

SELF-DIRECTED LEARNING READINESS IN MEDICAL STUDENTS AT
THE OHIO STATE UNIVERSITY

DISSERTATION

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By

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CHAPTER I

Introduction

This chapter presents an overview of one of the most important problems facing medical educators today; how to prepare medical practitioners who are able to effectively manage and direct their own continuing education. Continuing education is critical for many professions, but perhaps none so much as medicine.

Problem Area

Past evaluations have frequently criticized the medical curricula for too often emphasizing the memorization of large amounts of information rather than the development of the ability to independently assimilate knowledge. “Pressures expected by the overwhelming amounts of facts that students must absorb and memorize hinder the development of effective and efficient learning habits” (AAMC, 1984, p. 127). The medical knowledge base is enormous with the half-life of useful knowledge and skills shrinking with increasing speed (Knowles, 1984). Encouraging students to memorize sizable portions of this information base is a wasteful use of the precious time available for the development of the medical practitioner.

Medical educators should make use of this time encouraging the development of independent learning skills, thus enabling medical students to continue learning independently throughout their professional careers. Dyer, critic of the traditional curricula stated: “all signs indicate that we have done an unsatisfactory job in achieving this objective” (Dyer, 1962, p. IX). “ ‘To help the students establish essential habits . . . of continuing self education’ has been enunciated by the AAMC as an objective of undergraduate medical education,” asserted Bowers (Bowers, 1962, P. IX). Yet Dyer (Dyer, 1962, p. IX) stated, “perhaps the medical schools do not inculcate life-long habits of self-education.”

The Ohio State University is one of a few medical colleges that have implemented an Independent Study Program (ISP). At Ohio State, students may choose to enroll in the independent study program rather than the traditional Lecture-Discussion Program (LDP). The purpose of the independent study program is to allow individual an alternative to the traditional medical curriculum. The independent study program offers students the opportunity to take greater responsibility for their learning.

Whether the ISP path option contributes to higher levels of self-directed learning readiness has yet to be determined. A method of assessing the self-directed learning ability of medical students should be established to ascertain if the medical curriculum is inculcating self-directed learning abilities in the students.

Problem Statement

The purpose of this study is to investigate self-directed learning readiness (SDLR) in medical students at The Ohio State University. Questions to be addressed include, do the independent study students have higher SDLR scores than the lecture-discussion students, and to SDLR scores differ between the class years for the first three years of coursework? The first year of medical schools is identified as Med I, the second as Med II and the third as Med III. Self-directed learning (also referred to as: self-instruction, autonomous learning, independent learning, independent study, self-study (Guglielmino, 1977)) is defined by Griffin as a learning situation “which allows a student to develop personal competencies through experiences as an individual but in interaction with others when needed” (Griffin, 1965, p.2). Self-directed learning readiness will be measured by the Self-Directed Learning Readiness Scale (Guglielmino, 1977).

This study will investigate:

1. What is the self-directed learning readiness of the medical students at The Ohio State University?
2. Is there a difference between the medical education paths, ISP and LDP, in SDLR scores in any of the three class years (Med I, Med II, Med III)?
3. How to the variables listed below relate to SDLR scores?
 - a. age
 - b. race

- c. level of education previously attained
- d. participation in an honors or special track program
- e. type of undergraduate major
- f. gender
- g. path
- h. year

Importance of Topic

“It is the ideal of every profession, stated or implied in its code of ethics, that each professional should feel a deep and continuing concern that his or her own education be carried out at a high level throughout a lifetime of practice” (Houle, 1980, p. 305-306). In the medical professions it is clearly indicated that such a concern be evident in its members. Rappleye (Commission on Medical Education, 1932, p.171) writes: “the course can only begin the education of the physician, for he must remain a student throughout life.”

The American Medical Association (AMA) and the Association of American Medical Colleges (AAMC) continue to advocate the development of independent learning skills in medical students. In Physicians for the Twenty-First Century the need for medical schools to help students develop skills in how to learn was identified: “general professional education should prepare medical students to learn throughout their professional lives rather than simply to master current information and techniques” (AAMC, 1984, P.11).

The need to evaluate the self-directed learning abilities of medical students was also identified:

medical faculties should adopt evaluation methods to identify: (a) those students who have the ability to learn independently and provide opportunities for their further development of this skill; and (b) those students who lack the intrinsic drive and self-confidence to thrive in an environment that emphasizes learning independently and challenge them to develop this ability (AAMC, 1984, p.11).

To date, no investigation designed to assess self-directed learning readiness in medical students has been found in the literature. This investigation will use the Self-Directed Learning Readiness Scale (Guglielmino, 1977) to assess self-directed learning readiness in the medical students at Ohio State.

Key Terms and Definitions

Continuing Education

Several definitions of continuing education emphasize the distinction between education and continuing education. Continuing education is something the learner chooses to return to, whereas education is something typically chosen by someone else for the learner. Specifically, this implies that there has been a lapse in time from the initial educational experience, during which a perceived lack of information or recognized change in information content requires further learning by the individual. The individual recognizes this difference and initiates some action to correct it.

The necessity to keep on learning throughout life seems so obvious to the leaders of most professions that they believe that its self-evidence will cause it to be internalized within the system and pattern of actions of every practitioner. But an examination of the practices of professional schools often shows that this idea is nowhere communicated systematically and thoroughly (Houle, 1980, p.85).

Further, the internal recognition of the importance of continuing education must be instilled in the professional early and as part of their basic training. Houle (1980, p.85) stated,

If the custom of continuing to learn is not established in the years of pre-service instruction, the failure to practice it will have increasingly serious consequences: Pre-service students do not have to “cover the ground”, and later they will not know how to do so.

“Continuing education should be considered as part of an entire process of learning that continues throughout the lifespan” (Houle, 1980, p.308).

Continuing education is provided in a variety of instructional modes. Most professions and accrediting agency continue to place an emphasis on the traditional lecture mode of instruction. The lecture, however, may not be the most effective or efficient mode available. Houle encourages educators and professional organizations to recognize the importance of self-directed learning as the ultimate outcome of having internalized the importance of continuing education. “To achieve its greatest potential, continuing education must fulfill the promise of its name and be truly continuing – not casual, sporadic, or opportunistic. This fact means essentially that it must be self-directed” (Houle, 1908, p.13).

Continuing Medical Education

The medical community has long recognized the need for continuing education partially due to rapid changes in technology. Sheperd (1960) reported that as early as 1932 the Commission on Medical Education was recommending compulsory continuing medical education. Brown and Uhl (1970) affirm that one of the “basic principles essential for achieving the goals of medical excellence and a high quality of medical care . . . [is] the physician must remain ‘a lifelong student’!”.

Physicians are active in a variety of continuing education programs. The American Medical Association reported in 1980 that physicians in the United States spent an average of 13.4 hours per week engaged in continuing medical education and attended formal continuing education courses at an average of 12.7 days per year.

Medical professionals must be acutely aware of their learning needs and abilities. The medical professional must be a self-directed learning – one who is able to identify information that needs to be acquired and where and how to acquire it.

Self Directed Learning

Self-directed learning has been extensively discussed in the adult education literature since the middle of the century. A basic definition might state that self-directed learning is any activity in which the learner initiates and takes responsibility for the learning.

Oddi (1987) stated that some of the confusion over the concept of self-directed learning originates in the variety of terms used to identify it. Oddi identifies ten different labels describing self-directed learning: self-education, independent study or independent learning, self-teaching, self-instruction, individual learning, independent self-education, autonomous learning, self-directed inquiry, self-initiated learning and androgological learning.

Knowles (1973, p.8) defines self-directed learning as:

a process in which individual take the initiative, with or without the help of others, in designing their learning needs, formulating learning goals, identifying human and material resources of learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes.

Guglielmino (1977) defined, a highly self-directed learner as:

. . . one who exhibits initiative, independence, and persistence in learning; one who accepts responsibility for his or her own learning and views problems as challenges, not obstacles; one who is capable of self-discipline and has a high degree of curiosity; one who has a strong desire to learn change and is self-confident; one who is able to use basic study skill, organize his or her time and set an appropriate pace for learning, and to develop a plan for completing work; one who enjoys learning and has a tendency to be goal-oriented (p.73).

Path

Path in this context will refer to one of the two program paths available for students in the College of Medicine during years one and two. A program path may be either independent study program or lecture discussion program.

Independent Study Program. The Independent Study Program (ISP) is an alternative curriculum that students may enroll in for the first two years (Med I and Med II) of study. The purpose of the ISP path is to individualize the course of study to fit the student's particular needs and to develop the habit of independent learning. This program should promote the lifelong learning patterns acclaimed by the American Medical Association. Examples of some of the optional educational materials available through the ISP path are multiple text books, three dimensional models and computer-assisted instruction.

Lecture-Discussion Program. The Lecture-Discussion Program (LDP) is the traditional curriculum which presents the material in a lecture format. Students in this program attend the traditional lecture format classes and are assigned a text(s) as reference materials.

Year

Year will be used to identify the class rank of the students. Students are enrolled in one of four possible class years; Med I, Med II, Med III or Med IV. This investigation will include Med I, Med II and Med III students.

Limitations of the Study

This study will be limited to the investigation of self-directed learning readiness of medical students enrolled in the first three years of the medical program at The Ohio State University. The fourth year of medical school was excluded for two reasons. First, several faculty and staff members expressed a concern for data collection from this group. Med IV students are in their last year of medical studies and are geographically distributed in clinical settings. The second reason for excluding the Med IV group, again as suggested by staff directors within the College of Medicine, is because little difference is expected between Med III and Med IV.

Additionally, the College of Medicine was willing to contribute some financial assistance and encouraged the researcher to omit this group and concentrate on obtaining a better return rate from the first three years. Therefore, by eliminating the fourth year, all available funds will be concentrated on obtaining a census of the first three years rather than sampling from each of the four.

This research will use the Self-Directed Learning Readiness Scale developed by Guglielmino (1977) to assess medical students readiness for self-directed learning. The Self-Directed Learning Readiness Scale is discussed in Chapters II and III. Earlier works have investigated differences in students characteristics, academic achievement, and residency

choices between the two education paths (see Early, 1982; Sachs et al., 1985; Trzebiatowski et al., 1987).

There are inherent weaknesses in any ex post facto research. These include: (1) common cause, when the independent and dependent variables are both influenced by a third variable; (2) reverse causality, where the dependent variable is actually the cause, not the independent variable; and (3) extraneous variables where some other variable not investigated is really the cause (Ary, Jacobs, Razavieh, 1985). These concerns are addressed below.

Common cause of a third variable invalidating this research is unlikely because of the extensive literature available on the characteristics of self-directed learners. Even if being a self-directed learner is related to other characteristics, this does not reduce the importance of identifying differences between the paths or years.

Reverse causality may also be a threat but, again, in this investigation it will not change the importance of the findings. Students may be entering into the path they do because they are (or are not) self-directed learners. Indeed, this is expected by the researcher. The literature supports the presupposition that students who are highly self-directed learners will choose to be in an environment that allows them to be responsible for their own learning. The ISP was designed for these students; this path encourages and provides for more self-directed learning activities. Furthermore, students who have completed the ISP are expected to continue to score higher than those from the LDP.

Finally, the possibility of an extraneous variable being responsible for the differences found between groups has been considered. Those variables cited in the literature as being related to self-directed learners have been included in the design as alternative independent variables.

Chapter II

Literature Review

Placing an emphasis on life-long learning creates a need for identifying and evaluating self-directed learning skills and characteristics of self-directed learners. Self-directed learning is more than a desirable quality in medical practitioners; it should be a philosophical approach to life.

Three of the most prominent authors in adult education and self-directed learning are Cyril Houle, Malcolm Knowles and Allen Tough. Houle (1980) has published on the continuing educational needs of the professional. Knowles (1973, 1984) has concentrated his efforts in adult education, training, and development within the business sector. Tough (1979, 1981) has investigated the self-directed learning practices of adults in various occupations and settings. These sources and others discuss the need for continuing professional education in the medical setting as well as the different methods of delivery and the benefits obtained.

Continuing Professional Education

Houle, a recognized researcher and instructor in the fields of adult education and continuing education, emphasizes the concept of life-long learning as an indicator of professionalism. He has documented the frequency and patterns of continuing education in

many different professions. Support for life-long learning and continuing education appear in the code of ethics for many professions and is usually a requirement for license renewal.

Houle criticizes that many professions claim their members are aware of and recognize the need for continued learning, but fail to act on that knowledge. “Many a professional can report almost verbatim and with an air of conviction whatever he or she has been taught about ‘keeping up to date’ but show few signs, either by participation in educational activities or by performance at work, of putting that knowledge into practice” (Houle, 1980, p. 76).

Todd (1987, p. 366) stated, “In terms of rapidly expanding knowledge and changing technology, medical education must be a continuing life long process.” Todd also noted, however, that “Doctors are not very good at identifying their own deficiencies and educational packages they select often lead to no improvement in performance ... (p. 367).

Todd is not alone in recognizing the dilemma facing medical practitioners. Miller (1967) noted the rapidly changing knowledge base in medicine, as well as the increase in new technology. He stressed that the current categorical content model of teaching was already overwhelming students and practitioners alike. Rather than cover the totality of what is currently known about the many content areas, Miller suggested a process model of education. “There is ample evidence to support the view that adult learning is not most efficiently achieved through systematic subject instruction; it is accomplished by involving

learners in identifying problems and seeking ways to solve them. It does not come in categorical bundles but in a growing need to know” (Miller, 1967, P. 322).

