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Student Characteristics Predictive of Performance in Self-Directed Study in an Introductory Psychology Course

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STUDENT CHARACTERISTICS PREDICTIVE OF PERFORMANCE IN SELF-DIRECTED STUDY IN AN INTRODUCTORY PSYCHOLOGY COURSE

by

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VITA

The author, Joseph Anthony Gutenson, is the son of Joseph Gutenson and Ann Schneider Gutenson. He was born December 31, 1927, in Chicago, Illinois.

He graduated from Proviso Township High School in Maywood, Illinois in June, 1945. In September of 1947 he entered Northern Illinois State Teachers College, and in June, 1950, was an honors graduate with the degree of Bachelor of Science of Education with a major in industrial arts. In August of 1963 he received the Master of Education degree with a major in industrial education from Chicago Teachers College. In June of 1967 he received the degree of Master of Science in Education with a major in counseling and guidance from Purdue University. The University of Illinois awarded him the Advanced Certificate in Education with a major in education administration in June of 1969.

In August, 1950, he was employed at the Reavis High School in Burbank, Illinois, where he taught industrial arts until 1967. In September, 1967, he began an association with Thornton Community College, South Holland, Illinois. He has been an administrative intern, Assistant Dean of Instruction, Dean of Instruction, Dean of Career Education, and teacher. Since August, 1973, he has taught psychology.

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CHAPTER I

INTRODUCTION

The most widely used teaching technique employed in higher education is the lecture. Wilbert McKeachie (1965) has suggested that:

> College teaching and lecturing have been so long associated that when one pictures a college professor in a classroom, he almost inevitably pictures him as lecturing. The popularity of the lecture method probably derives from a conception of the instructor's primary goal as transmitting knowledge (p. 19).

The origin of the role of the teacher as a storehouse and transmitter of knowledge dates back to the time prior to the easy availability of the written word. Ohmer Milton (1973) has written:

> For hundreds of years a student and teacher absolutely had to be in the same place at the same time because the only way to dispense information was by mouth to nearby ears; the notion that teaching is talking is a historic carry-over from which higher education is only beginning to rumble about sundering itself (p. 6).

In the absence of printed materials, the lecture was an economical and convenient way to teach; however, the question arises as to whether or not, under today's changed conditions, it is still appropriate. More to the point, is any teaching method more efficacious or superior to any other? Koenig and McKeachie (1959) wrote:

> Does it make any difference how we teach? Despite a number of carefully executed studies on the comparative

> effectiveness of various teaching methods, there is little evidence to support the view that one teaching method is more effective than any other (p. 132).

After a survey of the research, Dubin and Taveggia (1968) concluded: "data demonstrate clearly and unequivocally that there is no difference among truly distinctive methods of college instruction when evaluated by student performance on final examinations" (p. 35).

The lack of difference may be a result of the method of evaluation. Benjamin Bloom (1971) has suggested that if students are normally distributed with respect to aptitude for some subject and all the students are provided with exactly the same instruction, the end result will be a normal distribution on an appropriate measure of achievement. If a mastery learning strategy is utilized, Bloom believes 95 percent of students can learn a subject with a high degree of mastery. He states:

> The basic task in education is to find strategies which will take individual differences into consideration but which will do so in such a way as to promote the fullest development of the individual (p. 45).

Many of the studies surveyed were designed to compare different methods of classroom instruction. As a result they used measures of central tendency to evaluate the results. Davis, Marzocco and Denny (1970) have pointed out that:

> Studies which employ these measures (of central tendency) to test differences between groups inevitably

> mask the effects of individual differences. Thus, some students may do better with one mode of instruction while other students do better with a second mode, but the use of the statistical mean would disguise this fact and on the average no differences between groups would be observed (p. 198).

This suggests that it may be more fruitful to search for the characteristics of the individual student associated with a particular mode of instruction than to attempt to determine which instructional method is superior.

Whether efficacious or not, the lecture seems to be popular. In one study, Evans, Smith and Colville (1962) found that all faculty respondents (319 of 400) in one university ranked lectures as the most used and favored teaching technique. The lecture, at least on occasion, is supplemented with other methods (discussion, reading, research papers, audio-visual aids, etc.). The lecture does have the inherent disadvantage of not providing for the individual differences in learning abilities of students, individualized instruction proports to deal with this problem. Programmed instruction, computer assisted instruction and audio-tutorial, among others, are attempts to individualize learning. However, Holland (1969) takes the position that "The fear of deadly uniformity is as great with so-called individualized instruction as without it" (p. 167). He believes that in order to diagnose learning effectively, several test items are required for each behavioral objective. This creates a cost-effectiveness problem, i.e.,

is the cost to the student in testing time sufficient to justify the results in terms of individualization? Additionally, he takes the position that present individualization is based on differing entering behaviors being guided towards objectives set by the educational establishment, leading to greater individual homogeneity rather than diversity.

The Personalized System of Instruction (PSI) is a popular method of individualized instruction. McKeachie and Kulik (1975) state that the method has been used in at least 850 college courses in psychology alone (p. 166). In 1968 Keller described the five features that distinguish PSI from conventional teaching procedures. PSI is individually paced, mastery oriented, student tutored, employs printed study guides and uses only a few lectures to stimulate and motivate students. The course is divided into units. At the beginning of the course the student receives a study guide with objectives for the first unit. The student can only advance into the next unit after he has mastered the previous unit. Tutors administer tests, provide assistance, and give the student the study guide for the next unit. The student proceeds at his own pace and takes tests only when he is ready. If the student fails an examination he receives help from the tutor and after remedial study takes a parallel form of the test. PSI is used with reported success in this country

and abroad (Keller, 1974).

Another form of individualization used successfully is self-directed study in which student and teacher are in a one-to-one relationship. An example of its use on a college-wide basis has been reported by Hunter (1972) at Meramec Community College.

In general, self-directed study can equal other methodologies of learning. Himmel (1970) reviewed 30 studies which compared self-directed study methods in undergraduate psychology courses to other more conventional instructional techniques (usually a "lecture course"). Of the 30 researchers, eight reported significantly higher achievement in self-directed study; five gave results favoring conventional techniques; and 17 yielded inconclusive data.

Courses utilizing the Personalized System of Instruction have been compared with conventionally taught courses. McKeachie and Kulik (1975) reviewed 5 studies which compared content learning as measured by final examinations. They concluded that content learning ". . . always equals, and most often exceeds, content learning under the lecture method" (p. 172). They also reviewed four studies which compared long-term retention in individualized and lecture courses. PSI students were found to perform better on measures of retention.

Historically there have been approaches to education using elements of an individualized approach. The monitorial

method, which was based on the work of the Anglican clergyman, Andrew Bell, and the Quaker teacher, Joseph Lancaster, received attention in the period of 1780-1820. This system was designed to bring about basic literacy by means of a master teacher training a number of student teachers called monitors, who in turn trained other students who served as monitors. Gutek (1970) tells us that because it offered low cost instruction it was popular in large cities such as New York and Philadelphia; however, by the late 1820's its popularity waned as critics argued that mechanical memorization was no substitute for genuine education.

Oxford University uses a system in which each undergraduate is assigned a tutor, who is responsible for him during his residence at the university. While formal teaching is chiefly by means of lecture the tutor may aid the student in acquiring the knowledge needed to pass the examinations necessary for graduation. The effectiveness of this teaching strategy depends in large measure on the competence of the tutor.

As an instructional mode, self-directed learning, while at least equal to other instructional methods in student achievement, also provides to some extent for individual learning abilities of students. Additionally, self-direction provides a student option which sharply contrasts with more conventional lecture or lecture/discussion techniques.

