FACTORIAL ANALYSIS OF INTELLECTUAL INTEREST AND MEASUREMENT OF ITS VALIDITY IN THE PREDICTION OF COLLEGE SUCCESS

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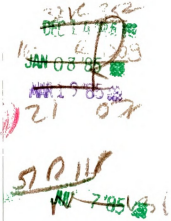

ABSTRACT

FACTORIAL ANALYSIS OF INTELLECTUAL INTEREST
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By

Yung Che Kim

The purpose of the present study was to determine the identity and structure of the psychological construct of intellectual interest and to measure the validity of this construct in the prediction of college success.

The population selected for the study consisted of all freshmen entering Michigan State University in Fall, 1970, with the following exclusions: foreign students, transfer students, students for whom data were incomplete and students who dropped out before the end of Fall term, 1970. Five thousand four hundred and sixty-eight students classified as Freshmen and not included in one or more of the above exclusions registered for credit courses during the Fall registration period. From this restricted population, six hundred and forty-three students were randomly selected.

The Academic Interest Scale and the M.S.U. Student Survey were given to the sample of students during the orientation week, September 21-22, 1970. The Academic

Interest Scale included four subscales from the Stern Activities Index, namely, Reflectiveness, Humanities-Social Science, Understanding, and Science; the Intellectual Interest Scale of Anderson and Western; and the Intellectualism-Pragmatism Scale of Yuker and Block. The M.S.U. Student Survey contained several scales. They were Trait Self-Ratings of College Freshmen, the Life Goals of College Freshmen, the General Self-Concept of Academic Ability, and the Student Questionnaire. Other data such as score on the Scholastic Aptitude Test, MSU Reading Test, MSU Arithmetic Test, MSU Mathematics Test, high school grade point average and MSU grade point average were also obtained.

The composite score of the Academic Interest Scale, used to measure the construct of intellectual interest, was derived by applying a 2-point scaling system to all of the 79 items in the three subscales, thus assigning equal value to each of the items. The correlation coefficient of the composite score based on the 2-point scaling system was .89 with the Stern total score, .70 with the Anderson and Western total score, and .63 with the Yuker and Block total score. The high intercorrelation coefficients evidenced both the convergent validity of the three subscales of intellectual interest and the justification of the method of derivation of the composite score. This manner of derivation of the composite score was further justified because items in the Likert-type scales were considered to be of approximately equal value. The KR 21 estimate of

reliability was .83. It suggested that the composite scale of intellectual interest was very reliable.

The identity and structure of the construct of intellectual interest was investigated by a principle axis solution of a 30 x 30 correlation matrix of the variables related to the cognitive, affective and background characteristics. Ten factors of acceptable magnitude, as indicated by their eigenvalue, were included in the Varimax rotation procedure. They were labeled scholastic aptitude, social sensitivity, high school achievement, parents' educational level, aesthetic, community size, conforming-religious, scientific, social hedonism and intellectual interest.

The three subscales of the composite scale of intellectual interest and the content of the "humanistic-cultural life goal" formed the common factor labeled "intellectual interest."

From the critical examination of the operational definitions drawn in the three subscales of intellectual interest, which were highly related, and the content of the "humanistic-cultural life goal," it was suggested that there were three highly correlated aspects of the construct of intellectual interest. They were an appreciation and enjoyment of cultural pursuits, academic and philosophical enquiry and antipragmatic interests in the arts as well as in the sciences.

The test of analysis of variance indicated that there were statistically significant differences at $\alpha = .01$, although small in magnitude, in intellectual interest, measured by the Academic Interest Scale, among (1) students majoring in different curricula, (2) students having different levels of educational expectations, and (3) students whose fathers have different occupations.

In order to investigate the validity of intellectual interest in the prediction of college success as measured by academic grade point average, the Pearson product-moment correlation coefficient, $r = .12$, and the correlation ration, $\eta_{yx} = .24$, were obtained. The former was based on the linear regression model and the latter on the curvilinear model. Both of the predictive validities were found to be statistically significant, but they were not statistically different. Therefore, the linear model of regression was adopted and it was concluded that the curvilinear model would provide no better prediction of college success than the linear model. Graphical examination of the distribution provided the same conclusion.

Also, the incremental validity was measured to test whether or not the addition of intellectual interest to four other commonly used predictors increased the predictability of college success. None of these increases was statistically significant. Therefore, it was concluded that intellectual interest had no incremental validity when added to these predictors.