Self-Directed Learning Research

Analyzing the concept of self-directed learning requires an exploration into the characteristics and skills of people who can be described as self-directed learners. What skills and behaviors can be observed that identify self-directed learners? How are these different from non-self-directed learners? These questions are answered in the sections below.

Skills Necessary for Self-Directed Learning

Given the definition of a self-directed learner from Chapter I, how can the faculty best develop self-directed learning readiness in their students? Knowles has identified at least seven skills necessary for self-directed learners (Knowles, 1973, p. 166-167).

1. The ability to develop and be in touch with curiosities. Perhaps another way of describing this skill would be ‘the ability to engage in divergent thinking.’
2. The ability to formulate questions, based on one’s curiosities, that are answerable through inquiry (in contrast to questions that are answerable by authority or faith). This skill is the beginning of the ability to engage in convergent thinking or inductive-deductive reasoning.

3. The ability to identify the data required to answer the various kinds of questions.
4. The ability to locate the most relevant and reliable sources of the required data (including experts, teachers, colleagues, one's own experience, the various audio-visual media, and the community).
5. The ability to select and use the most efficient means for collecting the required data from the appropriate sources.
6. The ability to organize, analyze, and evaluate the data so as to get valid answers to questions.
7. The ability to generalize, apply, and communicate the answers to the questions raised.

Self-Directed vs. Teacher-Directed Learning

A self-directed learning approach differs from the traditional school directed approach in several ways. Self-directed learning begins with deciding what is to be learned. In the traditional approach, the faculty or a curriculum committee determines what is to be learned. The self-directed learning approach allows this to be decided by the learner, either alone or with assistance. In choosing the materials to be used the traditional approach determines these, typically textbooks and lectures. The self-directed approach also may include attending lectures and reading books, but the decision as to which and how many methods to use is the learner's. Frequently there are a great many different methods that can be used to learn about any particular subject. The self-directed learning approach allows learners to explore and judge these different methodologies, and to find the ones that they are most comfortable and effective using.

Last, though perhaps most important, is the task of evaluation. Was the learning goal accomplished? Traditionally, the instructor would determine this, often by using a test to measure the amount of knowledge the student has obtained. The self-directed learning approach, however, requires the learner to decide whether or not enough information was obtained to solve the problem. If so, the learning project was successful; if not, the learner would return to explore more information.

Research Methodologies

Methods investing self-directed learning take two approaches (Brookfield, 1985); those which began with the work of Tough and those approaches that use the Self-Directed Learning Readiness Scale (SDLRS) developed by Guglielmino in 1977. Allen Tough and those researchers following his approach are grouped into a heading called learning projects. The work of these researchers is described first. More recent investigations into self-directed learning have used the SDLRS instrument developed by Guglielmino.

Learning Projects

The first methodology originates from the investigations of Tough into adult learning projects. Tough (1979, 1981) uses the concept of a learning project to describe a specific, purposeful investigation into some problem or curiosity. He has conducted several investigations into the type of learning tasks, motivators, and behaviors of adults involved in learning projects. These investigations consist of a variety of “interview schedules,

Questionnaires, prompt sheets, and measurement scales” (Brookfield, 1985, p.12). Such learning projects may include learning a new hobby, how to repair a broken lawn mower, learning memory aids or speed reading. In each case, the project is something the learner has an interest in, for whatever reason, and actively seeks out information on the subject.

The Self-Directed Learning Readiness Scale

The second approach to investigating self-directed learning uses the Self-Directed Learning Readiness Scale developed by Guglielmino in 1977. The SDLRS is a 58 item Likert type instrument designed to measure the subject’s self-directed learning readiness.

Guglielmino (1977, p. 73) defines a highly self-directed learner as:

. . . one who exhibits initiative, independence, and persistence in learning; one who accepts responsibility for his or her own learning and views problems as challenges, not obstacles; one who is capable of self-discipline and has a high degree of curiosity; one who has a strong desire to learn to use basic study skills, organize his or her time and set an appropriate place for learning, and to develop a plan for completing work; one who enjoys learning and has a tendency to be goal-oriented.

Describing how a self-directed learner would interact in a learning environment, Guglielmino (1977, p. 34) stated,

Although certain learning situations are more conducive to self-direction in learning than are others, it is the personal characteristics of the learner – including his [sic] attitudes, his values, and his abilities – which ultimately determine whether self-directed learning will take place in a given learning situation. The self-directed learning more often chooses or influences the learning

objectives, activities, resources, priorities, and levels of energy expenditure than does the other-directed learner.

Brocket summarized the purpose of the SDLRS as a tool “. . . to measure the extent to which individuals perceive themselves to possess skills and attitudes often associated with the readiness to engage in self-directed learning” (1985a, p. 56). The purpose of the scale is to measure the individual’s attitudes and self-confidence in their current ability to direct their learning, not to measure actual self-directed learning behavior, or necessarily to predict such behavior.

Self-Directed Learning Research: Medical Education

This section addresses the specific issue of self-directed learning in medical education. Medical educators and organizations are acutely aware of the need to develop self-directed learning skills in medical students and practitioners. Documentation of self-directed learning in practitioners and the need to further develop self-directed learning in future practitioners are presented below.

Practitioner Education

Robert Richards in “Physicians’ Self-Directed Learning” reviewed seven studies on adult learning projects. Summarizing reasons why physicians undertake learning projects, Richards (1986b, p. 8) cited the following as accounting for 91% of all learning projects: specific patient problems (21%), intellectual curiosity (18%), personal interest (18%), new

technology (17%), professional development (10%) and potential for economic advancement (7%).

Behaviors used in self-directed learning include: reading, seeking consultation, participating in group discussions, enrolling in post-graduate formal coursework, experimenting, using CAI and other media resources, using reference librarians to help with locating text based materials, and attending professional conferences. These findings corroborate the 1980 AMA Council on Medical Education report. This report stated that on average, U.S. physicians spent 13.4 hours each week in continuing education activities. The report also noted that though the most frequently used activities were reading of journals and consulting with colleagues, attending professional meetings or medical-school sponsored courses was preferred by physicians. An average of 12.7 days each year was reported as time spent in formal continuing medical education courses.

Medical Student Education

Before we can expect practitioners to diagnose their own learning needs, we must incorporate into the medical curriculum activities which show them how to do this and allow them time to practice it. The most appropriate time for this is not after they have begun practicing but while they are still in medical school. Brown and Uhl (1970) have stated that the physician must remain a life-long student in order to achieve both medical excellence and to provide high quality medical care. Krowka and Peck (1979, p. 53) succinctly stated:

Medical education can be viewed as a process that begins with premedical students and matures into continuing medical education. Few will argue that an individual's attitudes toward education adventures affect the degree to which he participates, evaluates, and communicates within the experience. In this context it could be postulated that if a physician is to be most effective during his practicing years, the concept of continuing medical education should be instilled and cultivated during his undergraduate medical school years.

Fisher (1981), Caplan (1977), and Fox and West (1984) concur that medical students need to redirect their learning from teacher-directed to self-directed. Medical educations can facilitate this transition by offering specific instruction and practice within the curriculum that simulate the learning problems characteristics of actual medical practice.

Caplan notes, as do most of these authors, that the faculty greatly influence the students they teach. Further, the faculty must visibly demonstrate the very principles of self-directed and continuing education to their students. Mager (1986) uses the term modeling to describe this process. Caplan specifically suggests that faculty encourage the students to actively read journal articles for new technologies and discoveries and to bring these articles to class for discussion (noting that the faculty member should do this as well).

Medical Student Education at The Ohio State University

The Ohio State University College of Medicine offers students two different pre-clinical programs. The first, and the one with the largest enrollment, is the traditional lecture-discussion program. The second is the independent study program. The College of Medicine instituted the ISP program in 1970 in an effort to meet the growing concerns about the ineffectiveness of the traditional lecture based program. “The original mission of the ISP was to provide a curricular alternative for the purposes of individualizing the course of study to fit students’ needs and to develop the habit of independent learning which would establish lifelong patterns” (Trzebiatowski et al, 1985, p. 458). The ISP is a pre-clinical program of self-paced progression through the organ system modules in the basic and clinical sciences. The ISP students are required to pass the National Board of Medical Examiners (NBME) Exam, Part I, before continuing with the third year of medical school.

The ISP path is not entirely self-directed as some learning project can be. Students are supplied a list of recommended books and learning objectives. Students have the opportunity to take computer-assisted instructional modules and can take computer-based evaluations at any time to evaluate their learning. The ISP path provides a great deal of flexibility for the student, but the final evaluation of success is not the students opinion of their knowledge as it would be in a truly self-directed situation.

The lecture discussion path (LDP) students are evaluated throughout the pre-clinical years by faculty-administered exams. These frequent evaluations help guide the students by

showing them areas that need further attention. Students are required to pass each of the courses in the two year preclinical period rather than Part I of the NBME Exam.

After successfully completing the requirements for the preclinical instruction, students begin their third year (Med III). Med III does not continue as two separate paths, but as one in which students complete six clinical rotations, each lasting eight weeks. The six clinical rotations include: Internal Medicine, Surgery, Pediatrics, Psychiatry, Obstetrics/Gynecology and Family Medicine. The Family Medicine rotation is divided into two groups. One-half of the students participate in the Family Medicine rotation for four weeks. The other one-half of the students are on an elective rotation for four weeks. At the end of the four weeks, the groups switch.

After Passing each of the six clinical rotations students enter their fourth year. The fourth year (Med IV) is similar to the Med III in design. Students select a series of clinical rotations to participate in. This list is larger than that in Med III, and students have the opportunity to choose those areas in which they are most interested.

Research using the Self-Directed Learning Readiness Scale

The SDLRS has been used by previous researchers to investigate the self-directed learning readiness of various populations. For example, Hall-Johnson (1986) used the SDLRS with cooperative extension agents; Savoie (1980), Skaggs (1981) and Graeve (1987) have used the SDLRS with nurses.

Russell (1990) studied the relationship between preference for structure and self-directed learning readiness. As supported by the literature, she found an inverse relationship between preference for structure and self-directed learning readiness. Those students who scored high on the SDLRS preferred less structure in the educational setting, while those who scored low preferred more structure.

Wiley (1983) suggests that those students preferring low structure may benefit more from a self-directed learning project than those preferring more structured learning situations. This investigation reported that neither preference for structure nor participating in a self-directed learning project contributed significantly to variance in SDLR score. Wiley (1983) did, however, find an interaction between these variables. Those students having a low preference for structure had greater residual SDLR scores following a self-directed learning project than did those preferring higher structure.

The SDLRS has been used to test construct validity in newer instruments. McBride, (1987), for example, used the SDLRS to establish construct validity with the Kearney and Fleischer's Exercise of Self-Care Agency Scale. The use of the SDLRS to support construct validity in other instruments demonstrates its acceptance in the adult education community and its appropriateness as an instrument to evaluate the constructs associated with self-directed learning.

However, at the time of conduct for dissertation, no published reports have been found that measure the self-directed learning readiness of medical students. Accordingly, this is the first such investigation to determine this much discussed, highly desirable skill in medical students. The findings of this research may help in the development of the medical curriculum in its effort to produce physicians who are not only committed to life-long learning but ready to practice it.

Alternative Characteristics of Self-Directed Learners

In any research it is important to consider the possible effects of extraneous variables, and this is especially true in ex-post facto research. Potentially extraneous or confounding variables need to be controlled for by either eliminating their effect (holding them constant) or by building them into the design. For this research, the literature was extensively reviewed for possible variables which may also be predictors of self-directed learners.

The literature base in the field of adult education is an extensive one. Researchers in this field have been investigating the characteristics of adult learners for several decades and have accumulated a sizable amount of information. Some of these characteristics may also correlate with a preference for self-directed learning. Additionally, research involving

independent study programs have also reported some characteristics of those most successful using this method of learning. Variables found in the literature that are likely to be relevant to the medical student population are discussed below.

One of the most frequently cited characteristics (predictors) of those who return for continuing educations is the level of education previously attained (Cross, 1978; Congreve, 1965). Congreve (1965) reported that the higher the level of educational achievement, the greater the preference for and success with self-directed learning.

Cross (1978) indicated that age and race were indicative of learners likely to seek out further education. Cross reported that the highest number of learning projects is undertaken by the 25-34 year old age group, followed by 35-44, 17-24 and 45-54 respectively. Whites had the highest percentage of participation in continuing education when compared to other races. Although Cross (1977, 1978) found no significant correlation between gender and number of learning projects, this characteristic will also be investigated.

Honors track programs or others which are targeted to superior students have also been indicative of potentially successful independent study students (Dressel and Thompson, 1973; Rogge, 1965). There is some disagreement though over the limitation of independent study programs to students with academic achievement. Rogge (1965, p. 11) stated,

“Colleges discovered that independent study, first limited to superior seniors, was even more appropriate, in the judgment of most reviewers, for lower classmen of varying academic abilities.” This suggests that self-directed learning may be even more appropriate with average or under-achieving students instead of high-achieving students.