There are potential problems with techniques that attempt to individualize instruction. First is a tendency toward increased cost of instruction because of fewer students per teacher ratios. Second is the possible need for a major restructuring of the teaching methodology in order to initiate the technique.

Students who complete self-directed courses usually express satisfaction with their learning experience; however, a problem that has been observed with self-directed learning strategies is a high withdrawal rate (Keller, 1968; Sheppard & MacDermot, 1970).

Born and Whelan (1973) suggest that student withdrawals are at least partly a function of classroom procedures. Their data suggest that poorer students have difficulty with the self-pacing and that more careful management of study behavior might effect course completion. Other possibilities that might be considered are student dissatisfaction with the instructional strategy or perhaps a mismatch between teaching strategy and learning style.

Ryan (1974) compared withdrawal rates in personalized courses and in the conventional control groups when experimental comparisons were made. He concluded:

> Clearly, a personalized course does not necessarily mean a high level of student withdrawal. While it is certainly obvious that a particular personalized course can lead to a larger number of withdrawals, the pattern of withdrawals reported in the studies reviewed here

> does not suggest that there is anything about the personalized course structure per se that inevitably leads to more students seeking to drop a course (p. 18).

Bigelow and Egbert (1968) compared students in a traditional (lecture) study group and students in independent study in a psychology course. Their results implied that students successful in traditional study succeeded as well as students in independent study. They found a significant difference between those who were successful and nonsuccessful in independent study on the personality traits of responsibility and intellectual efficiency. Those with higher social needs tended to be less satisfied with independent study.

There is evidence to suggest a significant personality difference between students preferring self-directed versus lecture-instructional options. Koenig and McKeachie (1959) found that women high in need for achievement preferred either independent study or small group discussion to lecture instruction in an introductory psychology class. Horn (1971) found that students who preferred independent study showed a lower need for social approval and lower anxiety level than did the students who preferred the conventional method in a graduate course in library science. Pascal (1969) investigated student choice of teaching method in a psychology course and noted that:

> Students who choose the independent study option indicate a significantly greater need for autonomy, flexibility, a higher tolerance for ambiguity and a greater

> preference for abstract and scientific thinking than students who prefer the lecture option (p. 72).

McKeachie and Kulik (1975) in a review of the literature on effective college teaching state: "It is probable that independent study, like the other methods reviewed, is particularly effective with certain kinds of students" (p. 186). They also made the following observation:

> The paucity of positive results suggests that we need more research on methods of selecting and training students for independent study, arranging the independent study experience and measuring the varied outcomes for which students and teachers strive (p. 186).

The foregoing discussion suggests that an experimental investigation of a self-directed learning activity could lead to an instructional strategy useful in the classroom. From a pragmatic point of view, initiating a self-directed learning strategy requires several considerations. The strategy should:

1. be economical and require little, if any, additional expenditure of funds and require little additional time of the instructor.
2. attempt to deal with the problem of matching the individual characteristics of the student to the teaching method.
3. be relatively easy to implement.
4. concern itself with the high dropout rate noted with some methods of self-directed study.

5. offer some possible advantages over the existing instructional method.

This study considers these points within the framework of suitable research methodology.

Nature and Scope of Study

This study attempts to determine which student characteristics are related to successful performance in a self-directed learning experience in an introductory psychology course. The student characteristics measured are:

1. intellective factors
2. personality factors
3. study habits
4. student's academic load (number of college credit hours for which currently enrolled)
5. student's employment load (number of hours per week student works)
6. age
7. student's prediction of final grade (difference score between predicted and actual grade)
8. sex

The study has three purposes:

1. To test the hypothesis that: "there is a significant difference between those who choose lecture/discussion and those who choose self-directed study in the student

characteristics measured."

2. To test the hypothesis that: "there is a relationship between the student characteristics measured and high achievement (defined as high examination scores) in self-directed study.
3. To determine which variables make up a multiple regression equation that best predict student success in self-directed study.

CHAPTER II

REVIEW OF THE LITERATURE

The study of academic performance in school at all levels has long been a concern of educators. Studies and theories with the purpose of explaining the relationships between intellective and nonintellective variables and academic achievement are common. An additional goal of such studies and theories is to predict "academic success." Standardized tests such as the American College Tests and the Scholastic Aptitude Tests are intellectual measures often used to predict success in college. There is little question that measures of intellectual ability correlate with academic performance; however, these measures can account for only part of the variance. Results of studies which explore the use of nonintellective variables for academic prediction are not as clear-cut. Some nonintellective variables have been positively related to the criteria of academic achievement, some negatively, and some have exhibited no relationship. For many variables the results have been mixed and contradictory, and there are undoubtedly interactions with other variables.

Investigations of student performance and teaching effectiveness often have been conducted utilizing psychology

students. Birney and McKeachie (1955) surveyed the research since 1942 on the teaching of psychology. Among the things discussed were methods of instruction, interaction of teaching method and student personality, instructor-method interaction, student characteristics, instructor personality, measures of classroom process and measures of course outcomes. McKeachie (1963, 1970) broadened the discussion under the rubric of research on teaching at the college and university level. Among the additional topics of consideration are learning principles relevant to teaching methods, research on teaching methods, automated techniques and student characteristics related to effective teaching. McKeachie and Kulik (1975) updated the earlier reviews with an emphasis on insights gained from recent research. Topics covered include individualized instruction with emphasis on the Keller Plan; educational technology; methods emphasizing student interaction and autonomy; characteristics of students affecting teaching effectiveness; and structure, content and information-processing strategies.

While intellective factors are considered, the focus of this review is on those nonintellective student characteristics which predict successful performance in self-directed study in psychology courses. Research directly related to some variables as defined for this study is limited; therefore, studies done in other contexts deemed appropriate to the

discussion are included.

Intellective Factors

Lavin (1965) reviewed the literature dealing with intellective factors as predictors of academic performance and observed that relevant literature is voluminous. He reported on an earlier review by Cronbach (1949) which found that college level ability tests correlate about .50 to .55 with college grade-point averages (GPA). Lavin found that more recent research (through 1961) also indicates that correlations average about .50, with a range of about .30 to .70, when a single ability measure is used and about .65 for a battery of predictors (p. 51, 52). Other researchers have noted the high school GPA best predicts college GPA; however, aptitude test scores add to the accuracy of the prediction (Commission on Tests, 1970; Astin, 1971; Pedrini & Pedrini, 1974). Research using measures of intellectual ability and scholastic aptitude as predictors in psychology courses was surveyed by Gough (1964). He reported a median coefficient of .43 (range .27 to .67) for nine studies. Lin and McKeachie (1973) reported three studies utilizing students as subjects in introductory psychology courses. Correlation coefficients between predictors and performance measure ranged between .21 and .58 for men and .25 and .55 for women. From this cursory review it can be seen that the preponderance

of evidence indicates that measures of intellectual ability are useful predictors of academic performance.

Achievement Motivation

Lavin (1965) reviewed and analyzed nearly 300 studies on the prediction of academic performance completed through 1961. He separately considered single variable and multivariate studies related to personality factors. He reported that single variable studies utilizing objective techniques consistently indicated positive relationships between achievement motivation, independence, introversion and successful academic performance.

Also, Lavin listed all the major variables reported as being related to academic performance in multivariate studies. He then examined the list and classified the variables according to six underlying dimensions. These, with the names of the variables constituting each, are presented in Table 1.