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CHAPTER I

INTRODUCTION

Ability to think is the central concern of a university because it is a primary factor in the learning process. To say that the ability of students to think clearly is of central concern is neither to say that it is the sole interest of the university nor, in all circumstances, the most important, but that it is a pervasive concern in all aspects of the work of a university.

With an increasing demand for intellectual competence in modern times, larger numbers of youth from all segments of our population are entering colleges and universities. More and more young people and their parents are viewing college education as necessary in order to achieve success in a complex society.

Some of the benefits of higher education include a stronger belief in one's own capacities to handle broad responsibilities, an increased ability to solve important problems, and a greater likelihood of making a significant impact on the larger society. Higher education is an important aspect of the continuing process of rationalization in all spheres of life--finding logical and coherent patterns in the flux of events.

Faced with limited budgets and physical facilities, institutions of higher education are finding it increasingly difficult to meet the diverse demands of students, their parents and society in general. Rapid psychological and technological advances in recent years have increased the demand upon educators to "toughen it up, pour it on, and raise the standards of excellence."

Rising standards of excellence have, in turn, caused colleges and universities to become more selective in their admission procedures. Differences in admission requirements and the great variation in the content of the curricula found among our colleges and universities today are factors which help build the uniqueness of each institution's educational environment. These differences among universities along with those resulting from a wide range of abilities within the student body and great diversity among the high school academic training programs from which students come, are bewildering to students. Consequently, institutions of higher education must, on an individual or group basis, develop a policy for admission which includes matching the academic style of the student with the demands of the scholarly environment that exists on the campus.

At present, the selection of students is determined by many factors, not all of which are easily identified or measured. Many research studies have indicated that cognitive measures account for 30 to 45 percent of the

variation in academic performance. While no other single factor accounts for this much variation, more than half of the variance still remains unaccounted for.

From time to time, assessment of the affective domain, including attitude and personality characteristics, has been used as a means of describing variance otherwise unaccounted for in academic success. It is in this area that it seems most likely at the present time that additional research will provide information to institutions of higher learning useful in selecting those students who will learn with the greatest efficiency and economy. Findings in this area will also have value for the individual student in developing self-understanding, devising educational and vocational plans, and making personal and social adjustments.

Importance of the Study

There is considerable research evidence to indicate that achievement stems not only from functional capacity but also from acquired habits, interests, attitudes and motivation. The search for better predictors of college success has been pursued with increased effort during the past two decades. This has produced many prediction studies relating to college success. Usually, an intellectual measure such as a scholastic aptitude test or high school grade point average is found to be the best single predictor of college success, especially in the freshman year (Lutz, 1968).

Most studies of affective measures examine the relationship of the affective domain to the achievement of cognitive objectives. Some of the affective variables related to these studies are individual aspiration to succeed (Nason, 1954); motivation to achieve generally (Morgan, 1952); self-confidence, self-acceptance, positive self-concept (Terman, 1947); and belief in oneself (Bishton, 1966). McConnel and his associates (1962) studied "intellectual potentiality" and its promise of academic success at the Center for the Study of Higher Education, University of California.

These studies clearly indicate that it is still productive to study the personal characteristics of college students as they relate to intellectual or scholastic performance. The relationship of such performance to life goals, self-ratings of traits and other cognitive and non-cognitive variables merits further attention.

Since it is true that each individual is different, differentially qualified and differentially characterized, individual differences among students should be identified and their implications for scholastic achievement investigated further. Everyone, whether planning to attend college or not, should fully understand his strengths and weaknesses in order to cope with the academic and vocational requirements of living in modern society. The capacity to accurately measure a clearly defined construct such as intellectual interest will help students with

decision-making in all areas including selection of a college to attend, major field to study and social activities in which to engage.

In addition, institutions of higher learning are always searching for a more valid method of screening applicants for admission. It may well be that knowledge about certain affective characteristics of prospective students can be of major assistance both in the selection process and in the development of effective instructional and student personnel programs.

Purpose of the Study

It is the purpose of this study, first, to identify the structure and pattern of the construct of intellectual interest and, secondly, to test the validity of the construct in the prediction of academic success of college freshmen in an institution of higher education.