Morstain (1972) investigated college student’s preference for independent study and found that the student’s major area was related to preference for independent study. Students in the humanities, arts, and social sciences reported a greater preference for independent, self-directed learning situations than did engineering, computer and information science, and physical education majors.

These additional characteristics may indicate a preference for self-directed learning and may be associated with higher SDLRS scores. Therefore, the data collection instrument will include a section designed to identify these characteristics (Figure 1) in the medical students.

<i>Variable Name</i>	<i>Description</i>
<i>AGE</i>	The age (in years) of the respondent
<i>RACE</i>	The race of the respondent
<i>LEVEL</i>	Level of education attained
<i>HONORS</i>	Participation in an honors/special track
<i>MAJOR</i>	Undergraduate major
<i>GENDER</i>	Gender of respondent

Figure 1. List of alternative characteristics.

CHAPTER III

Research Methodology

This chapter describes the population which was studied, identifies the variables investigated, and states how these variables were operationalized. The research design, instrumentation, and methods of data collection are presented. Techniques for data management and the statistical procedures that were used in the analysis are also discussed.

This study was a census of The Ohio State University medical students enrolled at a particular point in time. The researchers believes this population to be representative of both students at Ohio State at different points in time, as well as medical students nationally. Therefore, the population data will be used as sample data for two larger groups, as well as for describing the current self-directed learning readiness of the medical students at Ohio State.

Population

The sample studied in this investigation consisted of the students at The Ohio State University, College of Medicine enrolled in one of the first three years in the medical program

at the time of this study. This sample included all Med I students (ISP and LDP), all Med II students (ISP and LDP), and all Med III students. These students represent a sample in time of all Ohio State medical student and all medical students nationally at this time.

The medical students at The Ohio State University are very similar to the national applicant pool. Table 1 shows scores for the classes (Med I, Med II and Med III) in this study and the national average scores of all entering medical students for the years (AAMC 1988, 1989, 1990). These similarities suggest that the Ohio State medical student is much like other medical students throughout the nation.

TABLE 1

Ohio State and National GPA and MCAT Scores.

<i>Year</i>	<i>GPA</i>	<i>Biology</i>	<i>Chemistry</i>	<i>MCAT Physics</i>	<i>Scores Problem Solving</i>	<i>Reading</i>	<i>Quantitative</i>
<i>1988</i>							
<i>OSU</i>	3.44	9.3	9.3	9.2	9.1	8.5	8.4
<i>Nat.</i>	3.42	9.6	9.4	9.4	9.3	8.7	8.7
<i>1989</i>							
<i>OSU</i>	3.48	9.7	9.5	9.6	9.5	8.9	8.8
<i>Nat.</i>	3.40	9.6	9.2	9.2	9.2	8.7	8.6
<i>1990</i>							
<i>OSU</i>	3.45	9.8	9.7	9.6	9.6	8.9	8.8
<i>Nat.</i>	3.41	9.6	9.3	9.3	9.3	8.7	8.6

Independent Variables

In this investigation two primary independent variables, path and year, were examined to determine their effect on the depending variable. Five additional alternative independent variables were previously found to be characteristics of self-directed learners and were included in this investigation to see how strongly they relate to self-directed learning readiness in the medical students at Ohio State. A sixth variable, gender, was added to this study to verify that self-directed learning is not related to gender.

Path

The variable program path contains two levels, those students who were enrolled in the ISP or LDP. Path was a dichotomous variable. It was an attribute the subject possessed rather than something manipulated by the researcher. Occasionally a student will change from the ISP to the LDP. This may be at the student's request or due to the suggestion by an advisor that a different path may be more appropriate for the student. Data about Path was gathered by having the students mark the option indicating the program path they were a member of and if they have switched programs.

Year

Year was used to identify the class rank of the students. Students indicated their class rank as either Med I, Med II, or Med III. Year, like Path, was also an attribute of the student and was a categorical variable. Year was, however, an ordinal variable.

Alternative Independent Variables

Listed below are the alternative variables included in this investigation. These variables were found in the literature to be related to self-directed learning and may help to identify self-directed learners in this study.

Age. The age of the medical student was obtained by having student write their age (in years) in a space provided. Age was an attribute variable at the interval level of measurement.

Honors. Honors was used to measure whether or not the student was enrolled in a special track (honors or accelerated) for their undergraduate degree. Students indicated yes, they were, or no, they were not, a participant in a special track. It was up to the student to determine whether or not they were in an honors track program as opposed to simply taking a few honors courses. The investigator intended to have students who were officially enrolled in a specific honors or accelerated path indicate so with this variable. The question, as presented in the questionnaire did not specifically state this, so the interpretation of belonging to an honors track was the student's. This was a categorical variable at the nominal level of measurement. Honors was a dichotomous variable.

Race. The variable race was measured by having students circle the appropriate option indicating whether they were black, white, Asian, or other. Race was an attribute variable; categorical at the nominal level of measurement.

Gender. The variable gender was measured by having students circle the option indicating their gender as either male or female. Gender was a dichotomous attribute variable.

Major. The variable major was used to identify the undergraduate major degree area of the student. This variable was operationalized by having students identify their undergraduate major as either (1) arts, humanities, social studies, education, business, other human studies major, or (2) chemistry, physics, math, biology, computer-information science, mathematics, statistics, engineering or other physical science related major. Major was a dichotomous variable which was an attribute of the student.

Educational Level. This variable measured the highest level of education attained by the student. It was operationalized by having the student indicate the option representing the highest degree attained (Bachelors degree, Masters degree, or a Ph.D.). Educational level, an attribute, was a categorical variable, measured at the ordinal level.

Switch. This variable was not part of the research question but was asked to determine the number of students who have switched from one program path to the other. Whether the student switched programs or not was not used in the data analysis, but is reported in the results section to indicate the number of students who have changed from one program to the other, and the direction of this change.

Dependent Variable

Self-Directed Learning Readiness

The dependent variable, self-directed learning readiness, was operationally defined as the score on the Self-Directed Learning Readiness Scale developed by Guglielmino (1977). Self-directed learning readiness was measured at the interval level.

Guglielmino's definition for self-directed learning was presented in Chapter II. Guglielmino reported an average score of 214 for all adults. Scores between 214 and 240 fall in the top 50% of all adults. Scores of 240-265 fall into the top 16%, and scores over 265 fall in the top 2% of all adults. Scores below the mean are as follows: 188-214 lower 50% of all adults, 162-188 lower 16% of all adults, and below 162 are the lower 2% of all adults.

Design

An ex post facto research design was used to answer the research questions. Ex post facto (sometimes referred to as causal-comparative research) was used "to determine the cause for or consequences of differences between groups of people" (Frankel, 1990, p. 9). Ex post facto (after the fact) was the most appropriate research design because the students have self-selected into one of the two program paths. That is, program path was an attribute variable, one that was pre-existing and in this case not manipulated by the investigator.

A cross-sectional analysis of students enrolled in each of the three year “classes” (Med I, Med II, and Med III) was made. Cross sectional analysis is that in which the data are collected at just one point in time, in this case during the middle of the academic year, specifically February and March of 1991. Further, since all students in Med I, II and III were intended to participate, a census rather than a survey was conducted. A cross-sectional analysis will allow assessment of self-directed learning readiness between groups (ISP and LDP) and years.

Med I	Med II	Med III
ISP	ISP	Students are combined At this point for clinical rotations
LDP	LDP	

Figure 2. The medical program: the first three years.

In this study, there were no manipulated variables; they were all attribute variables. Figure 3 shows a listing of the variables in this study and their level of measurement. Figure 4 is a graphic representation of the expected relationship among the variables. Filled arrows represent the expected relationship between all of the independent variables and the dependent variable. The dot filled arrow represents the potential effects of the alternative independent variables on the main independent variables.

<i>Variable</i>	<i>Level of Measurement</i>
<i>Independent</i>	
<i>Year</i>	Ordinal
<i>Path</i>	Nominal
<i>Alternative Independent</i>	
<i>Age</i>	Interval
<i>Race</i>	Nominal
<i>Level</i>	Ordinal
<i>Honors</i>	Nominal
<i>Major</i>	Nominal
<i>Gender</i>	Nominal
<i>Dependent</i>	
<i>SDLR</i>	Interval

Figure 3. List of variables and level of measurement.

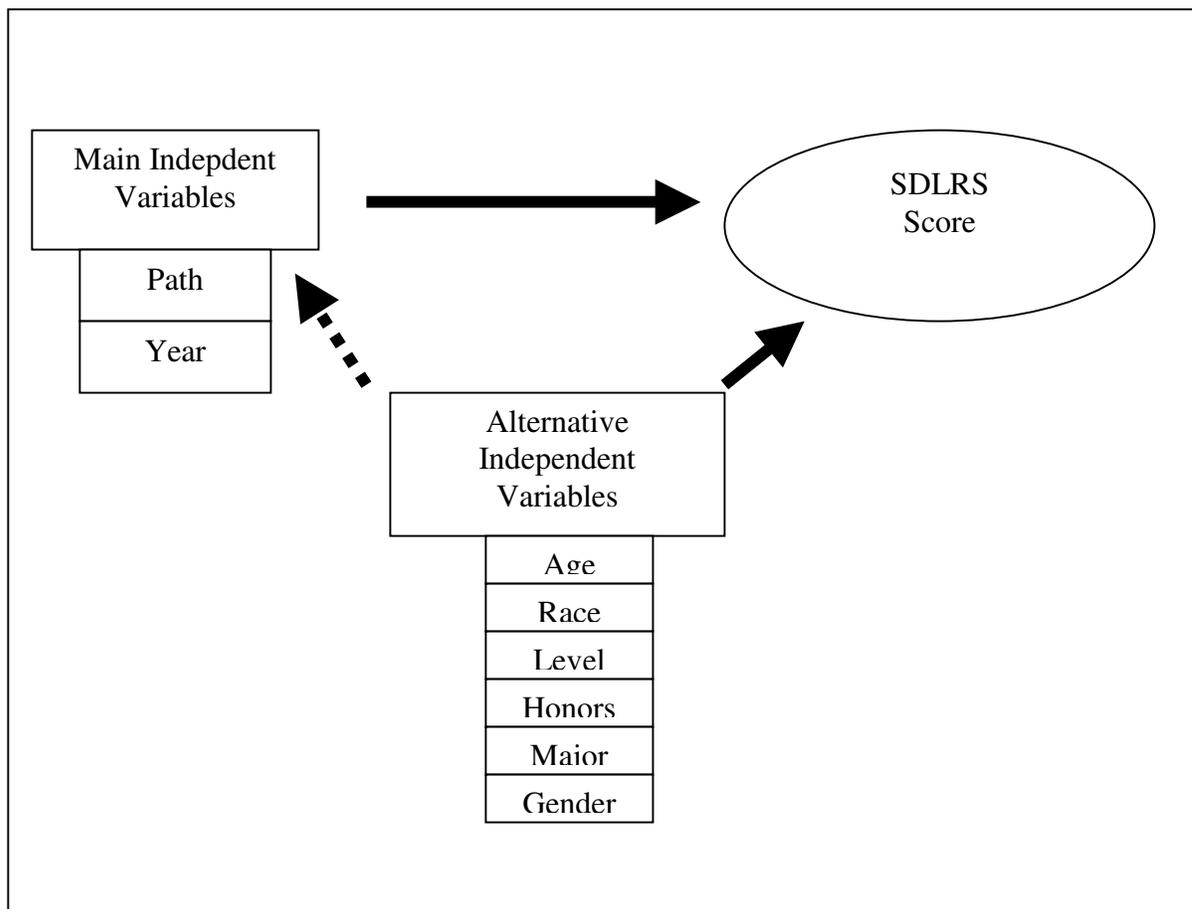


Figure 4. Model of predicted variable effects.

Instrumentation

The Self-Directed Learning Readiness Scale (Guglielmino, 1977) was used in this investigation to measure the students' readiness for self-directed learning. The reliability and validity of the instrument was documented by Guglielmino in her doctoral dissertation (Guglielmino, 1977).

Reliability and Validity

The SDLRS was developed using the Delphi technique with 14 experts in the self-directed learning area as the Delphi team. The instrument went through three rounds and was revised as necessary. Both Guglielmino (1977) and Brockett (1985b) report a Cronbach's alpha reliability coefficient of .87 for this instrument. Wiley (1983) reported a Cronbach's alpha reliability coefficient of .91. Wiley also used the SDLRS as a pretest and posttest and reported a test-retest reliability coefficient of .793.

Brockett (1985a) identified several researchers who have concluded that there is substantial support for construct validity of the SDLRS. These researchers each compared SDLRS scores with another measure such as creative thinking, number of learning project undertaken in a give time period and self-concept as a learner. Predictive validity has been established by several investigators (Savoie, 1980; Skaggs 1981; Hall-Johnsen, 1986; Graeve, 1987). In establishing criterion validity, these researchers found SDLRS scores to be a

significant predictor on some outcome measure such as grade in a course which relied on independent study or number of learning projects completed.

The SDLRS consists of 58 statements to which the subject responds whether or not this accurately describes them or how they think about themselves. Likert-type scales like the SDLRS are common in social research. The subjects are very likely to be familiar with them, contributing support for the face validity of the instrument (Kerlinger, 1973; Ary et al, 1985).

