Age. Dwarves mature at the same rate as humans, but they're considered young until they reach the age of 50. On average, they live about 350 years.

Alignment. Most dwarves are lawful, believing firmly in the benefits of a well-ordered society. They tend toward good as well, with a strong sense of fair play and a belief that everyone deserves to share in the wealth that others amass.

Size. Dwarves stand between 4 and 5 feet tall and average about 150 pounds. Your size is Medium.

Speed. Your base walking speed is 25 feet. Your speed is not reduced by wearing heavy armor.

Darkvision. Accustomed to life underground, you have superior vision in dark and dim conditions. You can see in dim light within 60 feet of you as if it were bright light, and in darkness as if it were dim light. You can't discern color in darkness, only shades of gray.

Dwarven Resilience. You have advantage on saving throws against poison, and you have resistance against poison damage.

Dwarven Combat Training. You have proficiency with the battleaxe, handaxe, light hammer, and warhammer.

Tool Proficiency. You gain proficiency with the artisan's tools of your choice: smith's tools, brewer's supplies, or mason's tools.

Stonecunning. Whenever you make an Intelligence (History) check related to the origin of stonework, you are considered proficient in the History skill and add double your proficiency bonus to the check, instead of your normal proficiency bonus.

Languages. You can speak, read, and write Common and Dwarvish. Dwarvish is full of hard consonants and guttural sounds, and those characteristics spill over into whatever other language a dwarf might speak.

Dwarf Subraces

Two dwarf subraces are commonly found in the world. Choose one of them, such as hill dwarf or mountain dwarf.

Hill Dwarf. As a hill dwarf, you have keen senses, deep intuition, and remarkable resilience.

Ability Score Increase. Your Wisdom score increases by 1.

Dwarven Toughness. Your hit point maximum increases by 1, and it increases by 1 every time you gain a level.

physicians reported projects with a relationship to credit. Specifically, 8% of projects were motivated by a specific credit award. There was no significant difference between the two specialty groups with regard to credit motivation.

Enthusiasm, Benefit, Amount Learned and Project Status

Physicians perceived themselves as receiving extensive benefit and outcome from their learning projects. Surprisingly, the enthusiasm for learning was reported as only medium and this was true for both vocational and non-vocational projects in both specialities. A predominance of projects were reported to be active and on-going.

DISCUSSION

The self-directed learning activities described and evaluated in this study are distinguishable in that this specific learning project methodology has never been applied exclusively to a physician sample. The results indicate that physicians do a tremendous amount of intentional and self-directed learning. When compared to other studies of the general population this group of physicians' participated in fewer number of projects than did other professionals studied, but more projects than the average number reported in general population studies.

In an attempt to compare and contrast the learning behaviors of the two specialty groups comparisons were made for each of the nine learning variables. While there were

significant differences reported on several of these variables, one major difference among the two specialty groups was in the reporting of vocational project learning orientations. Learning updates consumed the majority (24%) of vocational projects of general surgeons, while focused learning was the orientation of most (23%) of family physicians vocational projects. Special interest projects were least mentioned for both groups of physicians. This raises interesting questions about the origin and motivational factors of learning project selection. Are there unique characteristics, of each specialty, which contribute to such a finding?

Several of the learning behaviors reported in this study confirm the general findings of other physician studies. This was true in the category of learning motivations, resources, planners and credit value. Physicians are practical and highly self-sufficient in their learning approach and rely on a variety of persons and other resources to obtain their learning.

CONCLUSIONS

The results of this study have definite implications for medical educators at all levels. There are four major conclusions which resulted from this study.

1. The traditional emphasis on teacher-directed CME needs further re-examination. This study confirms that

Architecture adaptable multiplateforme

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Fonctionnalités avancées

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physicians carry out large amounts of their continued learning efforts through self-directed learning activities. Therefore, the importance given to formal training and classroom learning may be unbalanced with respect to meeting physicians' real learning needs. Medical educators and CME providers must look at a fresh and pragmatic approach to physician learning if they are to be most effective in their educational efforts. Self-directed learning activities need further research and investigation, and certainly a more positive emphasis among medical educators.

2. Physicians primarily focus their learning efforts on practical, medically related learning. And, while there was a tremendous diversity in the subject matter which physicians reported, all physicians' expressed a tendency towards pragmatic learning. The demands of medical practice and the constant changes in medical knowledge push physicians to stay abreast and informed of content which relates specifically to care of their patients. These findings certainly impact CME program planning and call for more effective needs assesments of physician learning needs.

3. Physicians motivations for learning were primarily to solve patient care problems. The reasons cited most often for initiating a learning project were vocational and medically related. Specifically, physicians described patient care as the inducement for learning something new or reviewing current knowledge. These findings suggest that

Physiology research degree

Physiology research degree. Physiology research degree. Physiology research degree.

many physicians do keep up-to-date with current medical practices in order to give the best care to their patients. And, it raises questions about the necessity of mandatory continuing medical education requirments.