The relationship of intellectual interest to other biographic, demographic, cognitive and affective variables will be determined. Knowledge of these relationships may help to describe the characteristic of intellectual interest of college freshmen. The constitutive structure and factorial clusters of intellectual interest are expected to be clarified. In other words, by analyzing the construct of intellectual interest and relating demographic, cognitive and affective variables gathered for the study, it is presumed that the identity and structure of intellectual interest domain will be clarified.

For this purpose, the following variables will be used in the present study:

A. The biographical and demographic variables.

1. Sex.
2. Major areas the student expects to study in.
3. Community the student lives most of his/her life.
4. Size of graduating class of high school.
5. Father's educational level.
6. Mother's educational level.
7. Educational expectation.
8. Father's occupation.

B. The cognitive variables.

1. MSU Reading test.
2. MSU Arithmetic test.
3. MSU Mathematics test.
4. MSU Quantitative test.
5. The Scholastic Aptitude test--Verbal.
6. The Scholastic Aptitude test--Mathematics.
7. The Scholastic Aptitude test--Total.
8. Self-reported high school grade point average.
9. Actual high school grade point average.

C. The affective variables.

1. Seven factors of trait self-ratings of college freshmen.
2. Seven factors of life goals of college freshmen.
3. General self-concept of academic ability.

As noted in a previous section, the study of academic predictors for college success has been popular for decades with increasing effort and attention being given to this area. High school grade point average, rank in class and aptitude tests have usually been shown to be the best predictors. Such studies have revealed that aptitude tests have an average correlation of about .50 with college grade point average. However, none of the single variables or combinations of variables has been successful in explaining

more than 30 to 45 percent of variation of the criterion of academic performance. Thus, there has been an increasing interest in studies focused upon affective variables. Even with the addition of affective predictors, a large part of the variance in the criterion of academic performance is usually still unaccounted for.

With these factors in mind, this study is designed to investigate and describe the relationship of the affective construct called intellectual interest to academic performance. The study will also attempt to determine the usefulness of intellectual interest as a predictor of college academic success during the freshman year.

Hypotheses to Be Tested

The first aspect of this study will be to determine the nature and structure of intellectual interest. For this purpose, the following general hypotheses will be tested:

Hypothesis 1: Three subscales used to measure the construct of intellectual interest have convergent validity as shown by reasonably high correlations with each other.

Hypothesis 2: There are differences in intellectual interest, as measured by the Academic Interest Scale, between males and females and among:

a. students majoring in different curricula,

b. students who lived a major portion of their lives on a farm, in a village, town, small city, or large city,

c. students who were in different sized high school graduating classes,

d. students whose fathers and/or mothers completed grade school, high school, college, graduate or professional school,

e. students who plan to receive four years of college education and those who plan to attend graduate or professional school,

f. students whose fathers are executives, business owners, white-collar workers, skilled craftsmen, semi-skilled workers, low or unskilled laborers, farm owners, public service workers, or professional personnel (doctor, lawyer, dentist, and so forth).

Hypothesis 3: There is a relationship between intellectual interest and performance on the Scholastic Aptitude Test, Michigan State University Reading Test, Michigan State University Arithmetic Test and Michigan State University Quantitative Test.

Hypothesis 4: There is a relationship between intellectual interest and seven factors of trait self-rating measured by Trait Self-Ratings of College Freshmen Scale.

Hypothesis 5: There is a relationship between intellectual interest and seven factors of life goals of college freshmen measured by Life Goals of College Freshmen Scale.

Hypothesis 6: There is a relationship between intellectual interest and academic self-concept measured by General Self-Concept of Academic Ability.

Hypothesis 7: The biographic, demographic and background variables, cognitive and affective variables, including the intellectual interest variable in this study, may be factored into interpretable subgroups.

The second aspect of the study will be to test the validity of intellectual interest in the prediction of academic success of freshmen students at an institution of higher education. The following hypotheses will be tested:

Hypothesis 1: There is a significant relationship between intellectual interest as measured by the Academic Interest Scale and the grade point average subjects earn during their first term of college work.

Hypothesis 2: The accuracy of prediction of college success is increased when intellectual interest is considered in conjunction with a scholastic aptitude test score, high school grade point average, general self-concept of academic ability or a combination of these variables.

Definition of Terms

1. College grade point average (MSU GPA) refers to an average of the student's grades earned in subjects completed in college work.