Human Subjects Review Board

The use of this instrument with the population cited has been reviewed and approved by the University Human Subjects Review Board (protocol number: 91B0010).

Data Collection

This section describes the data collection techniques employed for each of the groups in the investigation. Oral and written instructions were the same for all groups.

Med I and Med II LDP

Data collection from the LDP Med I and Med II students occurred during a course in which all students were expected to attend. This method of data collection was approved by the College of Medicine, which requested that the faculty/instructor support this research by making time available. The exact date and time of the data collection depended upon the

individual instructor's schedule. The oral instructions were read from a script (Appendix A) which explained the purpose of the study, the interest the College of Medicine has in the results, and the importance of participation by each student. Students who were absent or who declined to participate in the study were omitted from the data collection and analysis (n=31 for the Med I group and n=101 for the Med II group).

For the Med I group data collection was scheduled to occur following a CPR certification exam. In attendance at this time were some ISP students who had also not been certified. There were 198 students in attendance for this exam, 151 questionnaires from LDP students were returned and 15 from ISP students. The total number of Med I LDP students in attendance was not known, so the percent return was calculated from the total number enrolled (182) and was 83.0%.

The Med II LDP group was surveyed in a similar manner. The Med II secretary was asked which class would most likely have the greatest number of students in attendance. The probably number of students likely to attend one of the most popular lectures was estimated at 120. Such a class was chosen for the data collection point and 114 students were present. There were 104 questionnaires returned reflecting a return rate of 91.0%. The total number of students in the Med II group, however, was 205. For the total number of students the return rate was only 50.7%.

Med I and Med II ISP

The ISP students in Med I and Med II received a packet in the campus mailboxes containing: a letter requesting their participation from Dr. Clausen, the Director of the Independent Study Program (Appendix B), a letter from the researcher which solicited their participation and included information regarding voluntary participation and confidentiality (Appendix C), the instrument (Appendix D), and a pre-addressed campus mail envelop to return the instrument to the investigator.

The initial mailing resulted in a return of seven questionnaires from the Med I ISP group (33.3%) and nine questionnaires from the Med II ISP group (50.0%). Following the suggestions made by Dillman (1978) a follow-up letter asking them to participate and another copy of the instrument was sent to those who had not responded by the end of the second week. Those who had not responded by the end of the second week were considered non-respondents for analysis purposes.

The guidelines suggested by Miller and Smith (1983) were used to determine if the non-respondents were similar to the respondents. Those students sent a second copy of the instrument were considered late respondents and were surrogates for the non-response group. The second mailing resulted in the return of five additional Med I ISP questionnaires, raising the return rate to 57.1% by mail. Combining these with those returned in the class room setting produced a 75.0% return rate.

The second mailing resulted in the return of two more Med II ISP questionnaires, producing a return rate of 61.0%. The combined early respondents had a mean score of 250 and a standard deviation of 18.27. The late respondents had a mean score of 247.8 and a standard deviation of 13.79. The data of these groups were then collapsed and then each group was analyzed.

Med III

Students enrolled in Med III, which includes all third year students, participate in small group (approximately 35 students) rotations which last 8 weeks. Each of these rotations is preceded by an introductory session. These students were surveyed as they attended the introductory session in the same manner as Med I and II were. Some of the instructors who directed the introductory session expressed a concern that the orientation session was already too busy. In this case, the instructor agreed to allow time during the first lecture for completing the instrument. For these situations, a similar set of instructions were written and appear in Appendix E.

As previously described, one-half of the students enrolled in the family medicine rotation were on elective and unavailable in a class setting. Students on the elective rotation were surveyed as the ISP students were, only with a letter from Dr. McIlroy, the Director of the Med III program, (Appendix F) rather than a letter from Dr. Clausen.

There were 146 questionnaires collected from the Med III group producing a return rate of 64.6%. Of those 146, six were returned from the mail group, all as early respondents.

The return rate via mail for the Med III group was 27.3%. The overall return rate for the entire study was 65.8%. Table 2 shows the distribution of the return rates for each of the groups studied.

TABLE 2

Return Rates from Student Groups.

<i>Group</i>	<i># Received</i>	<i># Possible</i>	<i>Return Rate</i>
<i>Med I</i>			
<i>ISP</i>	27	36	75.0%
<i>LDP</i>	151	182	83.0%
<i>Total</i>	178	218	82.0%
<i>Med II</i>			
<i>ISP</i>	11	18	61.0%
<i>LDP</i>	104	205	50.7%
<i>Total</i>	115	223	52.0%
<i>Med III</i>			
<i>ISP*</i>	23	26	88.0%
<i>LDP*</i>	123	200	62.0%
<i>Total</i>	146	226	64.6%
<i>ISP Total</i>	61	80	76.3%
<i>LDP Total</i>	378	587	64.0%
<i>Total</i>	439	667	65.8%

* prior program path

Data Management and Analysis

Extreme care was taken to ensure the accurate transcription of raw data into the analysis format. The sections below describe the procedures used in this process.

Data Entry

Following the collection, the results were entered via keyboard into a word processing package that created an ASCII format text file. The data were double checked either by visual comparison or by entering the data twice and comparing the lines for any errors. The data were then passed to another program (written in the “C” programming language) which again checked for any missing values or values which were inappropriate for that field. This program then scored the SDLRS portion of the survey and appended the total score to the end of the data string.

Data Analysis

The data analysis includes descriptive statistics as well as analysis of variance (ANOVA, multiple linear regression, and analysis of covariance (ANCOVA)). Self-directed learning readiness as measured by the SDLRS was the dependent variable in this study. There were several categorical independent variables also being used. The appropriate statistical analysis for use in this situation is analysis of variance (ANOVA) – a technique used to determine if the samples are populations with equal means. All statistical tests in this study were conducted at the .05 level of significance.

Two-way analysis of variance was used to test the hypothesis that there were no differences between the groups (ISP and LDP) or the years (Med I, II, III) and that no group-by-year interaction existed. Multiple regression was used to determine if the alternative variables contributed to a regression equation that would predict SDLRS scores. Four variables were found to contribute significantly to the regression equation. One of those, age, was used as a covariate and a three-way analysis of covariance was conducted. This analysis was used to identify the effect of each variable, determine if that effect was significant, and detect any interactions between the variables.

Chapter IV

Research Findings

Reported below are the findings from this investigation. Demographic information collected about the respondents are presented first. Descriptive statistics were used to answer the first research question of medical student SDLRS scores. Two-way analysis of variance was used to answer the second research question which addressed the effects of year and path on SDLRS score. The third question was answered using multiple regression. An additional analysis of covariance was made to assist in the interpretation of the significance from both a statistical and practical level. The results of this additional analysis are presented last.

Demographics

The “average” medical student at Ohio State, based on the findings of this investigation, was a 24 year-old white male. He has a bachelors degree in a physical science major and was not enrolled in an honors or special track program during his undergraduate major. Specifically, the mean age for all students was 24.6 with a standard deviation of 2.76.

Of the 439 students in the study, 371 were white, 46 Asian, 17 black, and 5 of some other race. There were 407 students who had a bachelors degree, 22 a masters degree, and 10 a Ph.D. The study included 278 male students and 161 female students. Women represented 37% of those responding.

Participation in an honors or special track program was interpreted individually by each student. There were 241 students who reported no having been enrolled in this type of program; 198, however, reported they were. The number of students with a physical science major outnumbered those with social science majors. There were 380 students with a physical science majors and only 59 with social science majors. Five respondents were double majors and were recorded as physical science majors for the analysis. This decision was made based on two factors: first, because of the small number of respondents in this category, it did not seem necessary to make a separate entry for them, and second, the mean for this group was 229.4 – closer to the mean for all physical science majors (230.8) than the mean for all social science majors (225.5).

Research Questions

1. What is the self-directed learning readiness of the medical students at the Ohio State University? This question was answered using descriptive statistics.

2. Is there a difference between the medical education paths, ISP and LDP, in SDLR scores in any of the three years? Analysis of variance was used to answer this question. Differences between the years, the paths and interactions between year and path were examined. The statistical hypothesis tested (at the .05 level) was that there was no difference between the paths or years and that there were no interaction effects.

3. How does each variable relate to SDLR scores? This question was answered using the Pearson product moment correlation coefficient, Spearman rank order correlation coefficient, and the Point bi-serial correlation coefficient. Multiple regression analysis was used to determine which variables contributed to the regression equation.

As mentioned in Chapter III, the largest return rate was from the Med I group. This study included 178 Med I, 115 Med II, and 146 Med III students. Of the 439 participating, 61 were enrolled in the independent study program and 378 in the traditional lecture discussion program path. Only 22 (5%) of the students participating had switched from one program to the other. Fifteen had switched to the lecture-discussion path and seven had switched to the independent study program.

Analysis by path indicated a difference between the two groups in age. The students in the ISP were older than those in the LDP. Appendix G presents a table showing the frequency distribution of each variable.

The SDLRS Scores of the Medical Students

The first research question asked what are the Self-Directed Learning Readiness Scores of the medical students at Ohio State. The mean score for all medical students was 230 with a standard deviation of 21.5. The median, mode and standard deviation for each group (year and path) are presented in Table 3. Figure 5 is a histogram of all scores with the normal curve superimposed on it. Cronbachs alpha was calculated for the whole group and for each of the possible paths. This procedure resulted in an overall alpha of .927 for the whole group, .921 for the ISP group and .926 for the LDP group.

Table 3 indicates little difference among the years in SDLRS score, but a larger difference between the paths in each year. Med II has the largest difference, 21 points, between the ISP and LDP paths. This may be partially due to the lower response rate from the Med II LDP group. It is possible that those students who were absent may have raised the mean for the LDP group. However, the LDP group mean of 230 was three points higher than the Med I LDP group and one point higher than the Med III LDP group. As such, this score is very likely to be representative of the true score for the Med II LDP group. Figures 6, 7 and 8 present bar graphs which more easily depict the difference in scores between the groups based on year, path, and path in year respectively.

TABLE 3

Mean SDLRS Scores by Year and Path.

<i>Year and Path</i>	<i>n</i>	<i>Median</i>	<i>Mean</i>	<i>Standard Deviation</i>
<i>Med I</i>				
<i>ISP</i>	27	236	237	17
<i>LDP</i>	151	226	227	21
<i>Med II</i>				
<i>ISP</i>	11	249	251	15
<i>LDP</i>	104	227	230	22
<i>Med III</i>				
<i>ISP</i>	23	246	237	25
<i>LDP</i>	123	231	229	21

* prior program path

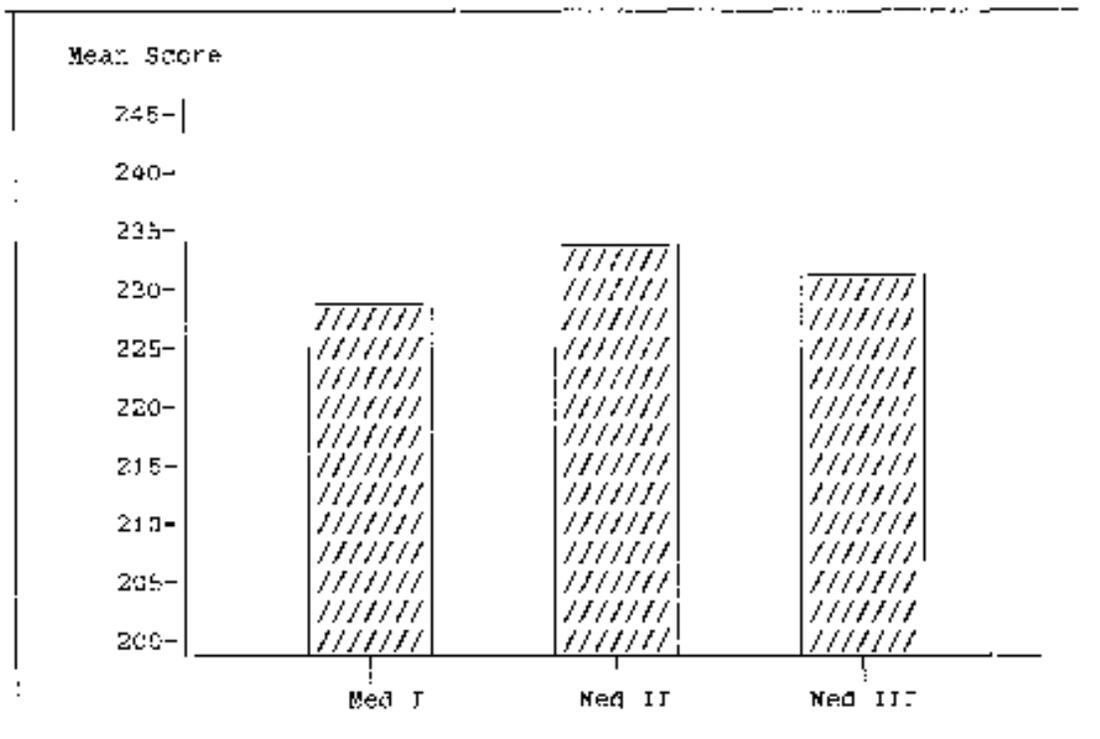


Figure 6. Bar graph of SDLRS group means by year.