Lenning, Munday, Johnson, VanderWell and Brue (1974) summarized the published reviews covering the literature on the relationship of nonintellective variables to academic success compiled through 1963. They reported:

> According to one or more reviewers personality variables that seemed to hold the greatest promise for usefullness in predicting grades and persistence were maturity in outlook (personal and social maturity); ability to conform to the group; amount of introvertedness; lack of

TABLE 1

Classification of Personality Variables Associated with Academic Performance in Multivariate Studies

Dimension I: Social Maturity in the Student Role

greater social presence
responsibility
greater social maturity
greater socialization
restraint in social behavior

Dimension II: Emotional Stability

higher morale
greater stability
greater freedom from neurotic orientation to study

Dimension III: Achievement Motivation Syndrome

higher achievement motivation
higher activity level
more endurance

Dimension IV: Cognitive Style

greater curiosity
greater flexibility
greater originality
greater ability to visualize a configuration when moved
more relevant thinking in class
more class participation (quality and frequency)
greater liking for thinking
less stereopathy

Dimension V: Achievement via Conformance

higher need for order
greater femininity
higher conformance

Dimension VI: Achievement via Independence

lower need for affiliation
greater independence
low conformity to peer group standards
moderate impulsivity (lack of constrictedness)

Multivariate study items describe characteristics of the high achiever.

Source: Lavin (1965, p. 107)

> conflict over independence-dependence; amount of independence; impulse control or ego function (responsibility, goodness, conscience, lack of hostility, and self-assurance); and overall adjustment. All of these variables have positive relationships with persistence or grades in various studies (p. 9).

The researchers also noted that "need for achievement generally correlated positively with grades" (p. 10). These findings are consistent with those of Lavin.

Weiss, Wertheimer and Groesbeck (1959) added n-Ach scores from the Edwards Personal Preference Schedule (EPPS) to academic aptitude test scores for a sample of 49 undergraduate psychology students. They found the coefficient of correlation with overall grade point average (GPA) was increased from .55 to .64 in a multiple regression equation. Goodstein and Heilbrum (1962) obtained a .24 correlation between n-Ach scores and GPA after correlations due to differences in academic aptitude were partialed out (N=206). On the other hand, Morgan (1975) found that the Edwards n-Ach scale is not a useful supplement to ability test scores in the prediction of academic performance for introductory psychology students (N=217).

Gough (1964) utilized a sample of 2,190 students in introductory psychology. Scores from 18 California Psychological Inventory (CPI) scales were correlated with final grades. The highest values for both sexes were observed for achievement via independence with coefficients of .33 for males and .29 for females. Stepwise multiple regression

analyses were conducted for each sex. For males, a coefficient of .41 was obtained utilizing six variables (achievement via conformance, achievement via independence, social presence, self-control, intellectual efficiency, and psychological mindedness). For women, a coefficient of .34 was obtained also using six variables (achievement via independence, sociability, responsibility, good impression, communality and psychological-mindedness).

Lin and McKeachie (1973) cited 13 studies, including Gough's research, indicating personality variables are related to achievement in introductory psychology courses (see Table 2). They reported 3 studies in which they found that intelligence and a measure of study habits and skills could be used to provide predictability for both men and women. Academic motivation accounted for additional variability in men while social science interest added to the predictive variability in women.

The factor that appears most consistently in the research reviewed clusters around achievement motivation. It is interesting to note that after reviewing the literature dealing with nonintellective descriptors and predictors of academic success deWolf (1974) concluded: "of all of the nonintellective descriptors and predictors included in this review, the one which most warrants further consideration is student motivation".

TABLE 2

List of Studies on the Relationship Between Non-Intellectual Variables and Performance in Introductory Psychology Courses

Study	Variable (Scale)	r
Altus (1948)	MMPI Hypomania Scale	Significant difference
Gough (1953)	Gough's Honor Point Ratio (Hr) later changed to Ai	.26 to .60
Gough (1964)	CPI Achievement via independence (Ai)	.29 to .36
Bendig (1957)	Gough's Hr (Ai) Scale	.32
Bendig (1958a)	Gough's Hr (Ai) Scale	.25, .30
Bendig (1958b)	Edwards Personal Preference Schedule (EPPS) n-Ach Scale	.37
Bendig (1959)	EPPS n-Ach Scale	.16
Bendig and Sprague (1954)	Guiford-Zimmerman Temperament Survey:	
	Restraint Scale	.20
	Objectivity Scale	.21
Huckabee (1968)	Cattell 16 PF:	
	Premsia Scale	.30
	Surgency Scale	-.38
Alpert and Haber (1960)	Achievement Anxiety Test (AAT)	
	Debilitating Anxiety (AAT-)	-.26
	Facilitating Anxiety (AAT+)	.23
Carrier and Jewell (1966)	AAT-	-.19 to -.57
	AAT+	.13 to .56
Garms (1970)	66 Items from MMPI, CPL, EPPS, F-Scale and Ethnocentrism	.43, .56

Source: Adapted from Lin & McKeachie (1973)

Anxiety

With mixed results, anxiety has been studied as an independent factor that relates to academic performance. Lavin (1965) reviewed the research and found anxiety is generally low and often inconsistent. He suggested that the relationship may be curvilinear. Lunning et al. (1974) after examining the literature through 1963 came to the following conclusions concerning the effect of anxiety on academic performance:

> The degree to which a student is able to handle his anxiety was found to be positively related to level of achievement and to persistence. The mature student has learned to control his anxieties and worries so they do not seriously impede achievement.
>
> Depending on the amount, anxiety may affect achievement in either direction. Anxiety generally has positive effects up to a point (that point depending on the person), but beyond this point it becomes detrimental. (p. 10)

Spielberger (1966) reported the results of several real-life and laboratory experiments which explored the effects of anxiety on learning and academic achievement. He found the greatest effect on high-anxious subjects who were in the mid-ability range. High anxious subjects of low-ability showed no observable effect in performance while high-anxiety tended to facilitate the performance of subjects in the high-ability range. Carrier and Jewell (1966) obtained data which supported the contention that scores on self-report

measures of anxiety can be useful in predicting academic examination performance in a psychology course. They found that the prediction of examination performance was better for female than for male students. Mukherjee (1969) found that anxiety was related to examinations in psychology courses while the control variables of ability and self-image were equalized for the high-anxious and low-anxious groups as defined by scores on Taylor's Manifest Anxiety Scale.

Dowaliby and Schumer (1973) explored teacher-centered versus student-centered instruction as related to manifest anxiety. They found that while the teacher-centered mode optimized learning for high-anxious students, the student-centered approach resulted in superior performance in examinations for low-anxious students. Stanton (1974) found that anxious students perform better with lecture than with independent study.

Domino (1971) found that students taught in a manner consistent with their achievement orientation (Achievement via Conformance or Achievement via Independence scales from the California Psychological Inventory) obtained significantly higher scores than students taught in a discordant manner. The evidence suggests that a relationship will be found between anxiety and level of performance.

Study Habits

Gough (1964) noted that most investigations of study habits and study skills deal with GPA in general and not with achievement in an introductory course. After reviewing the research on study habits and attitudes Lavin (1965) concluded that measures of study habits can predict academic performance; however, he was not sure whether or not study habit items are better predictors than study attitude items. Lenning, et al, (1974) reported after their survey of the literature: "Study habits and methods are positively related to academic achievement" (p. 11). Several studies found moderate correlations between Brown-Holtzman Survey of Study Habits and Attitudes (SSHA) scores and academic achievement (Brown, 1964; DeSena, 1964; Weigel & Weigel, 1967). Lin and McKeachie (1973) found in three studies of academic achievement in introductory psychology courses that items selected from the SSHA made independent contributions beyond intelligence to prediction equations. McCausland and Stewart (1974) used 154 college freshmen in an introductory psychology course as subjects in a study of the relationship between academic aptitude, study skills and college GPA. They discovered that while SSHA scores did not add predictability to a regression equation, which already included high school average and American College Test

scores, there is a statistically significant relationship between SSHA scores and college GPA. Ehre (1972) instructed psychology students in study skills and behavior self-management. This resulted in greater knowledge of study skills but had no effect on behavior or achievement.