2. High school grade point average (HS GPA) refers to an average of all grades earned in high school subjects and reported to the Registrar's Office of the university.

3. Predictor refers to an independent or antecedent variable that provides information for forecasting an unobserved event. The changes or differences in the predictor variable are associated with changes or differences in the unobserved event. Values of a predictor variable thus afford a basis for prediction of the unobserved event.

4. Criterion refers to a dependent or consequent variable which is presumed to be predictable from the predictor variable or variables. A set of observable activities or behaviors that are relevant to the criterion and that can also be measured may be called the "criterion performance." The scores obtained on an instrument or

scale representing the criterion variable are termed "criterion measures."

5. Self-concept of ability refers to the evaluation a person makes of his ability to achieve in academic tasks in general, especially as compared with others.

6. Trait self-rating refers to the evaluation a person makes of himself concerning seven traits, namely, physical well-being, scholarship, estheticism, pragmatism, technical-scientific ability, sociability, and sensitivity to others.

7. Life goals refers to the self-assessment of goals which are most relevant for various occupations and for various types of achievement, including seven dimensions, namely, prestige, artistic, personal happiness, humanistic-cultural, religious, scientific and hedonistic.

8. Regression equation refers to the functional form of the relationship between the predictors and the criterion. This is expressed in the form of a mathematical function in which Y, the criterion, is set equal to some expression which contains values on Xs, the predictors, and certain constants or parameters.

Assumptions

The predictive aspect of the study has several basic assumptions. One of them is the assumption of linearity of relationship between criterion and predictor. In a word, this assumption means that, if two variables are plotted

one against the other, the plot tends to follow a straight line.

Other essential assumptions regarding the use of a regression equation are those of normality and homogeneity of variance. Assumption of normality implies that the samples with which we work have been drawn from populations that are normally distributed. If the populations from which samples are drawn are not normally distributed, then statistical tests that depend upon the normality assumption are violated. The homogeneity of variance assumption implies that the variance within the groups is statistically the same. That is, variances are assumed to be homogeneous from group to group, within the bounds of random variation.

The assumption of linearity is tested in this study. This assures that the assumption regarding linearity will impose no problem for the study. Neither is there any reason to believe that this study violated any of the other assumptions. However, consideration will be given to these assumptions when generalizations are drawn from the results of the study.

Limitations of the Study

The manner in which the sample was selected placed some restriction upon the external validity of the study. Subjects who dropped out before completing the first term, transfer students, students with incomplete data, and foreign students were not included in the population

studied. Also, the population chosen for study included only Michigan State University students. Thus, generalizations cannot be made regarding other college and university populations. The usefulness of the prediction rule for a certain group is dependent upon its similarity to the norm group from which the regression equation was formulated. To the extent that the groups are different, the prediction will be in error.

For the study to be of maximum value it is necessary that replicative studies be made using other populations.

Summary of the Chapter

The purpose of this study is to investigate the structure of intellectual interest and to test the predictive validity of intellectual interest as a predictor of academic success in an institution of higher learning. Nine specific hypotheses are formulated, and they will be tested for significance.

After defining the terms frequently used throughout the study, the need for and rationale of the study were described from three different points of view, those of the individual student, institutions of higher education and society at large. Basic assumptions were then described.

Finally, limitations of the study were defined. It was pointed out that sources of limitations were in the theoretical assumptions of the method employed in the study and in the restricted definition of the population.

Chapter II will present a review of related research studies. The methodology of the study including the instrumentation, research procedures and statistical models employed will be shown in Chapter III. A presentation and analysis of the data will be conducted in Chapter IV. Finally, Chapter V will include a summary of the study, conclusions and recommendations for further study.

CHAPTER II

REVIEW OF THE LITERATURE

This study evolved from the ideas and findings of earlier research on intellectual interest, in general, and on college life, campus environment, and academic prediction.

There has been speculation about the impact of students upon one another and of the role of colleges and universities as socializing institutions. The intellectual dimensions of environmental pressure, influence of academic emphasis on curricular activities, and the scholastic value system were included in many previous studies. However, it is surprising to see that little effort has been made to directly investigate and measure these related dimensions. Some exceptions were the studies done by Yuker and Block (1969), Anderson and Western (1966) and McConnel and his associates (1962).