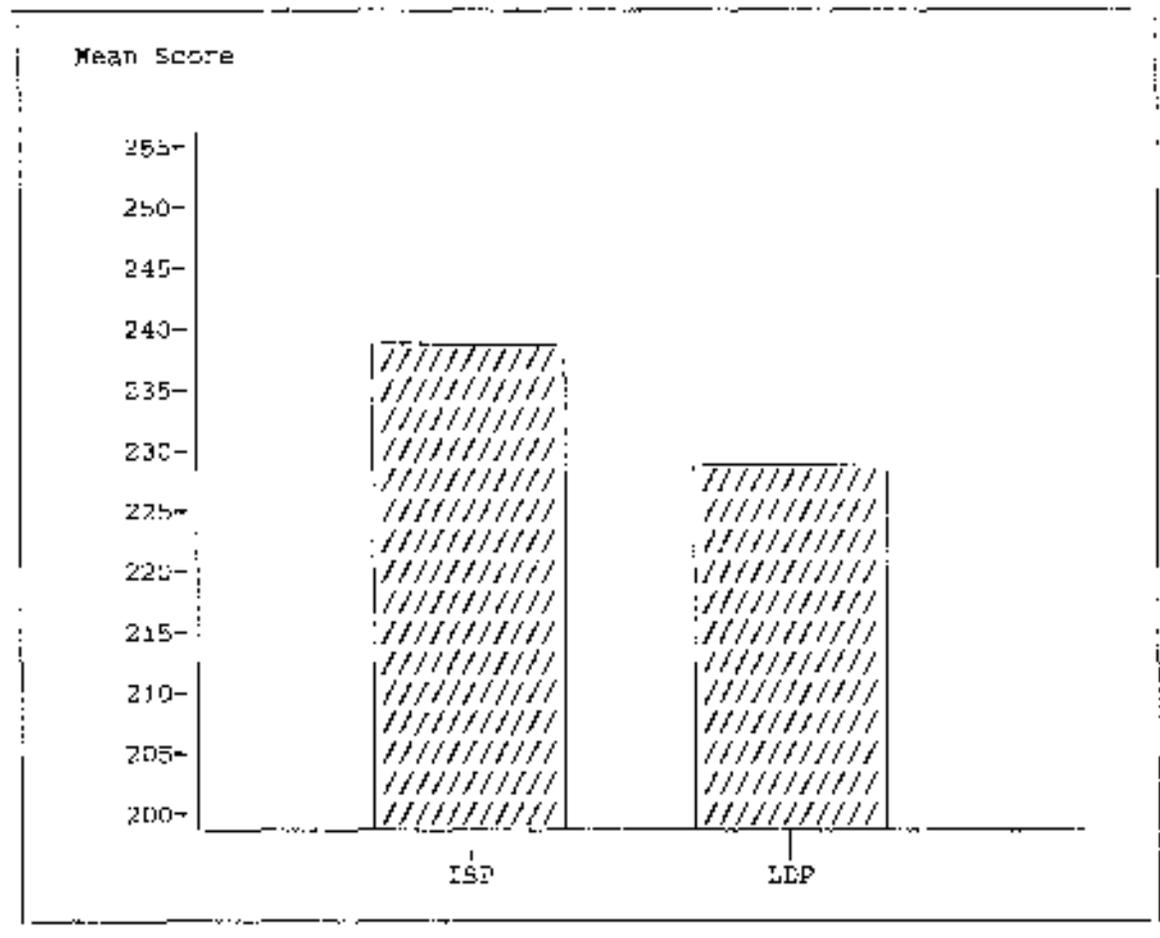


Figure 7. Bar graph of SDLRS group means by path.

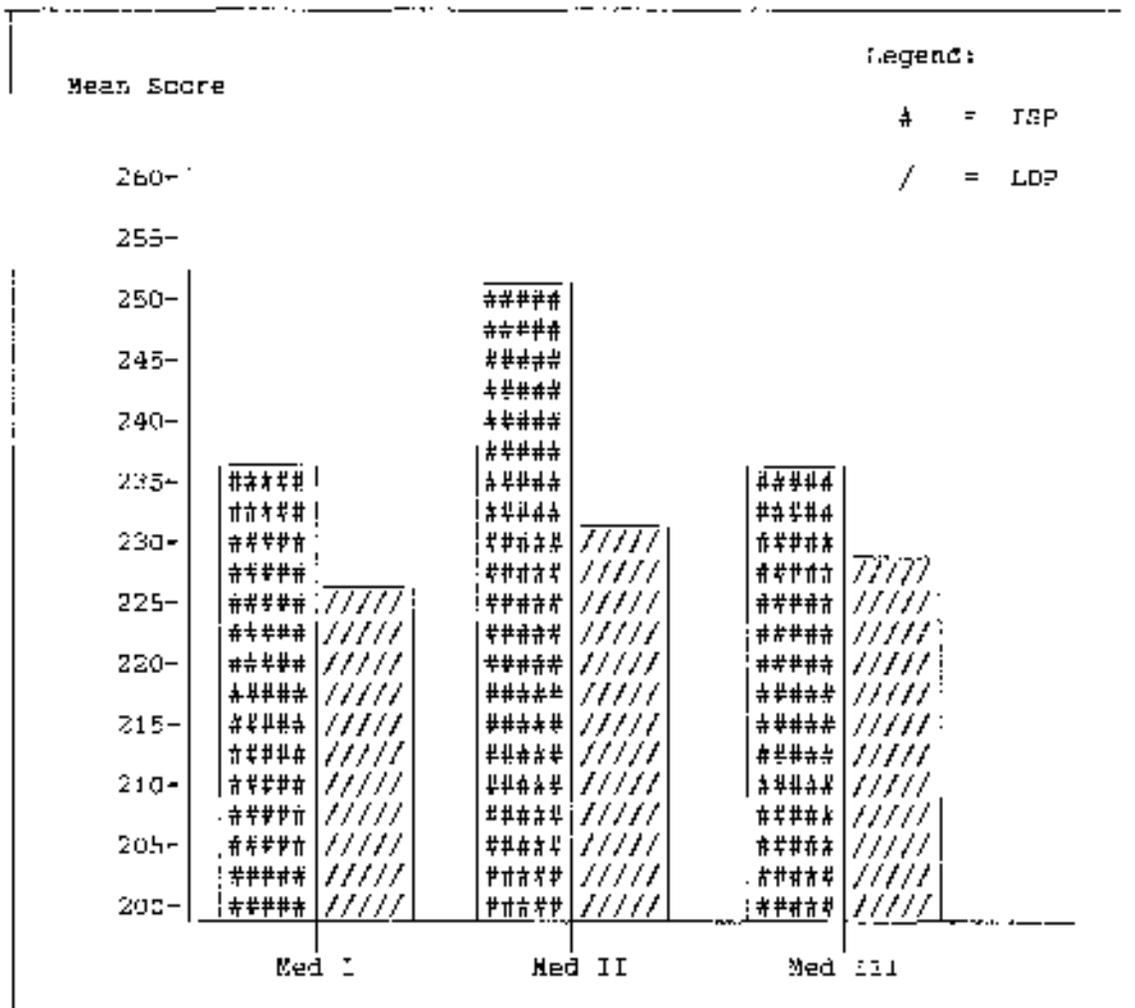


Figure 8. Bar graph of group means by path in year.

Significance of Path and Year on SDLRS Scores

Question two asked if there were differences in SDLRS scores based on path or year. Two-way analysis of variance showed no significant difference between the groups based on year. However, a significant difference was noted between the paths. Table 4 presents the summary statistics for the analysis of variance.

The analysis and initial interpretation of these findings showed there was no difference in SDLRS in any of the year groups. Therefore the statistical hypothesis that there was no difference in SDRLS scores based on year was not rejected. The hypothesis that there was not difference in SDLRS scores based on path was rejected. The summary table shows that scores based on path were significant ($F(1,433) = 15.7555, p < .0001$). The summary table also indicates significant interaction effect.

Because a significant difference in SDLRS scores between paths was found, the effect of the alternative variables was considered. Was path alone responsible for this difference or was one of the alternative variables contributing to this effect? The findings of this additional analysis are reported on page 60.

Table 4

Analysis of Variance Summary Table of Scores by Year and Path

<i>Source of Variation</i>	<i>n</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Sum of Squares</i>	<i>DF</i>	<i>Mean Square</i>	<i>F</i>
Year*	439	.93	.857	1379.170	2	689.585	1.547
Path**	439	.86	.346	7024.244	1	7024.244	15.755***
Interaction							
Year x Path				1296.416	2	648.208	1.454
Residual				193047.436	433	445.837	
Total				202426.178	438		

* 0 = Med I, 1 = Med II, 2 = Med III

** 0 = ISP, 1 = LDP

*** p < .05

How Does Each Variable Relate to the SDLR Score

The findings from question two indicated that year was not associated with a significant difference in score on the SDLRS, but that program path was. This question will measure how all of the variables in the study relate to score and to each other.

To assess how each variable related to the dependent variable, multiple regression analysis was used. The analysis reported the correlation coefficients presented in Table 5. The categorical variable, Race, had four levels (black, white, Asian, other) and so was not included in this analysis. The table indicates the greatest magnitude in relationship was

between year and age ($r = .56$). The largest relationship between score on the SDLRS and one of the independent variables (age) was $r = .20$. It should also be noted that the relationship between path and age was ($r = -.36$). Relationships were also found with path and score ($r = -.18$); honors and score ($r = .18$); and with age and level of education attained ($r = .35$).

Table 5

Correlation Coefficients

	<i>SCORE</i>	<i>YEAR</i>	<i>PATH</i>	<i>AGE</i>	<i>HONORS</i>	<i>MAJOR</i>	<i>LEVEL</i>	<i>GENDER</i>
<i>SCORE</i> ***	1.00							
<i>YEAR</i> **	.05	1.00						
<i>PATH</i> *	-.18	-.00	1.00					
<i>AGE</i> ***	.20	.56	-.36	1.00				
<i>HONORS</i> *	.18	-.00	-.05	-.07	1.00			
<i>MAJOR</i> *	.08	.04	.02	-.10	-.02	1.00		
<i>LEVEL</i> **	.12	-.01	-.22	.35	.01	-.04	1.00	
<i>GENDER</i> *	-.11	-.03	.04	-.03	-.13	.07	.06	1.00

N of Cases : 439

- * Point Bi-Serial
 Path: 0 = ISP, 1 = LDP
 Honors: 0 = Not Honors, 1 = Honors
 Major: 0 = Social Science, 1 = Physical Sciences
 Gender: 0 = Female, 1 = Male
- ** Spearman Rank Order
 Year: 0 = Med I, 1 = Med II, 2 = Med III
 Level: 0 = Bachelors, 1 = Masters, 2 = Ph.D.
- *** Pearson Product Moment

Multiple regression determines the contribution of each independent variable in predicting the dependent variable. The dependent variable in this investigation is self-directed learning readiness as measured by the SDLRS. The independent variables were: year (three levels), path (dichotomous), age (continuous, in years), race (four levels), level of education attained (three levels), honors (dichotomous), major (dichotomous), and gender (dichotomous). The variables race, year, and educational level have been dummy coded for this analysis. Appendix G shows the frequency counts for each level of the variables in the analysis.

The logic used in this method of analysis was to determine the effect that year, path, age, race, level, honors, major, and gender have on explaining the variance of scores on the self-directed learning readiness scale. The regression coefficients, noted under *b* in Table 6, show the role each variable has in determining the predicted mean.

Table 6

Results of Regression Analysis, Stepwise Entry

<i>Variable</i>	<i>R</i> ²	<i>R</i> ² Change	<i>b</i>	<i>t</i>
<i>Age</i>	.04	.04	1.56	4.28*
<i>Honors</i>	.08	.04	8.41	4.23*
<i>Major</i>	.09	.01	6.89	2.38*
<i>Path</i>	.10	.01	-6.73	-2.21*
<i>(constant)</i>			190.81	

* $p < .05$

When the independent variable age was tested, the proportion of variance explained was (.04). Age was significant beyond the .0001 level. The second variable entered into the equation was honors. Honors explained an additional 4% of the variance not already accounted for by the variable age. Honors was also significant beyond the .0001 level. Major was the third variable to enter into the equation and it explains 1% of the variance not already accounted for by the previous variables (age and honors). Major was significant beyond the .05 level ($p < .0177$). Finally, path enters the equation and explains an additional 1% of the variance. Path was significant beyond the .05 level ($p < .0274$). The combined effect of all four variables accounts for 10% of the variance in SDLRS score.

The regression equation for this investigation was:

$$Y' = 190.81 + 1.45(X1) + 8.20(X2) + 6.74(X3) - 6.73(X4)$$

X1 represents the respondent's age, and X2 whether or not the respondent participated in an honors or special track program. If the respondent did participate X2 was coded with a 1; if not a 0 was used. X3 represents the respondent's major where physical science majors were coded with a 1 and social science majors were coded with a 0. X4 represents the program path of the respondent. The ISP students were coded with a 0 and the LDP students coded with a 1.

Age, participation in an honors program, major and path each contributed significantly to the regression equation. The equation showed a positive relationship with age associated

with score, as age increased so did score on the SDLRS. Participation in an honors program also increased the predicted score. Majoring in the physical science as opposed to the social science was associated with a higher SDLRS score as was participation in the ISP path rather than the LDP path.