4. Physicians expressed a striking lack of importance for credit as a learning motivator. The majority of physician learning projects had little or no relationship to credit awards. It was clear that physicians did not view credit as a primary reason to initiate learning.

Medical students would benefit from undergraduate curriculums offering more support of and attention to self-directed learning. Teaching students the skills of assessing needs, planning learning, locating resources and evaluating outcomes would aid their ability for future self-directedness. Medical associations, specialty societies and continuing medical education providers might develop and promote their services as facilitators of learning rather than merely providers.

Generalizations from this study must be interpreted cautiously. The small sample size limits the ability to generalize these findings. Since only family physicians and general surgeons were interviewed, it is not possible to make generalizations of this data and apply it to other specialty groups. Also, the limited interview length and location may have created certain reporting limitations. Certainly

9. Exercise: Refactoring Legacy Code

Scenario: You've inherited a function that has grown over time. It works, but it's hard to read and test. Your task is to refactor it without changing its behavior.

```
def process_orders(orders, customers, products, discount_codes, tax_rates, shipping_rates, warehouses, inventory, config, logger):
    results = []
    for order in orders:
        if order['status'] == 'pending':
            customer = None
            for c in customers:
                if c['id'] == order['customer_id']:
                    customer = c
                    break
            if customer is None:
                logger.error(f"Customer not found for order {order['id']}")
                continue
            total = 0
            for item in order['items']:
                product = None
                for p in products:
                    if p['id'] == item['product_id']:
                        product = p
                        break
                if product is None:
                    logger.error(f"Product not found: {item['product_id']}")
                    continue
                price = product['price'] * item['quantity']
                if product['id'] in inventory and inventory[product['id']] < item['quantity']:
                    logger.warning(f"Insufficient inventory for {product['id']}")
                total += price
            if order.get('discount_code') in discount_codes:
                dc = discount_codes[order['discount_code']]
                if dc['type'] == 'percentage':
                    total = total * (1 - dc['value'] / 100)
                elif dc['type'] == 'fixed':
                    total = total - dc['value']
            tax = tax_rates.get(customer['region'], 0.0)
            total = total * (1 + tax)
            shipping = shipping_rates.get(customer['region'], 10.0)
            total = total + shipping
            results.append({'order_id': order['id'], 'total': round(total, 2)})
    return results
```

a) Identify at least four distinct problems with this code (readability, testability, performance, or design).

b) Refactor the function into smaller, well-named helper functions. Each helper should do one thing.

c) Write a brief docstring for the refactored `process_orders` function.

d) Explain how you would test the refactored code. What would you mock, and why?

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further research must be conducted with physicians to validate these findings and evaluate additional parameters of self-directed learning. Other specialties need to be studied and qualitative learning factors need further investigation.

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BIBLIOGRAPHY

Allerton, Thomas D. Selected characteristics of the learning projects pursued by parish ministers in the Louisville Metropolitan Area. University of Georgia, unpublished doctoral dissertation, 1974.

Allis E. The health professional as self-directed learner. Unpublished manuscript. North Central Regional Medical Education Center, Minneapolis, MN, October, 1980.

American Psychiatric Association. Individualized Learning Plan: Psychiatrist plan for CME. Department of Education, American Psychiatric Association, Washington D.C. 1972.

Aslanian, Carol B., and Brickell, Henry M. Americans in Transition: Life Changes as Reasons for Adult Learning. New York: College Entrance Examination Board, 1980.

Association of American Medical Colleges. Continuing education of physicians; conclusions and recommendations. AAMC ad hoc committee on continuing medical education, Sept. 1979.

Benson, Frank B., Jr. Learning Projects of Selected Administrators in Tennessee Colleges and Universities. University of Tennessee, unpublished doctoral dissertation, 1974.

Berg, H.M. Factors Differentiating Participant and Nonparticipant Nurses in Continuing Education. Columbia University, unpublished doctoral dissertation, 1973.

Bloom, B.S., et al. Taxonomy of Educational Objectives. Handbook I: Cognitive Domain. New York: McKay, 1956

Brookfield, S. "Self-directed adult learning: A critical paradigm." Adult Education Quarterly Vol.35, Winter, 1984, Pg. 59-71.

Burgess, Paul. "Reasons for Adult Group Educational Activities." Adult Education Vol. 22, No. 1, 1971, Pg. 3-29.

Castle, C. Hilmond and Storey, Patrick B. "Physicians' needs and interests in continuing medical education." Journal of the American Medical Association, Vol. 3, October 14, 1968, Pg. 611-628.

Catell, R.B., "Theory of fluid and crystallized intelligence: A critical experiment." Journal of Educational Psychology, Vol. 54, 1963, Pg. 1 - 22.