The evidence suggests a relationship between study habits and academic performance; however, the nature of the relationship has not been identified.

Student's Academic Load

There is an assumption in education that the student with fewer subjects has more time to spend on each and therefore improves his chances of success; however, present research does not support this assumption. Andrew (1956) and Merrill (1954) analyzed the relationship between academic load and scholastic success for academically deficient students and found a negligible relationship. Hountras (1958) found that student load was not related to foreign graduate student achievement. His findings suggest that weaker students attempt to earn fewer hours and that mental efficiency is a far more important factor than work load in influencing achievement. Merrill and Osborn (1959) studied the relationship between academic overload and scholastic success. They found students perform much the same in a quarter in which an academic overload is attempted as in other registration

periods. Lavin, (1965) in reviewing the literature, found that academic load has little or no effect upon school performance. He noted "For low-ability students, however, academic load is inversely related to grades. Because there is so little variability in load at any educational level, this probably cannot be considered to be an important factor."

The limited research available suggests that no relationship will be found in the study between the number of hours a student carries and the level of his performance.

Student's Employment Load

A number of studies have been carried out concerning the relationship of student employment to grades. Usually hours of work relating to the academic performance to full-time students are studied. Henry (1963) summarized a number of studies and came to the conclusion that students who work part-time, up to a reasonable work load, perform at least as well as those who do not work part-time. Anderson (1966) reported that a study at Modesto Junior College showed no difference between academic achievement of first semester freshmen who worked and a control group who did not work. Henry (1967) considered academic level as he tried to determine the effect of part-time work on the performance of first-semester freshmen at the University of Missouri. He

found no significant differences among students rated in the upper, middle, and lower thirds of their group and academic performance. Kaiser and Bergan (1968) studied 2,294 beginning freshmen enrolled fall semester at Kansas State University. They found that part-time employment had no adverse effects on academic achievement. Hay and Lindsay (1969) conducted two studies of the total enrollment of the Ogontz Campus of the Pennsylvania State University. A total of 887 subjects were included in Study I and 920 subjects in Study II. They concluded that the weight of the evidence points to no differences in grades when employed and non-employed students are compared. However, they found a tendency, although statistically non-significant, consistently in the direction of higher grades with fewer hours worked. They found that in general with up to 15 hours a week of work there is no adverse effect academically, while with 16 or more, the mean GPA of the employed students decreases.

It appears then that working 15 hours or less per week has no adverse effect on the academic performance of full-time freshmen students; however, these studies were not controlled for prior achievement. Perhaps the high achieving student is able to do well working an excess of 16 hours. Further study of this problem is needed.

Age

There are discrepancies among studies of intellectual change with age. Wechsler (1958) states:

> What is definitely established is: (1) that our intelligence tests can and do measure intelligence in older as well as younger subjects to a substantial, although not necessarily an equal, degree; (2) that the abilities by which intelligence is measured do in fact decline with age; and (3) that this decline is systematic and after age 30 more or less linear (p. 142).

While accepting the fact that older adults score lower on some tests Pressey and Kuhlen (1957) suggest that factors other than intellectual decline may account for the decrease in scores. They note:

> On conventional tests, adults have been found to average progressively lower with increasing age; however, the somewhat clerical and academic nature of these tests may make them progressively less satisfactory for older adults who are further away from their schooling, have had less education than young adults, and are less accustomed to tests (p. 115).

They also point out that much of the research which finds declining scores with age are based on cross-sectional studies.

Baltes and Schaie (1974) while reporting the results of longitudinal research state: "In our opinion, general intellectual decline in old age is largely a myth". They further note:

> The earlier findings of general intellectual decline over the individual life span were largely on artifact of methodology. On at least some dimensions of intelligence, particularly the crystallized type, people

> of average health can expect to maintain or even increase their level of performance into old age (p. 36).

The vast majority of college students fall into the 18 to 40 age range prior to the reported period of marked intellectual decline and, of course, other factors also affect performance. David Wechsler (1958) notes:

> . . . sheer ability enters as only one of several factors of intelligence, that factors like drive, interest and motivation also operate in varying degrees as determinants and that learned responses, stored information and general experience may substitute for, or better serve the individual than original aptitude. To these may be added the fact that at different ages different skills or abilities contribute varying amounts of whatever is needed for effective performance (p. 142).

Knox and Sjogren (1965) concluded that the older students who enroll in an adult education program are as intellectually able as are younger participants. While reviewing the differences affecting learning between adults and youth Zahn (1967) observed:

> From age twenty to age fifty a person does not decline in ability to learn or in intelligence. His actual performance on tasks may be less because of lower motivation, speed, his idea about himself or a decline in vision and hearing. Merely growing older does little to change his ability to learn or think.

Honzik and Macfarlane (1973) reported I.Q. scores improved significantly in both men and women between ages 18 and 40. Lunneborg, Olch and deWolf (1974) tested a sample of 153 middle-aged volunteers, finding the volunteers did not differ on any of nine comparisons from middle aged nonvolunteers.

Compared to university freshmen, median scores for older students were above the seventy-fifth percentile for freshmen on vocabulary and spelling and below the twenty-fifth freshmen percentile on quantitative tests. This finding is consistent with Sharon's (1971) determination - after an analysis of 43,877 College-Level Examination Program (CLEP) test scores - that the pattern of the level of academic achievement in different disciplines changed as a function of age. Knowledge of humanities, social sciences and history improved with age while achievement in mathematics and natural sciences declined. Granick and Friedman (1973) in reviewing studies relating education to intellectual decline noted that persons of advanced age performed as well as younger adults on verbal materials. Sharon also found a significant positive relationship between formal college education and academic knowledge. Sjogren, Knox and Grotelueschen (1968) found that recent participation in a learning activity is related to higher learning performance. Frerichs (1976) investigated differences in academic success due to age (younger or older than age 23) of 1,435 female nursing students enrolled in associate degree nursing programs in Illinois. Students in the older age range achieved GPA's approximately one grade point higher than the younger subjects. The author associates the results of the study with the commitment of the subjects to their field of study.

The literature suggests that although age alone does not affect intellectual ability and therefore academic performance, other factors associated with maturity such as subject field, recent educational experience, motivation and commitment to field of study may affect level of performance.

Student's Prediction of Final Grade

A student's prediction of how well he can expect to do in a course is probably related to his later performance. Gaier (1961) investigated the self-prediction of final grades in sections of a course in Adolescent and Educational Psychology. The responses from the 132 subjects were classified into three major categories (high, middle and low), based on the grade assigned by the instructor. Pearson correlation coefficients between assigned grades and expected grades were: high .78; middle .44; and low .65. While all the students' self estimates were significantly better than chance, the middle range of students was less capable, as a group, in estimating final performance than either the high or low groups. Calhoun (1975) attempted to determine if students with differing academic backgrounds and experience perform similarly in an undergraduate Psychology of Personality course taught by the Keller method. He found that final course achievement is significantly related to an

expected grade (the grade that the student expected to get when he began the course). Students who expected a higher grade at the beginning of the course achieved at a higher level on the post-test. Research on self-prediction of GPA generally supports the findings cited. Keefer (1969) found that self-prediction of academic success was a stable and significant variable which proved to be as reliable as the high school record and results of the standardized achievement test in the prediction of academic success. Doleys and Renzaglia (1963), Biggs, Roth and Strong (1970), and Biggs and Johnson (1972) also found significant relationships between self-prediction and GPA; however, in general, they found self-prediction is less effective as predictors of grades than are scores on a standardized test or past performance.