The Significance of Path on SDLR Scores

The results indicated that the variables path, honors, major and age were all significantly related to SDLRS score. The regression equation indicated those effects which were significant when the effects of the other variables were held constant. At this point one must determine if the variables remain significant if interactions between these variables were allowed.

To solve this problem, an analysis of covariance including interaction effects was conducted. The results indicated that when the variable age was used as a covariate, path and honors were no longer significant (Table 7). The two variables that were significant in this case were actually age and major. As the respondent's age increases, so did their score on the SDLRS. Also, if the respondent had an undergraduate major in the physical sciences, they scored significantly higher on the SDLRS.

Table 7

Analysis of Covariance Summary Table of Scores by Year, Path and Major with Age.

<i>SOURCE OF VARIATION</i>	<i>n</i>	<i>MEAN</i>	<i>STD. DEV</i>	<i>SUM OF SQUARES</i>	<i>DF</i>	<i>MEAN SQUARE</i>	<i>F</i>
<i>Covariate</i>							
<i>AGE</i>	439	24.56	2.759	6370.564	1	6370.564	14.167****
<i>PATH*</i>	439	.86	.348	217.394	1	217.394	.518
<i>HONORS **</i>	439	.45	.498	670.677	1	670.677	1.597
<i>MAJOR***</i>	439	.87	.341	2725.056	1	2725.056	6.488****
<i>2-way Interactions</i>							
<i>PATH HONORS</i>				84.378	1	84.378	.201
<i>PATH MAJOR</i>				603.335	1	603.335	1.436
<i>HONORS MAJOR</i>				41.700	1	41.700	.099
<i>3-way Interactions</i>							
<i>PATH HON MAJ</i>				75.695	1	75.695	.180
<i>Residual</i>				180611.918	430	420.028	
<i>Total</i>				202426.178	438		

* Path: 0 = ISP, 1 = LDP

** Honors: 0 = Not Honors, 1 = Honors

*** Major: 0 = Social Science, 1 = Physical Sciences

**** p < 0.5

Table 8 shows the mean age and score for each of the subgroups based on path, participation in honors program and type of major. As expected the ISP score on self-directed learning readiness was higher than the LDP score, but age is also higher for this group. Table 8 also shows the adjusted mean scores once the effects of the variable age were removed. This clearly shows the only remaining significant difference was based on major. Figure 9 is a bar graph depicting this relationship.

TABLE 8

Mean Age, Score and Adjusted Score by Group

<i>GROUP</i>	<i># IN CELL</i>	<i>AGE</i>	<i>SCORE</i>	<i>STD. DEV</i>	<i>ADJ. SCORE</i>
<i>ISP</i>					
<i>N PS</i>	26	27	241	15.5	236
<i>N SS</i>	4	30	230	5.4	221
<i>H PS</i>	26	26	242	24.5	237
<i>H SS</i>	5	28	230	28.7	224
<i>LDP</i>					
<i>N PS</i>	184	24	225	21.3	225
<i>N SS</i>	27	24	222	21.7	223
<i>H PS</i>	144	24	234	19.7	235
<i>H SS</i>	23	25	227	22.7	227

ISP

N PS Independent study, not honors, physical science major
N SS Independent study, not honors, social science major
H PS Independent study, honors, physical science major
H SS Independent study, honors, social science major

LDP

N PS Lecture-discussion, not honors, physical science major
N SS Lecture-discussion, not honors, social science major
H PS Lecture-discussion, honors, physical science major
H SS Lecture-discussion, honors, social science major

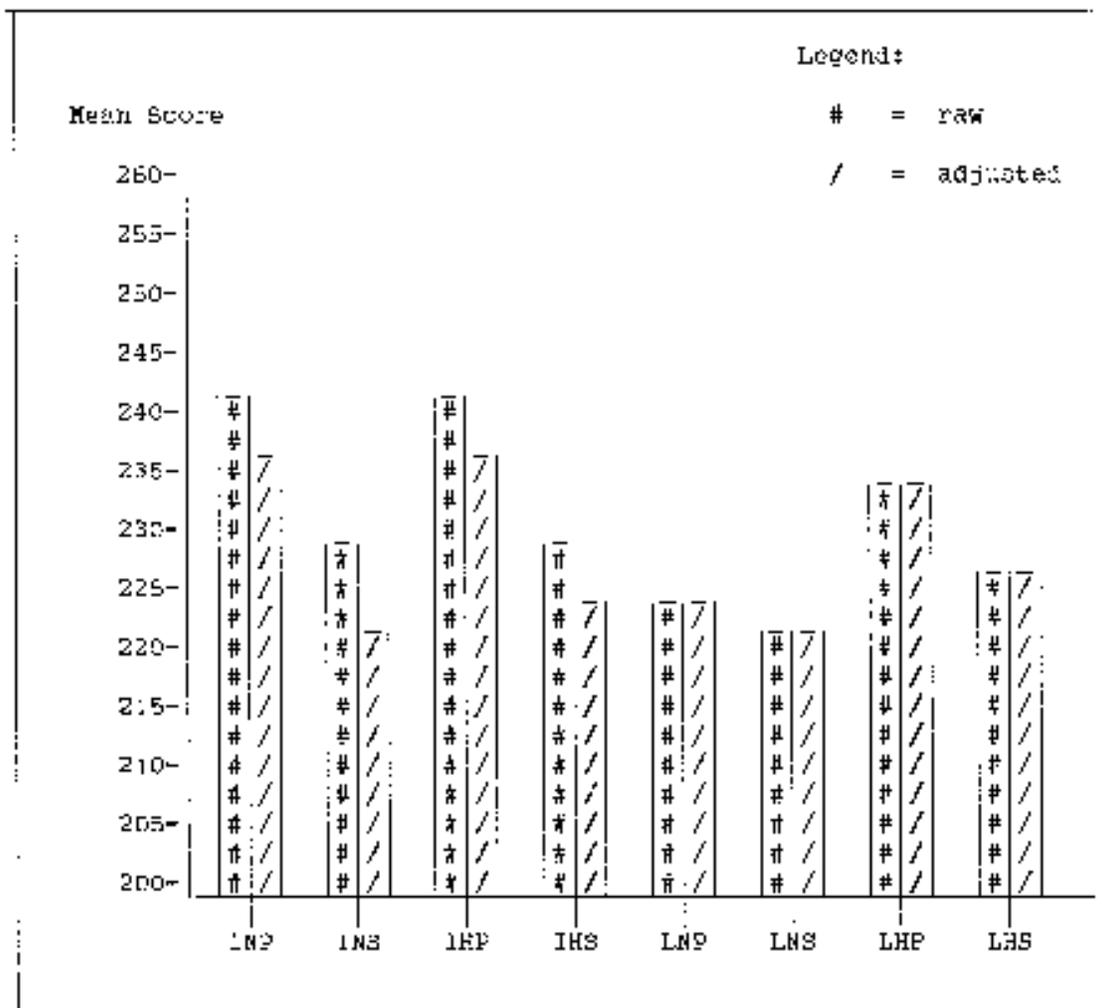


Figure 9. SDLES raw means and means adjusted for age by path, honors, and age.

Tests for Assumptions

A test for the assumptions of homogeneity of variance in the analysis of variance procedure was computed using the Bartlett-Box F test. This test procedure reported a value of 1.143, not significant at the .05 level ($p < .335$). Multicollinearity was not an issue in this investigation. The correlation coefficients indicate the highest relationship between the independent variables to be .46, which is well below the level of .80 usually identified as the critical level (Davis, 1971).

Tests for the assumptions of analysis of covariance were computed using the Bartlett-Box F test which was found to be 1.775, not significant at the .05 level ($p < .088$). That this value was even this close to being significant was most likely due to the very small number of respondents in the cells with highest and lowest variance. By removing the group with the lowest variance (5.4 compared to the others which ranged from 15.4 to 28.7) and the smallest cell size ($n = 4$) the Bartlett-Box F was 1.236 and not significant at the $p < .284$ level. Additionally, a test procedure which compares the slopes of the individual regression lines to the main regression line was also not significant.

CHAPTER V

Summary, Discussion, and Recommendations

Below is a brief summary of the intent of this research. The relative importance of the results from each research question identified in Chapter I is discussed and recommendations for further research are presented.

Summary

Medical professionals must be self-directed learners. The professional medical organizations have been attempting to incorporate self-directed learning skills into the medical curricula to aid in the development of practitioners who are self-directed learners. The Ohio State University College of Medicine responded very early to the call for an alternative curricula by developing the Independent Study Program path as an alternative to the traditional Lecture-Discussion path. This study was designed to measure the self-directed learning readiness of the medical students, determine if the medical students at The Ohio State University are higher in self-directed learning readiness than the average adult, and determine if there is a difference between the students in program paths or years in the College of Medicine.

This research anticipated that the independent study program group of students would score higher than the lecture-discussion group on self-directed learning readiness. This anticipation was grounded in the literature which supported the hypothesis that programs which allow students the opportunity to practice self-directed learning contribute to the student's ability, effectiveness, and desire for self-directed learning. The ISP path is such a program option for medical students at Ohio State.

Question I

This research question asked: what are the self-directed learning readiness scores of the medical students at Ohio State? Guglielmino reported the average SDLRS score for all adults to be 214. Crook (1985) reported a mean score of 222 and a standard deviation of 24.9 on 63 first year nursing students taking the SDLRS. Long and Agyekum (1984) reported a mean SDLRS score of 230 and a standard deviation of 21.7 for 92 college undergraduate students. The analysis of the findings for this question reported a mean score for all medical students of 230. This score is significantly different than the adult average score reported by Guglielmino and falls in the top 50% of all adult scores. This finding suggests that, as a whole, the medical students at Ohio State were more ready for self-directed learning than the average adult. However, the mean score of the medical students is the same as that reported by Long and Agyekum (230) for college undergraduates.

Such findings suggest that, though medical students were more ready for self-directed learning than the average adult, there is a need for further improvement. If it is indeed the goal of the medical college to produce medical practitioners who are highly self-directed learners, it is falling short of this goal. There were 97 students (22%) who scored below the average adult score for self-directed learning readiness. The medical curricula is failing to develop self-directed learning readiness in these students.

The mean score of all medical students is informative; it provides a general impression of the readiness for self-directed learning in the medical students at Ohio State. But more informative was testing for a difference between the ISP and LDP students in self-directed learning readiness.

Question II

The second research question was designed to determine if there was a significant difference in self-directed learning readiness depending on year or program path. A three by two analysis of variance showed no significant difference in SDLR based on year. The Self-Directed Learning Readiness Scale scores of the Med III students were not significantly different than the Med I students'. Such a result suggests the medical curricula was not contributing to an increase in self-directed learning readiness. Those students closer to actual medical practitioners were not scoring significantly higher on the SDLRS than those first entering into the medical program.

Path was found to be significantly different. The ISP group scored significantly higher on the SDLRS than did the LDP group. The mean score of the ISP was 242, 28 points above the average adult score and 13 points above the LIJP group. The ISP group mean falls in the top 16% of all adults in self-directed learning readiness. The mean score of the LDP group was 229, this was also higher than average adult score, and in the top 50% of all adults.

Medical professionals have a responsibility to continue their professional education throughout their career. Though self-directed learning is only one approach to continuing education, it is one that the professional medical organizations have been increasingly citing as an important option for practitioners. The below average scores of 22% of the medical students indicates that this group of students were not the highly self-directed learners the medical curricula has hoped to produce.

The ISP group was above the average adult score in self-directed learning readiness. As such one might assume that the ISP path was developing or promoting the skills necessary for self-directed learning in its students and the desire to use them. Unfortunately, as further analysis indicated, this was not the case. The ISP path itself was not responsible for the increased scores, but rather the age and major of the students. Analysis showed that the ISP students were significantly older than the LDP students.

Age was embedded in path in the initial analysis; removing the effect of age from the analysis resulted in path no longer being significant.

The initial goal of the ISP option was to provide an alternative program path for students and to develop the skills of independent study. The findings of this study suggest that it was not the program path that is associated with higher self-directed learning readiness, but that the higher age of the students. The students in the ISP have a mean age of 27, two years older than the mean age of the LDP group. The subsequent analyses also show the diminished effect of path as other variables are taken into account. The two-way analysis of variance found path significant beyond the .05 level ($p < .001$). The regression analysis also found path significant, but less so ($p < .027$). Finally, the three-way analysis of covariance found path not significant ($p < .472$).

The variable honors (like path) was not significant when the effect of the variable age was controlled for. This left only age and major as the significant variables affecting SDLRS scores. Higher ages were positively associated with higher SDLRS scores. Additionally, those students whose undergraduate major was in a physical science related area scored significantly higher than those who were in social science related areas.

Question III

Question three asked how the variables were related to self-directed learning readiness. Correlation coefficients were calculated to help answer this question. The variable

path with age had the greatest correlation coefficient at $r = .20$. This represents a low association according to Davis (1971).

Stepwise multiple regression was then used to build a model for predicting SDLRS score based on the variables available. The regression equation determined the proportion of variance in SDLRS score that was explained by the independent variables. The model shown in Figure 10 was built from the regression equation; it uses the variables age, honors, major and path to assist in the prediction of the student's score. These variables were able to account for 10% of the variance in SDLRS scores. Figure 10 differs from the original model which predicted the effects of the variables on SDLRS score by removing those which did not contribute to the regression equation. In this case, the variables year, race, level, and gender have been removed.