Nevertheless, the use of tests in the selection of applicants for admission and for the prediction of academic success, defined in terms of college grades, has been the most widely explored topic in educational-psychological research. Segal (1934) summarized the findings of 23 studies before 1933. Garrett, in his 1949 review which

covered two decades, mentioned approximately 194 studies. Fishman (1958) reported 580 studies in the years 1950-1958. Travers (1959) in a study on the prediction of achievement, cited more than 200 prediction related studies. Whitla (1969) reported that the published studies exploring the prediction relationship may represent only a fraction of the total number of such studies that have been conducted.

The literature which has bearing on this thesis is reviewed in this chapter. In order to put the research reviews in perspective, the summaries of studies illustrate the following areas:

1. Studies relating to the domain of intellectual interest.
2. Studies relating to college and university influence.
3. Prediction studies of college success.
    a. Studies using cognitive variables.
    b. Studies using affective variables.
    c. Studies using other variables.
    d. Studies related to other problems of prediction.

1. Studies Relating to the Domain of Intellectual Interest

Before examining the research related to the main subject of the study, intellectual interest, it might be helpful to review the main studies of the relationship between the cognitive and affective factors associated

with learning. In the report of his international study of educational achievement, Bloom (1965) stated that patterns of educational objectives for a group of schools are related to the pattern of scores on achievement examinations. By that, he suggested a direct relationship between the aims of education and academic performance as an educational outcome. The notion that educational objectives, while related to intellectual achievement, determine the development of interests, attitudes, values, motivation and many other non-intellectual dimensions is generally accepted. Many scholars have documented the relationship between the cognitive and affective domains (Scheere, 1965; Asch, 1952; Rhine, 1958; Festinger, 1957; and Heider, 1968). They believe in the fundamental unity of affective and cognitive behavior. For example, Rokeach (1960) stated the issue this way:

> We assume that every affective state also has its representation as a cognitive state in the form of some belief or some structural relation among beliefs within a system. With respect to the enjoyment of music, for example, we all build up through past experience a set of beliefs or expectancies about what constitutes "good" or "bad" music. It is in terms of such expectancies, which are more often implicit than explicit, that we enjoy a particular composition. Thus, a person who is exposed to a particular piece of classical music or jazz may enjoy it, even though it may be totally unfamiliar to him, because it is congruent with an already existing set of beliefs he has built up over time. Depending on the extent to which he is prepared to entertain new systems, he may or may not enjoy Schönberg or other music perceived as incompatible with his own beliefs about what constitutes good music. . . . In all cases, enjoyment or its opposite is the affective counterpart of a belief organization and can be thought of as being in one-to-one relation (isomorphic) with it. Thus, our cognitive approach is as much concerned with affection as with cognition. (P. 399.)

Rosenberg (1956), also, saw the basic congruence of the cognitive and affective systems. Krathwohl et al. (1965), claiming that it is possible that a different affective objective accompanies every cognitive objective in a course, developed the subcategories of the two domains. They are: knowledge-receiving, comprehension-responding, application-valuing, analysis-conceptualization, and evaluation-organization. Describing the categories of the classification scheme of the affective domain taxonomy, Krathwohl et al. defined "Responding," which is the second subdivision in the classification, this way:

> This is the category that many teachers will find best describes their "interest" objectives. Most commonly we use the term to indicate the desire that a child become sufficiently involved in or committed to a subject, phenomenon, or activity that he will seek it out and gain satisfaction from working with it or engaging in it. (Pp. 118-119.)

They further defined "Valuing," the third subdivision, in the following words:

> An important element of behavior characterized by Valuing is that it is motivated, not by the desire to comply or obey, but by the individual's commitment to the underlying value guiding the behavior. In the socialization process, the learner may conform externally to a number of socially desirable rules of behavior which he has only partially accepted as his own--has only partially internalized. (P. 140.)

The theoretical implication, that the individual begins to respond to stimuli and then continues increasingly of his own volition to the point where he is actively seeking instances in which he may respond, is fully employed in forming the definition of "intellectual interest" in the present study.

Guilford (1962) stated that having the information is not sufficient in developing creativity, and Holland (1966) suggests that creative performance occurs more frequently among students who are intellectual and independent.