The literature suggests that it is reasonable to hypothesize a relationship between the students self-prediction of final grade and academic achievement.

Sex

It is a common practice to analyze empirical data separately by sex. For example, sex differences have been noted in several of the studies cited in this review. The usual reasons for the discrepancy are either differences in correlation coefficients between predictors and performance for

males and females or differences in the personality variables which contributed to the regression equation. In a review of the literature on the prediction of academic performance Lavin (1965) stated:

> However, insofar as it has been possible to assess sex differences, the literature presents no evidence of any major differences between males and females in the relationship between personality variables and academic performance that is, in no case is a variable positively related for males and negatively related for females (p. 100).

Astin (1971) compared the freshman GPA of a national sample of 19,524 men and 17,057 women and found that women tended to get better grades. He noted that: "The academic performance of the female freshman surpasses that of the average male freshman, even when they matched in terms of high school grades and aptitude test scores" (p. 20). He speculated that motivation may be a major factor in explaining the difference. Additionally, Astin conducted a series of analyses involving first controlling for the student's high school grades, aptitude test scores and the selection of his college. He then examined each of approximately 100 other student characteristics to see which ones would significantly increase the accuracy of the prediction. Thirteen of the characteristics contributed additional accuracy to the prediction for both men and women; however, only eight of the characteristics were exactly the same for both sexes. Kahn (1973) studied the correlation of a predictor battery

of aptitude measures with first year college GPA. The first year GPA for 10,379 males and 8,951 females was obtained from five universities over a period of three academic years (1967-70). A total of 141 pairs of different predictor-criterion correlations were tested for a significance. Only 18 percent of the comparisons are significant at the .05 level or greater. In general, the correlations between predictors and achievement for females are higher than similar correlations for males. Kahn concluded that females are more predictable in academic achievement than males. Gross, Faggen and McCarthy (1974) collected data from 17,745 students enrolled in the 12 senior colleges and 10 community colleges of the City University of New York, finding that females are more predictable than males in academic settings.

The research indicates that if sex differences are found in personality measures, personal characteristics, and intellectual measures, the differences are minor.

CHAPTER III

METHOD

Subjects

The subjects for the present study were students enrolled in three sections of introductory psychology fall semester 1976 at Thornton Community College, South Holland, Illinois. One hundred and sixteen students appeared on the final class lists. Of these, five reported to class two or fewer times, six officially withdrew, and seven attended class but did not complete the final examination and therefore, received an incomplete course grade. These changes resulted in a total of 98 cases for which complete data were obtained.

Assignments to Treatments

The students were told the following at the first class meeting:

> This class is going to be participating in a learning experiment during this semester. We are attempting to determine if there is any difference in the grades of students who are taught by two different learning formats. Format one is called lecture/discussion. You have all had experience with similar instruction. Typically, the teacher presents material and students have an opportunity to ask questions and discuss the information that has been presented. The lecture/discussion group will meet on Monday, Wednesday, and Friday at this time in this room.

> Format two will be a self-directed group. Students will not meet as a class, and they will not listen to teacher presentations. Students will study independently. If a student has a question or wishes to discuss the material with the instructor, the student may come to the instructor's office. On Friday the student will come to class. The only attendance requirement is that the student come to class one day a week. During the one day a week when all students meet together, we will discuss matters of interest to the entire class, take several psychological tests, and take course examinations.
>
> You are encouraged to drop in at my office. The time and length of the visit are up to you. You can come in alone or with friends and talk about whatever you want. I am available to answer questions and help solve problems.
>
> Examinations are based on the content of the text book and do not include questions from class discussions. Students in both formats are graded on the same objective basis and have the same opportunity to achieve a high grade.

Both groups received the same course outline and heard the same presentation of course goals and requirements. Seventy-eight of the 98 usable cases chose the lecture/discussion option and 20 chose the self-directed option. The percent of originally enrolled students who became usable cases was approximately the same for each group (83 and 85 percent).

Instruments

1. Otis-Lennon Mental Ability Test, Advanced Level, Form J, (Otis and Lennon, 1967)

The Otis-Lennon test is constructed to yield a dependable measurement of the "g" or general intellective ability

factor. Various types of verbal and nonverbal items are designed to sample a wide variety of mental processes and to measure abstract reasoning ability. The test consists of 80 items arranged in a spiral omnibus form. Testing is limited to 40 minutes.

2. IPAT Anxiety Scale (or Self Analysis Form)

The Anxiety Scale is made up of items from the five principal factors of the 16 PF that make up the "second-order" dimension of anxiety. The test is a brief 40 item questionnaire with no time limit and takes about 10 minutes.

3. Survey of Study Habits and Attitudes, Form C. (Brown and Holtzman, 1967)

The SSHA identifies habits and attitudes which are related to academic success. Two scores are used in this study: 1) study habits and 2) study attitudes. The SSHA contains 100 items, is untimed and has a testing time of about 20 to 25 minutes.

4. California Psychological Inventory (Gough, 1975)

The CPI is designed to identify individuals who will be described in characteristic ways by others. Each of the 18 scales is intended to assess one important facet of interpersonal psychology. The test consists of 480 true-false items. The test is untimed and takes 45-60 minutes. Below are listed the scales and their purpose as described in the test manual.

1. Do (dominance) To assess factors of leadership ability, dominance, persistence, and social initiative.

2. Cs (capacity for status) To serve as an index of an individual's capacity for status (not his actual or achieved status). The scale attempts to measure the personal qualities and attributes which underlie and lead to status.

3. Sy (sociability) To identify persons of outgoing, sociable, participative temperament.

4. Sp (social presence) To assess factors such as poise, spontaneity, and self-confidence in personal and social interaction.

5. Sa (self-acceptance) To assess factors such as sense of personal worth, self-acceptance, and capacity for independent thinking and action.

6. Wb (sense of well-being) To identify persons who minimize their worries and complaints, and who are relatively free from self-doubt and disillusionment.

7. Re (responsibility) To identify persons of conscientious, responsible, and dependable disposition and temperament.

8. So (socialization) To indicate the degree of social maturity, integrity, and uprightness which the individual has attained.

9. Sc (self-control) To assess the degree and adequacy of self-regulation and self-control and freedom from impulsivity and self-centeredness.

10. To (tolerance) To identify persons with permissive, accepting and non-judgmental social beliefs and attitudes.

11. Gi (good impression) To identify persons capable of creating a favorable impression, and who are concerned about how others react to them.

12. Cm (communality) To indicate the degree to which an individual's reactions and responses correspond to the modal ("common") pattern established for the inventory.

13. Ac (achievement via conformance) To identify those factors of interest and motivation which facilitate achievement in any setting where conformance is a positive behavior.

14. Ai (achievement via independence) To identify those factors of interest and motivation which facilitate achievement in any setting where autonomy and independence are positive behaviors.

15. Ie (intellectual efficiency) To indicate the degree of personal and intellectual efficiency which the individual has attained.

16. Py (psychological-mindedness) To measure the degree to which the individual is interested in, and responsive to, the inner needs, motives, and experiences of others.

17. Fx (flexibility) To indicate the degree of flexibility and adaptability of a person's thinking and social behavior.

18. Fe (femininity) To assess the masculinity or femininity of interests. (High scores indicate more feminine interests, low scores more masculine.)

Student Information

To provide information concerning the first three of the following variables, students completed information forms during the first meeting of class.

1. Student's academic load

The student reports the number of credit hours in which he/she is currently enrolled.

2. Student's employment load

The number of hours that the student works each week is recorded.

3. Student's prediction of final grade

An explanation of the course and the experiment is given at the first class meeting. The student is also assured of the objectivity of the grading procedure and that the grade

prediction has no bearing on the student's final grade. The student is then requested to predict his/her final grade.