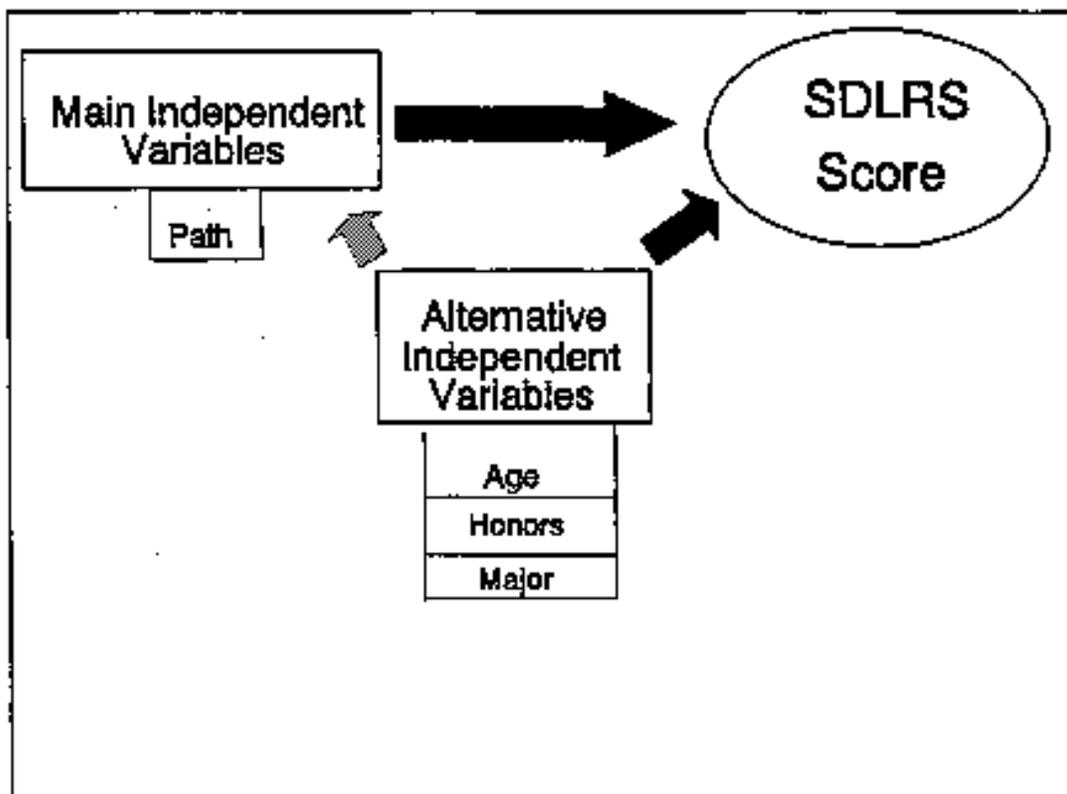


Figure 10. Model of variable effects based on regression.

Discussion

A difference in self-directed learning readiness was expected between the two paths, and though found, was not statistically significant once the effect of age was removed. This finding may be explained by taking into account both possible cross-over effects in the path options and the actual level of self-directed learning permitted in the ISP.

The first issue deals with the possibility that some of the ISP students may attend a lecture and some of the LDP students may be using other methods of learning besides those provided by the LDP path. Obviously, based on the attendance, a large number of students in the LDP are finding an alternative method to obtain the material offered by the lecture. In fact, nearly 40% of the LDP group were regularly missing the lectures.

The other issue deals with the actual self-directed learning permitted in the ISP path. Even though these students are given great autonomy in how they learn the material, and even the order in which they learn it, it is not a wholly self-directed project. Students in the ISP are provided with learning objectives, practice tests, and other evaluation methods that assist them in assessing their progress. The final evaluation of the ISP student is passing Part I of the NEME exam. Once again, even though the student may have learned the material independently, the final evaluation is institutional rather than individually. These effects, I believe, play an important role in the lack of significance found in the variable program path.

Difference in Major

A particularly interesting finding of this study was the significant difference in SDLRS scores based on undergraduate major. In this investigation, undergraduate majors from the physical sciences scored significantly higher on the SDLRS than did social science majors. This was an unexpected finding as Morstain (1974) reported that 76% (n = 177) of social science majors preferred independent study programs to the traditional course format. In contrast, only 39% (n = 102) of physical science majors preferred the independent study method over the traditional format.

The literature suggested that social science majors would prefer learning modes that allowed for independent study (Morstain, 1974). Students preferring independent study would be expected to enroll in programs offering this learning mode more than others, and would be expected to score higher on the SDLRS. The findings of this study conflict with Morstain's results. A possible explanation for this difference is presented below.

Morstain (1974) used 648 entering freshmen and upper-level transfer students for his study. He compared the subjects' declared major and preference for independent study or the traditional lecture format. Morstain found no difference in preference for instructional mode based on sex or entry level, but did find a significant difference based on declared major. Those students in Morstain's study who had declared social science majors showed a significant preference for independent study based programs over the traditional lecture

format. Those students who declared physical science majors showed a significant preference for the lecture mode.

Perhaps some of the discrepancy between Morstain's findings and those of this study can be explained by the groups studied. Morstain studied freshman. Freshmen frequently change majors before graduating, and they may have changed to a more suitable major for their actual learning preferences after Morstain's study. Morstain's group of students, if measured after graduating, may have been more like the group in this study.

At first glance, Morstain's results seem to agree with what most people believe are the differences between social sciences and physical sciences majors. That is, physical science is an exact science and has a prescribed set of rules and procedures that make up the knowledge base and research. Social science, on the other hand, is not an exact science. Social science involves people, their attitudes, and behaviors. As such, social science does not have the formal structures that the physical sciences do. This structure may be the basic understanding of the scientific approach to knowledge acquisition.

Familiarity with the scientific approach may be responsible for the increased scores on self-directed learning readiness associated with physical science majors. Experience with scientific research may increase the respondent's confidence and ability in directing their own learning needs. This difference may be the underlying reason why physical science majors were higher in self-directed learning readiness than the social science majors.

Medical schools have been encouraging students not to focus solely on physical science courses in preparation for pursuing a medical degree. This practice may complicate the ability of medical schools to achieve their goal of producing self-directed learners. If social science majors are indeed less likely to prefer self-directed learning situations, as found in this study, encouraging pre-medical school students to be social science majors may be associated with lower self-directed learning readiness scores in the medical students. Perhaps encouraging a major in the physical sciences with additional coursework in communication and inter-personal skills would maintain a high SDLRS score as well as contribute to the professional development of the future physician.

The literature also suggested race and level of previously attained education were related to preference for self-directed learning. This study did not find these variables to be a significant predictor of self-directed learning readiness. This may have been because of the homogeneity of the whole group of medical students. This study did, however, support the literature in finding that gender is not related to self-directed learning readiness.

Difference in Age

A synopsis of the findings indicate the ISP students do score significantly higher than the LDP students, though this was not because of differences inherent in the program paths. The ISP students in this study were scoring significantly higher due to the greater age of this group when compared to the LDP group. The older medical students were more highly self-directed learners, ready to take responsibility for their own continuing educational needs.

This finding suggests that as one becomes older, he/she becomes more interested in and able to direct his/her own learning needs. Whether this is just a disenchantment with the traditional learning mode or a true increase in self-directed learning is not known. Additionally, this finding also suggests that the SDLRS scores of practitioners may increase as age and years in practice also increases.

Figure 11 represents a revised model of variable effects based on the additional information provided by the analysis of covariance. This study found only age and major to be significant predictors of self-directed learning readiness.

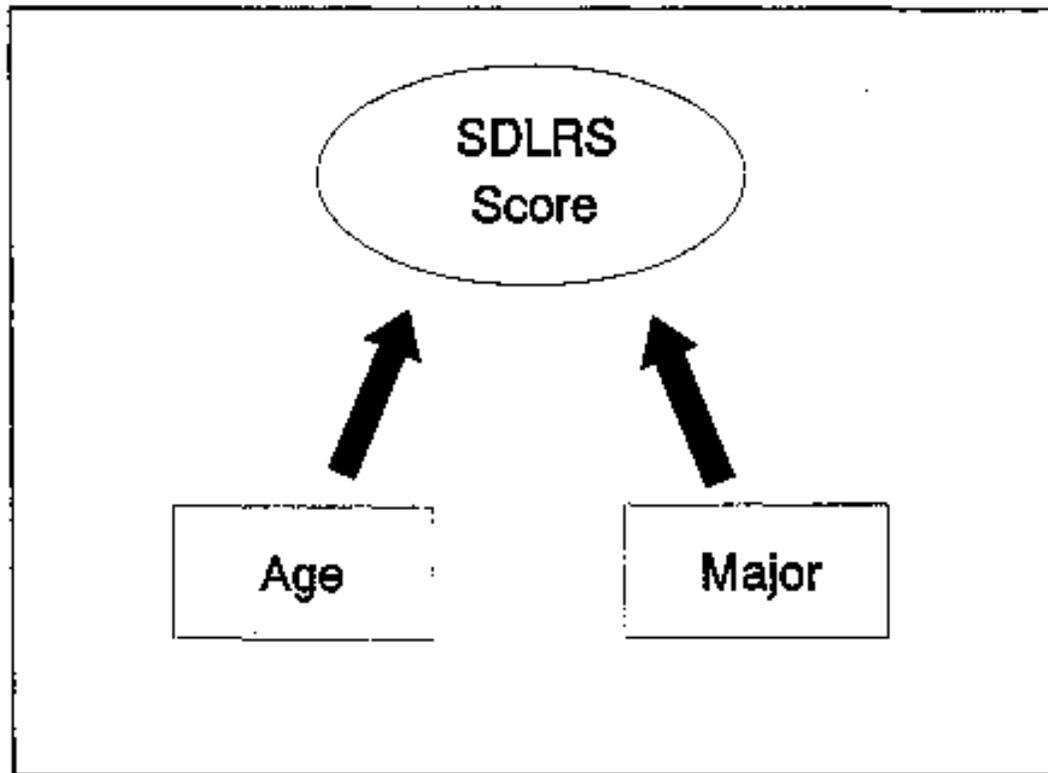


Figure 11. Model of variable effects based on regression and ANCOVA.

Recommendations for Additional Studies:

1. Assess the self-directed learning readiness of practicing physicians to determine the current status quo.

Such knowledge can be used to build a database to evaluate the change in self-directed learning readiness of practitioners brought about by instructional interventions. This database would allow a researcher to answer the following questions. Does age continue to have a significant effect on SDLRS scores in practitioners as it did on the students in this study? If so, what kind of effect is found? Does type of practice (private, small group, hospital, academic) have an effect on SDLRS scores? How can any effect found be used to enhance the medical curricula to assist in developing these skills at an earlier level in the practitioners' career?

2. Investigate alternative instructional methodologies (such as the problem based learning model) in use at other medical schools.

Determining the SDLRS scores of these other groups will facilitate the identification of successful programs that are leading to increased SDLRS scores. Identifying these alternative curricula which are designed to develop and foster self-directed learning and implementing them at other medical colleges will benefit the profession as a whole. What are the elements of the instructional plans at other medical colleges which are designed to develop and encourage self-directed learning? How successful are these other schools at developing self-directed learning readiness? How do the students in these program score on the SDLRS?

3. Panel studies of previous ISP and LDP students who are now established practitioners to determine if there is a difference in SDLRS scores following graduation.

This research might determine if program path makes a difference outside of the educational institution. Medical education can not be wholly self-directed. There will always be check points to ensure the potential practitioner is not a threat to his or her patients. Perhaps the alternative education provided by the ISP option will have an effect after graduation when the students are no longer measured by the institution. Do self-directed learning readiness scores become significant based on path after graduation? Does age Continue to have an effect on the difference found between the paths?

4. Focus groups or a Delphi study with physicians who are high self-directed learners to find out how they learn.

Such a meeting might include prominent physicians, medical researchers, and faculty. The participants may discuss how they prefer some learning modes over others, and why. What helps them to learn and what hinders their learning efforts? Such research could lead to discovering additional self directed learning characteristics and skills that can then become part of the instructional plan.

5. A panel study following an instructional intervention which was specifically designed to raise SDLRS scores would determine if these changes persist over time.

Do self-directed learning training programs raise SDLRS scores over time, or only for a short duration? Are these training methods effective in the work place? Will subjects return to previous methods once back in the work place or will they use the new skills?

Conclusion

Medical colleges should develop a curricula that helps students become more nearly ready for their own learning responsibilities as medical professionals. Such a plan should include instruction that will develop the self-directed learning skills identified by Knowles (see pp. 15—16). The performance of the medical students in this research indicates that the curriculum (at the time of this study) is not developing or promoting the use of these skills in its students.

Optional program paths, like the independent study program, need to be further investigated by medical researchers. Though this study was unable to find support for the claim that the independent study program was developing highly self-directed learners, it assessed the subjects while they were still in school. Perhaps a difference in self-directed learning will occur once the student is a practitioner. Further research into the self-directed learning readiness of practitioners, the type of program they are from, and the type of practice they are in may greatly enhance the current understanding of this skill. Such knowledge will also provide insight into new programs that can be developed within the medical curricula.