Ellis (1962) believed that thought and emotion are not separate or different functions. He made the following statement:

> Emotion, then, does not exist in its own right, as a special and almost mystical sort of entity; it is, rather, an essential part of an entire sensing-moving-thinking-emoting complex. What we usually label as thinking is a relatively calm and dispassionate appraisal (or organized perception) of a given situation, an objective comparison of many of the elements in this situation, and a coming to some conclusion as a result of this comparing or discriminating process. And what we usually label as emotion, . . . is a relatively uncalm, passionate, and strong evaluating of some person or object. (P. 47.)

Jacob (1957) suggested that affective behaviors develop when appropriate learning experiences are provided for students much the same as cognitive behaviors develop from appropriate learning experiences. There is need for conclusive experimentation and research on the relationship between the two domains.

Furthermore, not only does the relationship between these two domains need describing more in detail, but many of the psychological traits need a clearer definition of their identity and structure. This situation is also true of the domain of intellectual interest. England and England (1958) define an intellectual as:

> . . . a person interested in ideas in contrast with the merely practical man . . . it may be applied to one whose interest in ideas is not balanced by practicality. (P. 267.)

Barnhart (1951) in the American College Dictionary defines an intellectual as:

> A member of a class or group professing, or supposed to possess enlightened judgment and opinions with respect to public or political questions. (P. 348.)

William James (1907) noted that the intellectualism-pragmatism dichotomy was similar to the tender-minded, tough-minded dichotomy. The manual of the Omnibus Personality Inventory says:

> The development of measures of intellectual, scholarly concerns was channeled by what were assumed to be the major modes or correlates of academic activity. This was also an area where the measurement of change was obviously related to college objectives and achievement. . . . The system of Intellectual Disposition Categories is a way of classifying or locating persons at certain points on a "continuum of intellectual disposition." Specifically, the subjects are placed in one of eight Intellectual Disposition Categories (IDCs). This system was developed over several years on an exploratory basis and gradually acquired supportive evidence for its validity as it was tested, expanded, and retested. (Heist, 1968, pp. 1-56.)

Several subscales such as Thinking Introversion, Theoretical Orientation, Estheticism and Complexity were used by McConnel and his associates (1962) at the Center for the Study of Higher Education, University of California. Their emphasis was on students' intellectual interests and dispositions at the time college students entered the college and what happened to these characteristics while they were in college. In their sample of 372 students in four colleges under study, the correlations of the scales with the Scholastic Aptitude Test--Verbal ranged from -.01 to .58 and with SAT-M, from -.01 to .43. Their final study report is not yet available.

Weissman (1959), using some subscales of Omnibus Personality Inventory, made a pattern analysis of 900 National Merit Scholarship freshmen. He differentiated three groups: Group A--the individual tends to be thoughtful, reflective, independent and creative; Group B--the individual tends to have only a moderate liking for abstractions and reflective thought and Group C--the individual tends to prefer physical activity to thoughtful reflection.

McBee and Duke (1960), after using the Brown-Holtzman Survey of Study Habits and Attitudes in their study on the relationship between intelligence, scholastic motivation and academic achievement, pointed out the desirability of the study of specific interests in determining scholastic motivation.

Stern (1963b, 1966) investigated the college environment. Intellectual interest was one subscale of the environmental index he developed which was found to be significantly different from campus to campus.

One of the most extensive studies was done by Yuker and Block. They developed a thirty-item Likert-type scale which has been administered to over 3,500 college students. For a sample of 134 evening students, the correlation coefficient between grade point average and the score on the scale they developed was .32. When the 14 freshmen in the sample were dropped from the statistical analysis, grade point average for evening students classified as sophomores and above correlated .56 with the scale. They stated:

> Thus, the correlation between I-P (Intellectualism-Pragmatism Scale) score and grade point average seems quite substantial and approaches those found between grades and standardized tests of intellectual ability. This is particularly interesting in view of the fact that intelligence tests seem to have reached the point where higher correlations with success in school do not seem possible. . . . It is possible that the I-P scale taps an important additional attitude related to success in college. (P. 9.)

The I-P Scale was also administered to students who were accepted as incoming freshmen for the Fall, 1962 class at Hostra University. For the 445 students for whom complete data were available, the Scale correlated .26 with grades at the end of the first semester. It correlated .12 with high school average. The correlations between the I-P Scale score and each of the three GRE scores respectively were: GRE Social Science .12, GRE Humanities .56 and GRE Natural Science -.17. For a sample of about 1,500 students, a linear relationship was found between school year and the Scale score. The mean score increased each year from entering freshmen to graduate students. Most of the differences between two-year periods were significant beyond the .05 level of significance.