Competence in the Medical Professions: A Strategy. Hyattsville, Maryland: Division of Health Services Admin., Bureau of Health Manpower, U.S. Dept. of HEW, June, 1976.

Coolican, P. Self-Planned learning: Implications for the future of adult education. Technical report 74.507) Syracuse: Educational Policy Research Center, Syracuse University, 1974.

Cross, K. Patricia. The Missing Link: Connecting Adult Learners to Learning Resources. New York: College Entrance Examination Board, 1978.

Curry, L. Putnam W.R. "Continuing Medical Education in Maritime Canada: CMA Journal. Vol. 124, 1981, Pg. 563-566.

Davis, David A. "Continuing Education in the Community Hospital: An Interprofessional Approach". Journal of Medical Education, Vol. 52, Sept. 1977, Pg. 745-751.

Denys, Laurent O.J. The major learning efforts of two groups of Accra adults. University of Toronto, unpublished doctoral dissertation, 1973.

Dryer, Bernard V. "Lifetime Learning for Physicians," Journal of Medical Education, Vol. 37, 1962, Pg. 1 - 134.

Fair, James. Teachers as learners: the learning projects of beginning elementary school teachers. University of Toronto, unpublished doctoral dissertation, 1973.

Fenninger, L.D. "Education in the Health Professions." Nursing Outlook, Vol. 16, April, 1968, Pg. 30-33.

Field, Jeffery L. The learning efforts of Jamaican adults of low literacy attainment. University of Toronto, unpublished doctoral dissertation, 1977.

Fox, Robert D. and Harvill, L.M. "Self-assessments of need, relevance and motivation to learn as indicators of participation in continuing medical education," Medical Education, Vol. 18, 1984, Pg. 275-281.

Gardner, John. Self-Renewal: The Individual and the Innovative Society. New York: Harper and Row, 1963.

Geertsma, R.H. et al. "How physicians view the process of change in their practice behavior." Journal of Medical Education, Vol. 57, 1982, Pg. 752-761.

Greenberg, L. and Jewett, L. "CME providers and consumers: narrowing the gap." Continuing Medical Education Newsletter, American Medical Association, Vol. XII, March, 1983, Pg. 2-6.

Gregg, A. For Future Doctors. Chicago, University of Chicago Press, 1957.

Gross, Ronald. The Lifelong Learner. New York: Simon and Schuster, 1977.

Haynes, Brian R. and Davis, David A. et. al. "A critical appraisal of the efficacy of continuing medical education." Journal of American Medical Association, Vol. 251, No. 1, 1984, Pg. 61-64.

Hiemstra, Roger. "The older adult and learning." Department of Adult and Continuing Education, University of Nebraska, 1975.

Houle, Cyril O. The Inquiring Mind. Madison: University of Wisconsin Press, 1961.

_____. Continuing Learning in the Professions. San Francisco: Jossey-Bass, Inc., 1980.

_____. The Design of Education. San Francisco: Jossey-Bass Inc. 1972.

Jacks, L.P. Education Through Recreation. New York: Harper, 1932.

Johns, William E. Selected characteristics of the learning projects pursued by practicing pharmacists. University of Georgia, unpublished doctoral dissertation, 1973.

Johnson, Edwin. Selected characteristics of the learning projects pursued by adults who have earned a high school diploma and/or a high school equivalency certificate. University of Georgia, unpublished doctoral dissertation, 1973.

Johnson, Valerie, Herbert Levine, and Edward Lee Rosenthal. "Learning projects of unemployed adults in New Jersey." (Draft manuscript) New Brunswick, N.J.: Educational Advancement Project, Rutgers Labor Education Center, 1977.

Johnstone, John W.C. and Rivera, Ramon. Volunteers for Learning. Chicago: Aldine Publishing Company, 1965.

Kelley, Nancy E. A comparative study of professionally related learning projects of secondary school teachers. Cornell University, unpublished master's thesis, 1976.

Kidd, J.R. How Adults Learn. Chicago: Follett Publishing Co. 1973.

Knowles, M.S. The Modern Practice of Adult Education: Andragogy versus Pedagogy. New York: Association Press, 1970.

_____. Self-Directed Learning: A Guide for Learners and Teachers. New York: Association Proess, 1975.

Knowles, M.S. The Adult Learner: A Neglected Species. Houston, Texas: Gulf Publishing Co., 1978.

Knox, Alan B. Lifelong self-directed education in Fostering the Growing Need to Learn: Monographs and Annotated Bibliography on Continuing Education and Health Manpower. Rockville, MD. Health Resources Administration, Public Health Service, US Dept. of HEW, 1973.

_____. Adult Development and Learning. San Francisco: Jossey-Bass, 1977.

Kotre, John. Mann, Floyd C. and Vanselow, Neal. "The Michigan Physician and His Continuing Education," Michigan Medicine, June, 1971.

Kulich, J. An historical overview of the adult self-learner. Paper presented at the Northwest Institute on Independent Study: The Adult as a Self-learner, University of British Columbia, Vancover, February, 1970.