Medical professionals need to be highly motivated learners, capable and desiring to further increase their knowledge. If the professional medical organizations and colleges truly desire their practitioners to be highly self-directed learners, they must implement effective educational practices that will teach and develop these skills in medical students. The knowledge of and ability to use self-directed learning skills will benefit both the medical student and the practitioner. The time to develop these skill is while the student is in the pre-professional stages, not after graduation.

APPENDIX A

Oral Instructions
Read by Researcher

Oral Instructions

Hello, my name is Anthony Frisby and I am a doctoral candidate in the College of Education. Since 1988 I've been a graduate research associate for the College of Medicine working for the Office of Academic Services developing educational materials. My research interests involve educational research and evaluation, in particular medical and allied medical education. For my dissertation I am investigating the learning preferences and attitudes toward learning of medical students here at Ohio State.

The College of Medicine has asked your instructor to allow me roughly fifteen minutes of your time today for this investigation. Your participation in this investigation is strictly voluntary. The survey instrument you will be completing does not request your name or any identification so you may be assured your responses are confidential.

Once the final report has been written, the instruments used will be destroyed. Neither your responses or your willingness to participate in this investigation will be part of your record, now or at any time.

The survey I will be passing out will present 58 statements about education and learning in general. You will be asked whether you agree or disagree with the statement; or whether the statement accurately describes you. There are 8 additional questions which will collect some demographic data as well.

Your participation in this research is greatly appreciated, and may help to improve the quality of the medical education program.

APPENDIX B

Letter from Dr. Clausen
Requesting ISP Student Participation



Independent Study Program

Grant O. Graves Hall
333 West 10th Avenue
Columbus, OH 43210-1239
Phone 614-292-9000

February 11, 1991

MEMORANDUM

TO: All ISP Faculty and Students

FROM: Kathryn P. Clausen, M.D., Director, ISP *KPC*

SUBJECT: Graduate Student Questionnaire Regarding Self-Directed Study

Mr. Anthony Frisbee is doing a dissertation study on self-directed learning skills. He would like your participation in this study by completion of the enclosed questionnaires. I hope that you will be able to find the time to assist him in this interesting study. He has promised to share the results with us after it is completed.

KPC:dme

APPENDIX C

Letter from Researcher Requesting Student Participation
and Written Instructions for Mail Groups

Instructions

Enclosed is a questionnaire for you to complete from Anthony Frisby a doctoral candidate in the College of Education. Mr. Frisby is a graduate research associate for the College of Medicine working for the Office of Academic Services developing educational materials. His research interests involve educational research and evaluation, in particular medical and allied medical education. For his dissertation he is investigating the learning preferences and attitudes toward learning of medical students here at Ohio State.

Your participation in this investigation is strictly voluntary. The survey instrument you will be completing does not request your name and you may be assured your responses are confidential.

Once the final report has been written, the instruments used will be destroyed. Neither your responses or your willingness to participate in this investigation will be part of your record, now or at any time. If you decide you do not want to participate, please send a note stating so and your mailbox number in the enclosed envelop and you will not be contacted again.

The survey will present 58 statements about education and learning in general. You will be asked whether you agree or disagree with the statement; or whether the statement accurately describes you. There are 8 additional questions which will collect some demographic data as well. Once you have completed the instrument, please place it in the enclosed envelop and put in any campus mail mailbox.

Your participation in this research is greatly appreciated, and may help to improve the quality of the medical education program.

Thank You,

Anthony J. Frisby

APPENDIX 2

Instrumentation

QUESTIONNAIRE

INSTRUCTIONS: This is a questionnaire designed to gather data on learning preferences and attitudes towards learning. After reading each item, please indicate the degree to which you feel that statement is true of you. Please read each choice carefully and circle the number of the response which best expresses your feeling.

There is no time limit for the questionnaire. Try not to spend too much time on any one item, however, your first reaction to the question will usually be the most accurate.

RESPONSES

ITEMS:

	<i>Almost never true of me; I hardly ever feel this way.</i>	<i>Not often true of me; I feel this way less than half the time.</i>	<i>Sometimes true of me; I feel this way about half the time.</i>	<i>Usually true of me; I feel this way more than half the time.</i>	<i>Almost always true of me; there are a very few times when I don't feel this way.</i>
1. I'm looking forward to learning as long as I'm living.	1	2	3	4	5
2. I know what I want to learn.	1	2	3	4	5
3. When I see something that I don't understand, I stay away from it.	1	2	3	4	5
4. If there is something I want to learn, I can figure out a way to learn it.	1	2	3	4	5
5. I love to learn.	1	2	3	4	5
6. It takes me a while to get started on new projects.	1	2	3	4	5
7. In a classroom, I expect the teacher to tell all class members exactly what to do at all times.	1	2	3	4	5
8. I believe that thinking about who you are, where you are, and where you are going should be a major part of every person's education.	1	2	3	4	5
9. I don't work very well on my own.	1	2	3	4	5

	<i>Almost never true of me; I hardly ever feel this way.</i>	<i>Not often true of me; I feel this way less than half the time.</i>	<i>Sometimes true of me; I feel this way about half the time.</i>	<i>Usually true of me; I feel this way more than half the time.</i>	<i>Almost always true of me; I often feel this way.</i>
10. If I discover a need for information that I don't have, I know where to go to get it.	1	2	3	4	5
11. I can learn things on my own better than most people.	1	2	3	4	5
12. Even if I have a great idea, I can't seem to develop a plan for making it work.	1	2	3	4	5
13. In a learning experience, I prefer to take part in deciding what will be learned and how.	1	2	3	4	5
14. Difficult study doesn't bother me if I'm interested in something.	1	2	3	4	5
15. No one but me is truly responsible for what I learn.	1	2	3	4	5
16. I can tell whether I'm learning something well or not.	1	2	3	4	5
17. There are so many things I want to learn that I wish that there were more hours in a day.	1	2	3	4	5
18. If there is something I have decided to learn, I can't find time for it, no matter how busy I am.	1	2	3	4	5
19. Understanding what I read is a problem for me.	1	2	3	4	5
20. If I don't learn, it's not my fault.	1	2	3	4	5
21. I know when I need to learn more about something.	1	2	3	4	5
22. If I can understand something well enough to get a good grade on a test, it doesn't bother me if I still have questions about it.	1	2	3	4	5
23. I think libraries are boring places.	1	2	3	4	5
24. The people I admire most are always learning new things.	1	2	3	4	5

	<i>Almost never true of me; I hardly ever feel this way.</i>	<i>Not often true of me; I feel this way less than half the time.</i>	<i>Sometimes true of me; I feel this way about half the time.</i>	<i>Frequently true of me; I feel this way more than half the time.</i>	<i>Almost always true of me; there are very few times when I don't feel this way.</i>
25. I can think of many different ways to learn about a new topic.	1	2	3	4	5
26. I try to relate what I am studying to my long-term goals.	1	2	3	4	5
27. I am capable of learning just about almost anything I might need to know.	1	2	3	4	5
28. I really enjoy tracking down the answer to a question.	1	2	3	4	5
29. I don't like dealing with questions where there is not one right answer.	1	2	3	4	5
30. I have a lot of curiosity about things.	1	2	3	4	5
31. I'll be glad when I'm finished learning.	1	2	3	4	5
32. I'm not as interested in learning as some other people seem to be.	1	2	3	4	5
33. I don't have any problem with basic study skills.	1	2	3	4	5
34. I like to try new things, even if I'm not sure how they will turn out.	1	2	3	4	5
35. I don't like it when people who really know what they're doing point out mistakes that I am making.	1	2	3	4	5
36. I'm good at thinking of unusual ways to do things.	1	2	3	4	5
37. I like to think about the future.	1	2	3	4	5
38. I'm better than most people are at trying to find out the things I need to know.	1	2	3	4	5
39. I think of problems as challenges, not roadblocks.	1	2	3	4	5
40. I can make myself do what I think I should.	1	2	3	4	5

	<i>Almost never true of me; I hardly ever feel this way.</i>	<i>Not often true of me; I feel this way less than half the time.</i>	<i>Sometimes true of me; I feel this way about half the time.</i>	<i>Usually true of me; I feel this way more than half the time.</i>	<i>Almost always true of me; there are very few times when I don't feel this way.</i>
	1	2	3	4	5
41. I'm happy with the way I investigate problems.	1	2	3	4	5
42. I become a leader in group learning situations.	1	2	3	4	5
43. I enjoy discussing ideas.	1	2	3	4	5
44. I don't like challenging learning situations.	1	2	3	4	5
45. I have a strong desire to learn new things.	1	2	3	4	5
46. The more I learn, the more exciting the world becomes.	1	2	3	4	5
47. Learning is fun.	1	2	3	4	5
48. It's better to stick with the learning methods that we know will work instead of always trying new ones.	1	2	3	4	5
49. I want to learn more so that I can keep growing as a person.	1	2	3	4	5
50. I am responsible for my learning — no one else is.	1	2	3	4	5
51. Learning how to learn is important to me.	1	2	3	4	5
52. I will never be too old to learn new things.	1	2	3	4	5
53. Constant learning is a bore.	1	2	3	4	5
54. Learning is a tool for life.	1	2	3	4	5
55. I learn several new things on my own each year.	1	2	3	4	5
56. Learning doesn't make any difference in my life.	1	2	3	4	5
57. I am an effective learner in the classroom and on my own.	1	2	3	4	5
58. Learners are leaders.	1	2	3	4	5

1. Please enter your age _____.

2. Please indicate your race by circling the appropriate category:

Black White Asian Other

3. Please indicate your previous level of education attained by circling the appropriate category:

Bachelor Masters Ph.D.

4. Please indicate if you were enrolled in an honors or advanced program during your undergraduate coursework.

___ Yes, I participated in an honors or advanced program.

___ No, I did not participate in an honors or advanced program.

5. Please indicate the type of major that more accurately describes your undergraduate degree. Choose only one of the two options.

___ My bachelor degree is most related to human studies or the arts. (For example: education, journalism, history, business.)

___ My bachelor degree is most related to the physical sciences. (For example: chemistry, math, statistics, engineering.)

6. Please indicate your gender by circling the appropriate category:

Female Male

7. Please indicate your class rank by circling the appropriate category:

Med I Med II Med III

8. Please indicate the pre-clinical path you were last a member of:

ISP LDP

8a. If you have switched from the ISP to the LDP program check here: ___

8b. If you have switched from the LDP to the ISP program check here: ___

APPENDIX E

Oral Instructions
Read by Instructor

Oral Instructions

*** Please read the following instructions aloud to the students *
* prior to passing out the research instrument. ***

I will be distributing a questionnaire for you to complete for Anthony Frisby, a doctoral candidate in the College of Education. Mr. Frisby is a graduate research associate for the College of Medicine working for the Office of Academic Services developing educational materials. His research interests involve educational research and evaluation, in particular medical and allied medical education. For his dissertation he is investigating the learning preferences and attitudes toward learning of medical students here at Ohio State.

The College of Medicine has asked your instructor to allow roughly fifteen minutes of your time today for this investigation. Your participation in this investigation is strictly voluntary. The survey instrument you will be completing does not request your name or any identification so you may be assured your responses are confidential.

Once the final report has been written, the instruments used will be destroyed. Neither your responses or your willingness to participate in this investigation will be part of your record, now or at any time.

The survey I will be passing out will present 58 statements about education and learning in general. You will be asked whether you agree or disagree with the statement; or whether the statement accurately describes you. There are 8 additional questions which will collect some demographic data as well.

Your participation in this research is greatly appreciated, and may help to improve the quality of the medical education program.

APPENDIX F

Letter from Dr. McIlroy
Requesting LSP Student Participation



College of Medicine

Meeting Hall
370 West 9th Avenue
Columbus, OH 43210-1238
FAX 614-292-1544

February 26, 1991

Dear Med III student,

As Director of the Med III Academic Program for the College of Medicine, I ask you to please support the research project being conducted by Anthony Frisby and complete the enclosed questionnaire. Anthony's project, "Self-Directed Learning Readiness in Medical Students at The Ohio State University", addresses a number of important questions regarding the self-directed learning readiness and selection of program options in medical school. This research also seeks to determine whether and to what extent either or both of our current programs, the Lecture/Discussion Program and Independent Study Program, fosters the development of self-directed learning readiness which is so important for a successful career in medicine.

This research is of great value to the College of Medicine and its efforts to improve its educational programs. Your participation is much appreciated. Once you have completed the enclosed questionnaire, place it in the pre-addressed campus mail envelop and drop in any campus mail box.

Thank you,

Mary Mellroy, M.D.
Director, Med III Academic Program

APPENDIX 3

Frequency Count of Each Variable
at Each Level

Frequency Counts for Variables by Level

Variable Name	Level and Counts			
Year	Med I = 178	Med II = 115	Med III = 146	
Path	ISP = 51	LDP = 378		
Age	Ranged from 20 to 39 years old.			
	Mean = 24.6	Median = 24		
	Mode 24	Std. Dev. = 2.76		
Race	Black = 17	White = 371	Asian = 46	Other = 5
Level of Education				
	Bachelors = 407	Masters = 22	Ph.D. = 13	
Honors or Special Track Program				
	No = 241	Yes = 198		
Major	Social Studies = 59		Physical Sciences = 380	
Gender	Female = 161		Male = 278	

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