2. Studies Relating to College and University Influence

Various functions that peer groups serve for individual college students have been studied extensively. An American Council on Education research report (Astin, 1963 and 1965) gave evidence of such peer influences. Levine (1966) and Sanford (1963) have demonstrated that the individual's achieving independence from home was one of the

most important influences, and several investigators have noted the role the peer group plays in offering general emotional support to students, fulfilling needs not sufficiently met by the faculty or classroom. Reporting on Harvard's 1964 and 1965 classes from longitudinal data and intensive interviews, King (1967) noted that seniors rated the finding of meaning, goals and outlook for life as "most important." These same students believed that their interaction with other students was very valuable to their maturing college experience. A Bennington study (Newcomb, 1967) showed that students bringing diverse cultural outlooks to the college tended to be assimilated into the cultural outlook which predominated at the college.

Berdie (1966) makes the point in the following words:

> Students come from families, high schools, and communities that share many of the values of the university but that also are unaware of or perhaps rejecting other values. From the college, the student moves into a world of work, family, and community that again in many ways is different from his alma mater. While in college, the stresses and demands of the curriculum and college life are balanced against those of social problems, religious conflicts, racial discrimination, civil rights, and a society out of joint. (P. 132.)

As indicated in Berdie's remarks, student culture may be regarded as a homogeneous culture for certain purposes. Also, it might be viewed as a plurality of heterogenous subgroups valuing different interests and rewarding different activities. Interest regarding the study of college students' attitudes, critical thinking and values has generated many longitudinal and cross-sectional studies. Major studies have been or are being conducted at Michigan

State (Lehmann and Dressel, 1962), Stanford and Berkeley (Katz and associates, 1967), Cornell (Goldsen, 1960) and Harvard (King, 1967).

Pace (1967), Stern (1963a, 1966) and others extensively studied the college environment, using the College Characteristics Index. The Index consists of three hundred statements about college life--rules and regulations, features and facilities, faculty, curriculum, instruction, extracurricular programs and others. The Environment Assessment Technique, developed by Astin and Holland (1961), also assesses the college campus culture. Centra (1967) reworded the College and University Environment Scales and applied it to dormitories rather than to the university in general. After measuring the environmental pressures, demand and opportunities of residence halls at Michigan State University, Olson (1964) discovered that these living quarters differed from another primarily along an "intellectual-propriety dimension." Trow (1965) has explained it this way:

> Most colleges are not monolithic and uniform, but contain within themselves different subsocieties whose members share common codes of values, attitudes, and patterns of behavior. . . . The kind of subcultures a student identifies with shapes the kinds of people he spends his time with and the kinds of values and attitudes he is exposed, indeed, subjected to. (P. 58.)

Trow emphasized the interplay between personal and institutional distinctions in the shaping of self-concepts. Furthermore, he explained that certain attitudes, behaviors and styles of thought and action among adults who have been

to college, which are of importance for the quality of life in the society, may reasonably be believed to have been affected by some aspect of their experience in higher education. Moreover, Havice (1966), Bolton and Kammeyer (1967), Siegel (1968), and Krech (1962) explored the importance of knowledge of students' intelligence, needs, values, pressures and other characteristics for the individual who is on campus or going to apply for admission and for institutional authorities as well.

Tyler (1962) noted the point as follows:

> Let us consider the problem first from the standpoint of the individual high school student. The most important relevant questions to which he and his parents need answers are: "In which colleges am I likely to make the most educational progress if I continue with my present habits and attitudes? What changes in my habits and attitudes would be likely to result in marked increases in my educational achievement in each of the colleges under consideration?" . . . Information, . . . will be required to derive maximum benefit from the college experience. . . . Let us now consider the admission problem from the standpoint of the individual college. The most important relevant questions to which the college needs answers are: "What aggregations of students are likely to make most educational progress if the college continues with its present faculty, facilities and practices? What changes in conditions in the college are likely to increase student learning and for what aggregations of students?" These questions imply two assumptions which are not commonly expressed in admission procedures. The first is that the amount students learn is affected by the composition of the student body so that the problem of selection must consider the aggregate student body as well as each student. . . . A second assumption is that some of the conditions in a college affect the amount of learning for some aggregates of students. (Pp. 106-109)

In the fall of 1964, as part of the test battery of the American College Testing Program, over 8,000 high school students throughout the United States who applied to

colleges were asked to rate influences affecting their choices of particular colleges (Newcomb et al., 1967). Factor analysis showed the influence of intellectual emphasis, practicality, advice of others, social emphasis, emphasis on religious and ethical values and size of the school. Moreover, the composition of the entering student body was found to be determined by the college's particular image (Clark, 1959) or perception of the college image (Silber, 1961). Many other studies documented the interplay of the individual and the institution.