Lloyd, J.S. Abrahamson S. "Effectiveness of continuing medical education: A review of the evidence". Evaluation and the Health Professions, Vol. 2, September, 1979, Pg. 251-280.

Luikart, Clark. "Social networks and self-planned adult learning." University of North Carolina, Chapel Hill, unpublished doctoral dissertation, 1975.

Manning, Phil R. "Objectives of Continuing Medical Education". Continuing Medical Education Newsletter, American Medical Association, Vol. IX, January, 1980, Pg. 8 - 11.

Manning, Phil R. and Denson, T.A. "How cardiologists learn about echocardiography." Annals of Internal Medicine, Vol. 9, 1979, Pg. 469-471.

Margulies, N., and Raia, A.P. "Scientists, Engineers, and Technological Obsolescence." California Management Review, Vol. 10, 1967, Pg. 43-48.

Maslow, A.H. "Toward a humanistic biology", American Psychologist, Vol. 24, 1969.

McCatty, Cressy. "Patterns of Learning Projects Among Professional Men." University of Toronto, unpublished doctoral dissertation, 1973.

_____. "Patterns of Learning Projects Among Physicial and Health Education Teachers." Reporting Classroom Research, 1976, Pg.7-8.

McGovern, John P. and Roland, Charles G. William Osler, The Continuing Education. Springfield, Ill. Charles G. Thomas, Inc., 1969.

McLaughlin, Curtin P. and Penchansky, Roy. "Diffusion of innovation in medicine: a problem of continuing medical education". Journal of Medical Education, Vol. 40, May, 1965.

Means, Robert P. Information Seeking Behaviors of Michigan Family Physicians. University of Illinois, unpublished doctoral dissertation, 1979.

Meyer, T. "Continuing Medical Education and Professional Growth: The Physicians Protection". Illinois Medical Journal. Vol. 144, Sept., 1973, Pg. 217-21.

Miller, G.E. "Continuing education for what?" Journal of Medical Education, Vol. 42, April, 1967, Pg. 320-326.

Miller, Nancy and Peter B. Botsman. "Continuing education for extension agents." Human Ecology Forum, Vol. 6, 1975, Pg. 14 - 17.

Millis, John S. A Rational Policy for Medical Education and Its Financing. New York City: The National Fund for Medical Education, 1971.

Moran, V. "Study of comparison of independent learning activities vs. attendance at staff development by staff nurses". Journal of Continuing Education Nursing, Vol. 8, 1977, Pg. 14-21.

Morris, J.F. The Planning Behaviour and Conceptual Complexity of Selected Clergymen in Self-Directed Learning Projects related to their Continuing Professional Education. University of Toronto, unpublished doctoral dissertation, 1977.

Murchland, J.B. "The implications of andragogy on continuing education". Journal Trans. Ophthal. Soc., Vol. 33, 1981, Pg. 108-111.

National Science Foundation. Continuing Education for R & D Centers. Washington, D.C. National Science Foundation, 1969.

Penland, Patrick R. Individual Self-planned learning in America. University of Pittsburg, unpublished manuscript, 1977.

Pennington, Floyd C. Program development in continuing professional education: A comparative analysis of process in medicine, social work, and teaching. University of Illinois, unpublished doctoral dissertation, 1976.

Peters, John M. and Susan Gordon. Adult learning projects: A study of adult learning in urban and rural Tennessee. University of Tennessee, 1974.

Price, E.M. Learning Needs of Registered Nurses. New York: Teachers College Press, Columbia University, 1967.

Ribble, J.G., Burkett, G., and Escovitz, G.H. "Priorities and practices for continuing medical education program directors". Journal of American Medical Association, Vol. 245, 1981, Pg. 160-163.

Richards, Robert K. and Cohen R.M. "Why physicians attend traditional CME programs", Journal Medical Education, Vol. 55, 1980, Pg. 479-485.

_____. The Value and Limitations of Physician Participation in Traditional Forms of Continuing Medical Education/Part 1. Kalamazoo, Michigan: The Upjohn Company, 1981.

_____. Why Physicians Attend Traditional CME Programs. Kalamazoo, Michigan: The Upjohn Company, 1981.

_____. The Value and Limitations of Physician Participation in Traditional Forms of Continuing Medical Education/Part 2. Kalamazoo, Michigan: The Upjohn Company, 1983.

Richards, Robert K. The Physician and Self-directed Learning Projects, Kalamazoo, Mich: The Upjohn Company, 1985.

_____. "Will you be in school forever? The Future of Continuing Medical Education?" Medical Dimensions, Vol. 7. June/July, 1978.

Rogers, C.R. Freedom to Learn. Columbus, OH: Merrill, 1983.

Scott, A.J. "Continuing education: More or better?" New England Journal of Medicine, 1976; Pg. 444.