4. Other variables

Information on age and sex were obtained from test answer sheets.

Examination Score

The examination score is the combined score of a true-false midterm examination of 100 questions and a true-false final examination of 200 questions.

CHAPTER IV

RESULTS

The first hypothesis to be tested is: "there is a significant difference between those who choose lecture/discussion and those who choose self-directed study in the student characteristics measured."

A series of t-tests disclosed that there are statistical differences between the lecture/discussion group (LD) and the self-directed group (SD) on three variables: socialization, achievement via conformance and student grade prediction. Socialization and student grade prediction exceed the .05 level of significance with a two-tailed test while achievement via conformance exceeded the .10 level. It can be noted in Table 3 that the mean score for socialization and achievement via conformance is higher for the LD group while the mean for student grade prediction is higher for the SD group.

The higher means for the LD group on socialization and achievement via conformance can be explained in terms of preference for different learning modes. The learning mode for the LD group is one of group learning versus that of self instruction for the SD group. Socialization and achievement via conformance are personality variables that

Table 3

t-Test of Difference of Means of

Lecture/Discussion (LD) and Self-Directed (SD) Groups

Variable	Group	N	Mean	Std. Dev.	Two-tail prob.
socialization	LD	78	33.4	6.18	.014
	SD	20	29.5	6.62	
achievement via conformance	LD	78	24.1	5.70	.077
	SD	20	21.5	5.77	
student grade	LD	78	.73	.73	.009
	SD	20	1.25	.91	

are associated with preferring to be part of a group and accepting group norms. Perhaps the SD group has less of a need for social interaction and therefore chooses the self-directed course option.

While the t-test discloses that the difference between the two groups on the variable student grade prediction is statistically significant, it is of no practical significance because neither group accurately predicted their grades. The LD group are more accurate with a mean difference of .73 between the actual grade received and the predicted grade, while the SD group mean difference is 1.25. Forty-two percent (N=33) of the LD group accurately predicted their grade, 50 percent (N=39) predicted a grade that was too high, and 8 percent (N=6) predicted a grade that was too low. While 25 percent (N=5) of the SD group predicted their grade correctly, 65 percent (N=13) predicted too high, and 10 percent (N=2) predicted too low. It can be seen that a minority of the students accurately predicted their grade and that the tendency is to be overly optimistic in predictions.

A stepwise discriminant analysis determined that there is a difference between the LD and SD groups. As can be seen in Table 4, student grade prediction, achievement via conformance, and mental ability discriminate between the two groups. It can be noted that two variables, student

Table 4

Discriminant Analysis of the

Lecture/Discussion (LD) and the Self-Directed (SD) Groups

Step No.	Variable	F to enter or remove	Signifi-cance	Sig. of change
1	student grade prediction	7.216	.008	.007
2	achievement via con-formance	2.384	.010	.108
3	mental ability	1.649	.013	.173

Note: canonical correlation is .329

grade prediction and achievement via conformance, appear both in the t-test and the discriminant analysis. The canonical correlation associated with the single discriminant function is only .329. The canonical correlation is a measure of the degree of separation between the two groups of discriminating variables. Of the total variability between the groups only 11 percent of this variability is accounted for by these three variables. Since so little of the variability that might distinguish between the groups is accounted for the difference is of no practical significance.

Multiple regression analysis which will be discussed next revealed that student grade prediction and mental ability, two of the discriminating variables in the discriminant analysis, predict the criterion measure for the LD group but not the SD group.

A stepwise regression analysis reveals that the three variables most predictive of academic success as measured by the criterion (examination scores) are different for the LD and SD groups. The first three steps for the LD group are mental ability, capacity for status, and student grade prediction, while those for the SD group are intellectual efficiency, study habits and responsibility. To examine further the difference between the two groups, a multiple regression using only the three variables found most

predictive for one group was computed for the other group. Table 5 lists the variables and statistics originally found for the LD group in the first column with the statistics found for the SD group in the second column, and Table 6 lists those found originally for the SD group in the first column with those found for the LD group in the second column. It should be noted that the first variable in the multiple regression for the LD group is mental ability (r=.655). For the SD group the correlation for the same variable is .671. Obviously then, mental ability is a predictor of the criterion measure for both groups. The first variable in the SD group multiple regression is intellectual efficiency (r=.711). Mental ability placed in the same position has a correlation of .671. Since both correlate highly with the criterion, this suggests that both intellectual efficiency and mental ability are accounting for much of the same variance. The intercorrelation between mental ability and intellectual efficiency for the SD group is .719, supporting the conclusion. It also follows that if mental ability and intellectual efficiency are accounting for the same variance, a regression for the SD group that substitutes mental ability for intellectual efficiency should produce similar results. Stated another way, a regression utilizing the variables mental ability, study habits and responsibility should produce a

Table 5

Correlation Between Predictor Variables and Examination Scores for the Lecture/Discussion (LD) and Self-Directed (SD) Groups

Variable	Multiple R		R Square		Simple R		Beta		F	
	LD	SD	LD	SD	LD	SD	LD	SD	LD	SD
mental ability	.655	.671	.429	.450	.655	.670	.515	.469	45.471	5.063
capacity for status	.747	.690	.559	.476	.440	.356	.382	.127	28.078	.487
student grade prediction	.790	.730	.624	.534	-.435	-.592	-.271	-.293	12.858	1.988

Table 6

Correlation Between Predictor Variables and Examination Scores for the Self-Directed (SD) and Lecture/Discussion (LD) Groups

Variable	Multiple R		R Square		Simple R		Beta		F	
	SD	LD	SD	LD	SD	LD	SD	LD	SD	LD
intellectual efficiency	.711	.401	.506	.161	.711	.401	.617	.392	19.28	9.008
study habits	.818	.408	.669	.167	.709	.263	.545	.118	16.38	.850
responsibility	.890	.415	.792	.172	.084	.175	-.402	-.092	9.49	.487

correlation similar to the one for intellectual efficiency, study habits and responsibility. As is seen in Table 6, the multiple r is .890 for intellectual efficiency, study habits and responsibility while computation produces a multiple correlation of .824 for mental ability, study habits and responsibility which supports the assumption that intellectual efficiency and mental ability account for the same variance.

When intellectual efficiency, study habits and responsibility, the original SD group variables most predictive of the criterion, are entered into a multiple regression using LD data, it is found that the variables enter the multiple regression equation in the same order, however, only the first variable, intellectual efficiency (r=.401), makes a marked contribution to the equation for the LD group, the only .172 of the total variance is accounted for with the three variables.

A test for the difference between the simple r for intellectual efficiency (the first variable in the SD multiple regression) for the SD group (r=.711) and LD group (r=.401) revealed a difference at the .05 level with a one-tailed test. A similar test for difference conducted for study habits (the second variable in the SD multiple regression) for the SD group (r=.709) and LD group (r=.263) revealed a difference at the .05 level with a two-tailed

test. There is no difference between groups for the third variable which is responsibility.

The regression analysis suggests there is a difference between the two groups. The variables of intellectual efficiency, study habits and responsibility are highly correlated (r=.890) with the criterion (examination score) for the SD group while the same variables produce a low correlation for the LD group (r=.415). This suggests that those who choose self-instruction over group instruction may have different personality characteristics. The difference could be explained by suggesting that those who choose self-instruction are more efficient at accomplishing intellectual tasks, have better study habits and are able to assume responsibility for completing the necessary studying.

The higher means for the LD group on socialization and achievement via conformance suggest a greater social orientation for the LD group as compared to the SD group, while the regression analysis suggests more of an academic orientation for the SD group as compared to the LD group. To examine the possibility that clusters of variables might disclose the personality differences between the two groups, a factor analysis was completed.