Smith, L.H.Jr. "Medical Education for the 21st Century". Journal of Medical Education, Vol. 60, Feb. 1985, Pg. 106-112.

Suter, E. et. al., "Continuing Education of Health Professions: Proposals for a definition of quality". Journal of Medical Education, Vol. 56, Aug. 1981, Pg. 687-707.

Tough, A.M. Learning without a teacher: A study of tasks and assistance during adult self-teaching projects. Toronto: The Ontario Institute for Studies in Education, 1967.

_____ Why adults learn: A study of the major reasons for beginning and continuing a learning project. Toronto, Ontario Institute for Studies in Education, 1968.

_____. The adult's learning projects: A fresh approach to theory and practice in adult learning. Toronto, The Ontario Institute for Studies in Education, 1978.

_____. "Major Learning Efforts: Recent Research and Future Directions." Adult Education. Vol. 28, 1978, Pg. 250-263.

Verner, C. Adult Education: Theory and Method: A Conceptual Scheme for the Identification and Classification of Processes. Chicago: Adult Education Association, 1962.

Vollan, D. Postgraduate Medical Education in the U.S. American Medical Association, Chicago, 1965.

APPENDIX A

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

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SANTA BARBARA • SANTA CRUZ

SCHOOL OF MEDICINE
DEPARTMENT OF MEDICINE

SAN FRANCISCO, CALIFORNIA 94143

Dear Doctor;

WE NEED YOUR HELP!! We are interested in HOW PHYSICIANS LEARN. To explore this we have an exciting project underway to look at how physicians keep up with what's new in medicine. All of us learn, but we learn different things, in different ways for different reasons.

I, Linda, am a doctoral student and have chosen to do my dissertation research in the field of continuing medical education. I intend to collect information about physician learning styles and subsequently offer a knowledge base to the field of CME about learning activities of physicians.

I, David, am a practicing internist and the Director of Extended Programs in Medical Education at the University of California, San Francisco and thus have an invested interest in promoting effective CME. I would urge your support of Linda's research and concur that her project results will make a significant contribution to the field of continuing medical education.

WHAT DO WE WANT FROM YOU? We need 45-60 minutes of your time to discuss how you learn. These face-to-face meetings will be informal and will be scheduled at your time convenience and in your choice of location.

WHY WERE YOU CHOSEN? Your name was chosen from a selected sample of family practitioners general surgeons in the Bay area. It is important for the research design to achieve a high percent of positive responses.

WOULD YOU PLEASE PARTICIPATE? You will receive the tabulated results of this survey and the information you share will be completely confidential. Your participation in this survey will remain anonymous.

WON'T YOU TAKE A RISK.....and share 45-60 minutes of your life telling us about how you learn best, why you spend time learning and how you choose what you will learn? Your contribution is significant and will supply us with necessary information to be used to develop a national survey.

PLEASE RETURN THE ENCLOSED POSTCARD with your response. If you choose to participate, I will phone you soon to arrange the interview.

Thank you.

Sincerely,

David S Gullion, MD

David S. Gullion M.D.
Director, Extended Programs in Medical Education, UCSF

Linda J. Hummel

Linda J. Hummel
Doctoral Student

LEARNING ACTIVITIES OF PHYSICIANS

RETURN RESPONSE - Please send in enclosed post-paid envelope.

_____ *I WILL PARTICIPATE IN THE "LEARNING ACTIVITIES OF PHYSICIANS" STUDY.*

_____ *I WILL NOT PARTICIPATE IN THE "LEARNING ACTIVITIES OF PHYSICIANS" STUDY BECAUSE* _____

_____

_____ *I'M UNDECIDED!! GIVE ME A CALL AND WE'LL TALK MORE. MY PHONE NUMBER IS* _____

_____ _____

NAME Phone Number

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

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SCHOOL OF MEDICINE
DEPARTMENT OF MEDICINE

SAN FRANCISCO, CALIFORNIA 94143

Dear Physician:

Thank you for taking time from your busy schedule to participate in the "Learning Activities of Physicians" study. Your input and information sharing will be most helpful as we build a theory relative to physician learning efforts and learning patterns.

Following the completion of all physician interviews the data will be analyzed and tabulated and we will mail the findings to you for your information. We hope you will find it useful and informative

Thanks again for your time and effort.

Sincerely,

David S. Gullion

Linda J. Hummel

APPENDIX B

INTERVIEW PROTOCOL

FOR STUDYING SOME BASIC CHARACTERISTICS OF LEARNING PROJECTS

A STUDY OF PHYSICIANS' LEARNING PROJECTS

My research is about how physicians learn. How they learn in general, but specifically how physicians keep pace with changes in clinical practice, keep up with what's new in medicine, or re-acquaint themselves with things they've forgotten.

Everyone learns, but we all learn different things in different ways.

I'm interested in talking about and listing the things you have tried to learn during the past year....those things related to medicine and those things that are not related at all to your profession.

When I say learn I don't mean just the learning that people do in classrooms, colleges or hospital conferences. I mean any sort of deliberated effort at all to learn something, or to learn how to do something. Most likely you have tried to get some information or knowledge, or to gain some new skills or improve old ones, or to increase your sensitivity or understanding or appreciation.

Can you think of any deliberate efforts like this that you have made to learn something, during the past twelve months?

(PAUSE FOR TIME TO THINK)

Try to think back over all of the past twelve months...right back to November/December of last year. I am interested in any deliberate effort you made to learn something. Anything at all can be included, regardless of whether it was easy or hard, medically related or not, big

or little, important or trivial, serious or fun.

It doesn't matter when your effort started, as long as you have spent at least a few hours at it sometime since last November/December.

We want to get as complete a list as possible of your learning efforts, because we think that physicians, like other adult learners, make many more attempts to learn than is acknowledged. We can include any sort of information--knowledge, skills, or understanding....snything that you hve made an effort to change or explore. Just as long as you spent at least a few hours at it sometime during the past twelve months.

What else do you recall?

(PROBE SHEET # 1A)

Are there other things you learned related to medicine?

(PROBE SHEET # 1B)

I'd like you to look at this list of some of the things that people learn. It may remind you of still other things that you have tried to learn during the past twelve months. Take as long as you want to read and to think about whether you have tried to learn something similar.

(PROBE SHEET # 1C)

O.K. Thank you. That gives us a fairly complete list it seems. If you suddenly think of something else you have learned let me know.

LEARNING MOTIVATION

Now I want to find out a bit more about these things you named as

your efforts to learn. In this instance I'm specifically interested in those efforts which relate to your vocation or practice of medicine. So let's begin with the first medically related learning effort on your list. It was your effort to learn _____. Can you talk more about what led you to want to learn about _____. Do you remember if

there was one specific reason or several reasons that you initiated this learning effort? Can you think of a specific incident that triggered your desire to learn about_____?

LEARNING SOURCES/RESOURCES

How did you go about learning _____? What sources did you seek out or go to as you began this deliberte learning effort? Are there certain resources that you always use when you have something to learn or were these sources of learning new to you?

TIME SPENT LEARNING

Next, I'd like to explore time factors related to your learning activities. Again, going back to the first learning effort we discussed, I'd like to suggest that you use this sheet as an aid in estimating the number of hours spent planning, preparing and learning.

(PROBE SHEET # 1D)

ACTIVE, ENTHUSIASM, BENEFIT, AMOUNT LEARNED

Another component which is of interest in this study of learning

efforts relates to your perceptions of learning outcomes. These next four questions, with reference to each of the learning efforts you've just described, will relate to outcome.

Which of these two answers best describes learning effort number ____ at this present time? 1) NOT VERY ACTIVE: that is, you have dropped it or completed it, or you have set it aside for awhile, or you are spending much less time at it than you were before. B) DEFINITELY ACTIVE.. that is you are definitely continuing this learning effort right now, and you are spending about as much time as ever at it.

Secondly, please think for a moment about how much knowledge, information and understanding you gained as a result of this one learning project....or think about how much your skills and habits improved...or how much your attitudes or sensitivity changed. Would you say overall, A) you learned a LARGE amount or changed a great deal, B) you learned a MODERATE amount, or C) you changed or learned a LITTLE?

Next, let's talk about your enthusiasm for this learning. How enthusiastic are you about having this new knowledge and skill about _____? A) VERY enthusiastic, B) QUITE enthusiastic, or C) NOT VERY enthusiastic.

Lastly, is the issue of learning benefits. Let's set aside your own benefits for a moment, and look at any benefits for other people. Your new knowledge and skill might have been of some benefit to your patients, your family, your friends or relatives, your medical colleagues or community. To what extent did the knowledge and skill you gained provide some benefit to people other than yourself? A) To a LARGE extent, B) to a MEDIUM extent, or C) only to a SMALL extent.

CREDIT

In any of your learning efforts listed so far, was credit any part of your motivation for learning? Did you hope to use any of your learning efforts towards certification or a degree? Was any of your learning directed towards passing a test or examination? Completing an assignment for a course, or toward some requirement or examination related to your job?

(FOR EACH LEARNING PROJECT THAT WAS FOR CREDIT)

> I'd like you to think for a minute of all the reasons for this particular learning effort. Was your desire for credit about 1/4 of your total motivation for learning, or 1/2, or 90%. What portion was it?

(RECORD AS CREDIT IF 50% OR HIGHER)

LEARNING PLANNER

This is the last component to be explored for each of the learning projects you've listed. I'd like to look at the learning efforts, in the same order, and try to decide who and what was the planner of your learning efforts. That is, who decided what you would learn, and how you would learn whenever you spent some time trying to learn?