Examination of the original factor analysis revealed that several variables contribute little to the analysis;

therefore, only the intellective, study habits and attitudes and personality variables are used in the final analysis. All these variables result from test scores. Further analysis revealed four distinct factors. The four factors and their loadings are listed in Table 7. Factor 1 is strongly loaded on a group of variables associated with positive personal adjustment (well-being, responsibility, socialization, self-control, tolerance, good impression, achievement via conformance, achievement via independence, intellectual efficiency, psychological-mindedness) and has a weak loading on anxiety. Factor 2 has strong loadings on capacity for status, sociability, social presence and self-acceptance, which are a cluster of variables associated with a positive social orientation. Factor 3 has strong loadings on mental ability, achievement via independence and examination score, variables which are related to academic ability. Factor 4 has strong loadings on those variables associated with a conforming good student (responsibility, communality, femininity, study habits) but with a weak loading on flexibility. A t-test was completed on the difference between individual loadings of each of the cases on each factor for each group. For this test factor scores are treated as if they are variables with a score for each subject on each factor utilized. The four t-tests comparing the two groups on the four factors

Table 7

Varimax Rotated Factor Matrix for Both Groups (N=98)

Variable	1	2	3	4	Eigen-value	Percent of Variance
mental ability	-.112	.161	(.735)	.007	8.168	35.5
anxiety	(-.766)*	-.348	.071	.142	2.890	12.6
dominance	.233	.747	.058	.199	2.072	9.0
capacity for status	.368	(.515)	.392	.174	1.702	7.4
sociability	.251	(.853)	.081	.158	1.231	5.4
social presence	.163	(.719)	.227	-.237	1.052	4.6
self-acceptance	-.075	(.862)	.029	.035	.856	3.7
well-being	(.777)	.276	.159	.056	.736	3.2
responsibility	(.588)	.086	.074	(.560)	.574	2.5
socialization	(.508)	.248	-.202	.419	.566	2.5
self-control	(.870)	-.222	-.058	.206	.471	2.0
tolerance	(.778)	.200	.405	.104	.392	1.7
good impression	(.800)	.010	-.209	.120	.347	1.5
communality	.174	.193	.147	(.573)	.326	1.4
achievement via conformance	(.674)	.273	-.070	.247	.284	1.2
achievement via independence	(.705)	-.093	(.537)	-.108	.263	1.1
intellectual efficiency	(.652)	.313	.466	.161	.228	1.0
psychological-mindedness	(.581)	.202	.043	.091	.205	0.9
flexibility	.045	-.228	.378	(-.508)	.181	0.8
femininity	-.091	-.340	.048	(.585)	.146	0.6
study habits	.448	.062	.254	(.575)	.140	0.6
study attitudes	.489	.000	.260	.454	.096	0.4
examination score	.048	.153	(.833)	.198	.073	0.3

*Parentheses denote strong and weak loadings

revealed there is no significant difference between the two groups.

All but one of the variables, examination score, are scores from standardized tests. The examination score is a measure of the knowledge gained from taking the introductory psychology course. It is possible that the examination score might have a leveling effect concealing some of the difference between the two groups. In order to examine this possibility a second factor analysis without the examination score was completed. Again four factors were discovered. As can be seen in Table 8, the four factors are similar to those uncovered in the first analysis. Again, factor 1 appears to represent positive personal adjustment, while factor 2 has strong loading on variables clustered about positive social orientation. However, in this analysis factor 3 instead of factor 4, as was the previous case, seems to represent the conforming good student factor, while factor 4 instead of factor 3 is strongly loaded on variables relating to academic ability. Again a *t*-test on the difference between individual loadings of each of the subject's scores on each factor for each group revealed that there is no significant difference between the two groups.

In order to test the possibility that a difference between the two groups might be revealed in the relationship between the factors and examination scores, a regression

Table 8

Varimax Rotated Factor Matrix for Both Groups (N=98)

with Examination Scores Removed

Variable	Factors 1	2	3	4	Eigen-value	Percent of Variance
mental ability	-.130	.275	.124	(.527)	8.043	36.6
anxiety	(-.805)*	-.313	.165	.021	2.838	12.9
dominance	.221	(.754)	.182	-.065	1.807	8.2
capacity for status	.311	(.580)	.297	.295	1.529	7.0
sociability	.245	(.861)	.135	-.045	1.179	5.4
social presence	.148	(.739)	-.179	.241	1.041	4.7
self-acceptance	-.065	(.858)	-.025	-.091	.814	3.7
well-being	(.768)	.292	.120	.154	.735	3.3
responsibility	(.546)	.120	(.604)	-.050	.573	2.6
socialization	(.525)	.223	.335	-.317	.565	2.6
self-control	(.869)	-.233	.240	-.031	.443	2.0
tolerance	(.711)	.267	.292	.423	.392	1.8
good impression	(.812)	-.031	.107	-.154	.326	1.5
communality	.160	.240	(.550)	-.095	.316	1.4
achievement via conformance	(.709)	.253	.184	-.178	.269	1.2
achievement via independence	(.622)	-.009	.158	(.645)	.243	1.1
intellectual efficiency	(.608)	.387	.301	.378	.218	1.0
psychological-mindedness	(.545)	.208	.169	.087	.192	0.9
flexibility	-.054	-.172	-.229	(.675)	.159	0.7
femininity	-.186	-.289	(.682)	-.016	.140	0.6
study habits	.410	.123	(.630)	.049	.095	0.4
study attitudes	.420	.065	(.576)	.169	.081	0.4

*Parentheses denote strong and weak loadings

analysis was completed using factor scores as the independent variable and examination score as the dependent variable. No differences were found.

While the factor analysis does not support the first hypothesis that there is a difference between the two groups, the evidence from the t-test and regression analysis does support the hypothesis; however, the difference is neither strong nor clear-cut.

The second hypothesis to be tested is: "there is a relationship between the student characteristics measured and high achievement (defined as high examination scores) in self-directed study".

The regression analysis disclosed a strong relationship between mental ability and examination scores for both groups. In addition to mental ability, ($r=.671$), intellectual efficiency ($r=.711$), study habits ($r=.709$), and study attitudes ($r=.611$) are predictive of achievement for the self-directed group. All correlations are statistically significant at the .01 level for a two-tailed test. The hypothesis of a relationship between student characteristics and high achievement is therefore supported for these four variables.

The third purpose of the study is: "to determine which variables make up a multiple regression equation that most accurately predicts student success in self-directed study."

Regression analysis disclosed that a regression equation made up of the three variables - intellectual efficiency, study habits, and responsibility - produces a multiple r of .890, which accounts for 79 percent of the variance. This provides a high level of predictability.

Other Findings

The review of the literature suggested the possibility of several findings, some of which are supported in this study.

The literature suggests that no difference in academic performance will be found between groups taught by different methods. Since this study found no significant difference, as measured by examination scores, between the lecture/discussion and self-directed groups, the findings reported in the literature are supported.

Achievement motive was frequently reported to be related to performance in the literature. Achievement via independence was significantly correlated with the criterion (examination score) for both groups combined ($r=.383$) and the lecture/discussion group ($r=.401$) at the .01 level with a two-tailed test. The SD group ($r=.280$) did not reach statistical significance nor does it differ significantly from the LD group. The findings of this study are consistent with the reported findings.

The evidence presented in the review of the literature suggested that a relationship would be found between anxiety and level of performance. No significant relationship was found. Obviously, this study does not support the reported findings.

Consistent with the literature, study habits are related to performance for both groups. As already noted, the SD group has a correlation of .709 with the criterion which is significant at the .01 level for a two-tailed test. For the LD group the correlation is .263 which is significant at the .05 level with a two-tailed test. Study attitudes are also significant at the .01 level for the SD group (r=.611), but non-significant for the LD group (r=.158). The differences between the SD and LD groups for both study habits and attitudes are significant at the .05 level for a two-tailed test.

The studies reviewed indicate that the number of hours worked will not affect student performance. This study found a correlation of .336 between the predictor variable of hours worked and the criterion of examination score for the LD group. This is significant at the .01 level with a two-tailed test. For the SD group the correlation was a non-significant .185. The correlations for the LD and SD groups are significantly different, suggesting a relationship between the number of hours worked and performance at least

for the lecture/discussion group. Since the mean number of hours worked (LD=18.3, SD=17.5) are not significantly different nor, as noted, are the correlations, it is not possible to suggest a practical difference between the two groups. However, a highly speculative explanation is that the higher correlation between the predictor variables and intellectual efficiency, study habits, and study attitudes and criterion for the SD group indicates the SD group is better able to complete the necessary studying and therefore is affected less by hours worked.

The literature reviewed for this study predicted that there would be no difference between the students' academic load and performance. The findings of this study support this prediction.

The literature does not present any clear indications as to the effect of age on performance. This study found a relationship between age as the predictor and examination scores as the criterion for each group individually significant, at the .10 level for the LD group (r=.209) and .05 level for the SD group (r=.491). When the two groups are combined (r=.259) the relationship between predictor and criterion is significant at the .01 level. All tests are two-tailed.

As predicted by the literature, no significant differences were found between the two sexes.

CHAPTER V

DISCUSSION

This study demonstrates a personality difference between the lecture/discussion group and the self-directed group, thereby confirming the first hypothesis. Higher scores on socialization and achievement via conformance for the LD group suggest a need for a conventional learning method. The fact that the student, by choosing the LD option, was choosing the conventional and conforming to past practice supports this position. A measure of conformity, adventureousness, or willingness to take a risk might further explore this difference.

The students choosing the LD option exhibit a greater need for achievement, albeit through conformance, which also might be further explored. Perhaps their need for achievement influences them to take the safer course, but those students whose need to achieve is not as high are more willing to take a chance.

Not surprisingly, the regression analysis showed that there was a significant correlation between mental ability and examination scores for both groups. However, it is interesting that while there is not a significant difference in the means between the two groups on intellectual efficiency,

the SD group had a high correlation between intellectual efficiency and examination scores. Perhaps the successful students choosing the SD option recognize their personal and intellectual efficiency and, therefore, are willing to experiment with a different approach to learning. Again, while students in the SD option do not score differently in any significant way on the study habits scale, successful students in the SD option have a high correlation between study habits and achievement which is significantly different from the LD group. Additionally, the SD students have a high correlation on the companion study attitudes scale which is also significantly different from the LD group. Good study habits and attitudes, of course, are associated with academic success. Student motivation seems most related to success for the LD group while study characteristics are more related to the SD group.

The high correlations between intellectual efficiency, study habits and attitudes and achievement support the second hypothesis of a relationship between student characteristics and high achievement in self-directed study.

The third purpose of this study is to determine which student characteristics correlate highly with successful performance. This purpose is satisfied with the three variables intellectual efficiency, study habits and responsibility. All three variables represent characteristics

that are logically associated with achievement. However, the fact that there are only 20 students in the SD group suggests that the formula should be revised with data gained from use of the multiple regression equation.

A limitation of the study was the small number of students in the self-directed group. Initially it was hoped that an equal number would volunteer for each option. However, only about twenty percent chose the SD option. To determine if the relatively small number of volunteers represented an unusual group, an equivalent group was given the same options at the beginning of the second semester. Only 13 percent chose the SD option. This may reflect an inherent conservatism in the community college student or perhaps a lack of interest in self-directed study. A similar study in a four-year residential institution may have different results.

Allowing the learner to shoulder a greater personal responsibility for carrying out his own education is a worthwhile objective of education. In fact, John Gardner (1961) has written:

> It is almost impossible to prevent the interested student from learning. He meets the teacher more than half-way--all the way if necessary. He seeks out the situations in which he can learn. He gets an education in the most active sense of that term (p. 94).

This study demonstrates that it is quite feasible to provide

self-directed study as an option if the criterion of success is objective examination scores based on a textbook.

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APPENDIX A

APPENDIX A

Mean and Standard Deviations for Lecture/Discussion and Self-Directed Groups

Variable	Lecture/Disc. N=78 Mean	Std. Dev.	Self-Direct. N=20 Mean	Std. Dev.	Pooled Var. Estimate T Value	2-tail Prob.
mental ability	49.74	14.01	50.30	14.82	-.16	.876
anxiety	33.99	12.12	36.90	14.11	-.93	.356
dominance	24.23	5.62	23.30	6.03	.65	.516
capacity for status	15.88	4.07	15.10	3.61	.79	.434
sociability	22.97	4.95	22.65	4.36	.27	.790
social presence	35.10	5.93	35.50	4.50	-.28	.781
self acceptance	21.15	3.69	20.35	3.23	.89	.375
well-being	30.99	6.29	28.95	6.44	1.29	.202
responsibility	23.76	5.23	22.55	5.74	.90	.369
socialization	33.42	6.18	29.50	6.62	2.50	.014
self-control	24.06	8.39	22.25	5.34	.92	.361
tolerance	16.38	5.63	15.80	4.80	.43	.671
good impression	13.71	5.92	12.50	4.80	.84	.402
communality	24.62	2.69	24.00	3.23	.88	.383
achievement via conformance	24.01	5.70	21.45	5.77	1.79	.077
achievement via independence	16.53	4.22	15.95	3.47	.56	.575
intellectual efficiency	31.60	6.37	31.30	6.91	.19	.853
psychological mindedness	9.29	2.54	9.40	3.27	-.16	.877
flexibility	8.91	3.58	8.85	3.47	.07	.946
femininity	20.51	4.72	20.20	5.53	.26	.799
study habits	45.47	15.98	41.85	15.75	.91	.366
study attitudes	60.33	14.69	55.85	15.02	1.21	.228
credit hour enrollment	12.82	3.35	13.10	3.93	-.29	.773
hours working	18.30	14.11	17.55	14.34	.21	.831
age	20.19	4.35	22.75	6.86	-1.59	.126[a]
grade prediction	.73	.73	1.25	.91	-2.69	.009
examination score	214.64	23.89	209.95	23.90	.78	.435

[a]Separate variance estimate

APPENDIX B

APPENDIX B

Intercorrelations of Variables Predictive of Academic Success (Tables 5 and 6)

Lecture/Discussion (LD) Group

Variables	mental ability	capacity for status	student grade prediction
mental ability	1.00000	.12650	.33435
capacity for status	.12650	1.00000	.02428
student grade prediction	.33435	.02428	1.00000

Self-Directed (SD) Group

Variables	mental ability	capacity for status	student grade prediction
mental ability	1.00000	.30232	-.55589
capacity for status	.30232	1.00000	-.29613
student grade prediction	-.55589	-.29613	1.00000

Self-Directed (SD) Group

Variables	intellectual efficiency	study habits	responsibility
intellectual efficiency	1.00000	.50905	.45681
study habits	.50905	1.00000	.37396
responsibility	.45681	.37396	1.00000

Lecture/Discussion (LD) Group

Variables	intellectual efficiency	study habits	responsibility
intellectual efficiency	1.00000	.48639	.52921
study habits	.48639	1.00000	.50173
responsibility	.52921	.50173	1.00000

APPROVAL SHEET

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now given final approval by the Committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Education.

October 21, 1977
Date

Joy Rogers
Director's Signature