(PROBE SHEET # 1E)

Using these descriptions of planners as an aid tell me who planned your learning effort. The first learning effort in our list is

_____. Does it fit into one of the four types of planners on this sheet?

That's the end of our interview. Thank you very much for your time and sharing your learning efforts with me.

PROBE SHEET # 1 A

SOME THINGS THAT PEOPLE LEARN ABOUT

A sport or game; jogging; swimming; dancing; bridge

Current Events; public affairs; politics; peace, biography

Medical technology; new mechanics in medicine; use of latest medical equipment

Home repairs; woodworking; home improvement project; decorating and furniture

A hobby or craft; collecting something; photography

Raising a child; discipline; infant care; child's education

nature; agriculture; birds

mathematics; statistics; economics

speed reading; effective writing; public speaking; vocabulary; literatue

science; astronomy; man in space

health; physical fitness; nutrition; personal appearance; losing weight

history; geography; travel; some region or city or neighborhood

personal finances; savings; insurance; investing; stock market; puchasing something

psychology; effective relationships with other people; group dynamics; leadership

solving personal problems; mental health; an emotional problem

careers; changing specialities; choosing a new occupation; locating a new job

gardening, landscaping

Computers; home personal; office computer systems; micro-computers

musical instrument; singing; music appreciation

professional or technical competence; sales skills; how to teach or supervise

some aspect of religion; ethics; philosophy; moral behavior

current changes in society; the future; changing family life; problems in cities;

dating; relationship with the opposite sex; manners; marriage;

art; painting; architecture

practice management; running an office; hiring staff; investing in medical equipment

French; Latin; Spanish; English, some other language

PROBE SHEET 1B - MEDICALLY RELATED LEARNING EFFORTS

HAVE YOU LEARNED ANYTHING ABOUT.....

RUNNING THE OFFICE, OFFICE ADMINISTRATION, PERSONNEL MANAGEMENT, OFFICE PROCEDURE?

NEW DRUG USE? INTERACTIONS OF DRUGS?

HAVE YOU LEARNED ANYTHING FROM SALESMEN OF ANY TYPE?

HAVE YOU LEARNED A NEW DIAGNOSIS OR TECHNICAL ASPECT OF MEDICINE?

DO YOU RECALL BEING CURIOUS ABOUT SOMETHING A COLLEAGUE MENTIONED OR ASKED ABOUT?

DO YOU RECALL LEARNING SOMETHING FROM A JOURNAL THAT "WARNS" AGAINST SOMETHING?

DO YOU EVER LEARN THINGS AS A RESULT OF PATIENT QUESTIONS?

HAVE YOU BECOME AWARE OF CHANGES IN RISK OR COST FACTORS RELATED TO YOUR PRACTICE?

HAVE YOU LEARNED SOMETHING SPECIFIC AS A RESULT OF "SOMETHING GOING WRONG"

PROBE SHEET 1C OTHER THINGS YOU MIGHT RECALL LEARNING ABOUT.....

Can you recall any other effort to learn that were related to your home or your family life? Anything related to your hobbies or recreation? Your medical practice? Your responsibilities in various organizations, or clubs, or in a church, or on a committee, or some other responsibilities? Anything related to some teaching, writing, or research that you do outside of or within your medical practice?

Thinking back over the past 12 months, can you recall any other times that your tried to learn something by reading a journal or book? When you read newspapers or journals do you read certain topics or sections because you want to REMEMBER the content? Have you tried to learn anything else from booklets, pamphlets, or brochures? From memos, letters, instructions, or plans? From technical or professional literature? From material from a library? From workbooks or programmed instruction? From an encyclopedia or other reference material?

Have you learned anything from a private teacher? From a counselor or therapist? From a financial or tax advisor? From a coach? From a fellow physician? From a specialist or expert?

Have you learned anything from documentaries or courses on television? From TV news or some other TV programs? From radio? From a computer or computer course? Have you deliberately sought to learn by seeking out stimulating individuals?

PROBE SHEET 1 D

TIME SPENT IN LEARNING EFFORTS

3. We need your best guess about the total amount of time you spent at all aspects of this learning effort during the past 12 months.
Please include the time you spent reading --listening--talking to peers--observing--or learning in some other way---if your MAIN purpose during that activity was to gain or retain certain knowledge or skill. In other words we will include all the times during which at least half of your total motivation was to gain certain knowledge or skill, and to retain it until at least two days later.

In addition to the time you spent at the actual learning itself, please include all the hours that you spent, during the past 12 months at deciding about the learning, planning the learning, and preparing and arranging for it. This can include any time spent at deciding whether to proceed with the learning --deciding what to learn--deciding how to learn ---deciding where to get help---seeking advice about these decisions(from other people or fromprinted materials)--traveling to some of the learning activities, such as a meeting or practice session or library--arranging appropriate conditions for learning--choosing the right book or person for the actual learning--obtaining that book or reaching that person.
Of course, you cannot remember exactly how many hours, so just give your best guess.

- -

4. Which of these two answers best describes this particular learning effort at the PRESENT time?

A. NOT VERY ACTIVE --that is, you have dropped it or completed it, or you have set it aside for awhile, or you are spending much less time at it than you were before.

B. DEFINITELY ACTIVE --that is, you are definitely continuing this learing effort right now, and you are spending about as much time as ever at it.

5. Please think for a moment about how much knowledge, information and understanding you gained as a result of this one learning project --- or think about how much your skills and habits improved ---or how much your attitudes or sensitivity changed.

Would you say that altogether;

A. you learned a LARGE amount or changed A GREAT DEAL;

B. you were about halfway between A and C;

C. you changed or learned A LITTLE

6. How enthusiastic have you been about having this new knowledge and skill?

F. VERY enthusiastic

G. QUITE enthusiastic

H. NOT ESPECIALLY enthusiastic

7. Let's set aside your own benefits for a moment, and look at any benefits for other people. Your new knowledge and skill might have been of some benefit to your patients, your family, your friends or relatives, your medical practice or your profession.

To what extent did the knowledge and skill you gained provide some benefit to people other than yourself?

J. to a fairly LARGE extent

K. to a MEDIUM extent(halfway between J and L)

L. only to a SMALL extent

PROBE SHEET 1 E

WHO PLANS LEARNING EFFORTS

There are four different sorts of learning efforts, according to who plans them. That is, a person's efforts to learn can be classified according to who was responsible for the day to day planning. We have to look at who planned or decided exactly what and how the person should learn at each session. For example, who decided what you would read or hear, or what else you should do in order to learn about a particular thing?

1. You may have decided to attend a GROUP, a CLASS or a CONFERENCE in order to learn....thus letting the group (or its leader) decide the activities and details of your learning. A group may be any size...from 5 to 100.

2. Your other learning efforts may have been planned or decided upon by some other person....who helped you in a ONE-TO-ONE learning situation. That is, there was one learner (you) and one helper (instructor, expert, or friend) who interacted with you face-to-face or through correspondence or on the phone.

3. Some of your learning efforts might have used a nonhuman resource as the OBJECT for planning or facilitating learning...the detailed planning regarding what to learn and what to do was done by an OBJECT. (Examples: set of recordings, a series of TV programs, programmed instruction materials, workbooks, language labs.)

4. Still other of your learning efforts may have been planned by YOU, THE LEARNER. If you were the one who was primarily responsible for the day-to-day planning and decision making about what to learn you were self-planning your learning. You may have gotten advice from various people and have used a variety of materials and resources, yet you actually decided WHAT TO LEARN, WHEN TO LEARN, WHAT ACTIVITIES AND RESOURCES TO DO NEXT.

INTERVIEW SCHEDULE FOR STUDYING SOME BASIC CHARACTERISTICS OF LEARNING PROJECTS:

DATA COLLECTION SHEET

LEARNING PROJECTS

1. DESIRED KNOWLEDGE AND SKILL:

2. MOTIVATION FOR LEARNING/ TRIGGERS / CRITICAL INCIDENTS

3. NUMBER OF HOURS:

4. A B

5. A B C

6. F G H

7. J K L

8. CREDIT? NO YES _____%

9. TYPE OF PLANNER

GROUP WITH PROFESSIONAL

PEER GROUP

ONE-TO-ONE PROFESSIONAL

ONE-TO-ONE FRIEND/RELATIVE

OBJECT (NON-HUMAN RESOURCE)

LEARNER (SELF-PLANNED)

MIXED

10. MAJOR SOURCE OF SUBJECT MATTER:

Demographic Data Form

MEDICAL SCHOOL _____ YEAR OF GRADUATION _____

TYPE OF PRACTICE _____SOLO _____GROUP _____PARTNERSHIP/CORP.

APPROXIMATE HOURS SPENT IN PRACTICE EACH WEEK _____HOURS

AGE_____ DO YOU OWN A COMPUTER? _____IN YOUR PRACTICE
_____AT HOME

IF YOU OWN(ED) A COMPUTER WOULD YOU USE IT IN YOUR CONTINUING MEDICAL EDUCATION? _____YES _____NO _____UNSURE

COLORADO AND ILLINOIS HAVE BOTH RECENTLY WITHDRAWN THEIR MANDATORY REQUIREMENTS FOR CATEGORY I CME CREDIT. IF CALIFORNIA FOLLOWED SUIT, WOULD YOU ATTEND: _____FEWER _____MORE FORMAL CME COURSES?

DO YOU BELIEVE THAT YOUR CONTINUED LEARNING, WHETHER SELF-INITIATED READING, COLLEAGUE CONSULTATION, OR TRADITIONAL CME COURSES CHANGES THE WAY YOU CARE FOR PATIENTS? _____YES _____NO _____SOME
(DESCRIBE)