In a longitudinal study of freshmen at the beginning and seniors at the end of the school year, Trent (1967) found that, for each sex, seniors have more liking for reflective thought, particularly of an abstract nature, than do freshmen. In the same type of study, Korn (1967), Nicholas (1967), and King (1967) document the increase in percentage of students emphasizing academic and intellectual satisfactions.

Stern (1966), Brewer (1963), and Yuker and Block (1967) have done cross-sectional studies on changes of intellectual orientation in college. Not all of the studies showed significant increases in intellectual orientation. A set of findings by Katz (1967) showed no significant increases. In the early 1960's, 73 percent of a sample of women at Bennington College spontaneously mentioned increases in intellectuality when asked how they had changed since coming to the college (Newcomb, 1967). In

1962, a sample of seniors at Michigan State University were presented with a list of "behavior traits" and were asked to describe changes that had come about in college in terms of whether they possessed more, less or the same degree of each quality. To the item, "interest in intellectual and cultural matters," 73 percent of the men and 84 percent of the women indicated more interest (Lehmann and Dressel, 1962). Many other studies in the general area of intellectual orientation usually have shown changes toward independence of thought, originality and widening interests.

As socializing institutions, colleges and universities have the task of influencing students so that they leave the campus with improved and desirable knowledge, skills, attitudes and values. A typology of student subgroupings that has become popular in recent years is that offered by Clark and Trow (1966). They describe four types of student subcultures which they label academic, nonconformist, collegiate and vocational. Whealer (1966) has analyzed the kinds of interpersonal settings and Wallace (1966) goes so far as to caricature the interaction between students and faculty. Astin (1963), in studying a sample of high-ability students at some 76 different colleges and universities, found that the intelligence level of the student body as a whole was negatively associated with perceived change in abilities and self-confidence.

3. Prediction Studies of College Success

Academic maladaptiveness is one of the major problems confronting teachers, school administrators, counselors and students as well. An extraordinary number of studies have been conducted on various aspects of student achievement in America's several levels of educational institutions.

Cattel et al. (1962) stated:

> The prediction of school achievement is valuable not only for the sheer understanding which we thereby achieve of the psychological mechanisms and situational conditions which lead to scholastic success, but also for two immediate practical purposes in school organization. In the first place one wishes to discover the causes and remedies of backgrounds in that minority of individuals who so markedly fail to achieve that special class organization has to be introduced. In the second place, one may wish to select, in general scholarship and fellowship selection practice, those individuals who are most likely to benefit from being given special opportunities in advanced education. (P. 3.)

It is evident that academic failure is both a problem to the individual, who may suffer from the sense of failure, and to society, which loses the full potential contributions of an unestimated number of its members. It follows that anything that can be done to reduce the incidence of academic maladjustment will contribute to individual and social accomplishment and well-being.

The seriousness of the problem has resulted in a tremendous number of prediction studies, as previously mentioned. For example, Fishman and Pasanella (1960) report 580 research studies between 1949 and 1959 alone. Since both the College Entrance Examination Board and the

American College Testing Program now provide research services for member institutions, many colleges and universities have been able to carry out prediction studies with a relatively small investment in terms of time, effort or personnel. Thus, it would seem reasonable to project that the last decade has at least equalled and likely surpassed this figure.

The generally accepted manner of handling the literature reviews is by subdividing the broad categories of predictors and criterion and by dealing with either intellective characteristics or nonintellective characteristics of individuals (Fishman and Pasanella, 1960). Studies related to other problems of prediction are cited below in four categories.

A. Studies Using Cognitive Variables

High school scholarship has been found to be the best single predictor of college success (Beatley, 1922; Garret, 1949; Richards and Lutz, 1968). Guisti (1964) reviewed the prediction literature and found convincing evidence that high school grade point average was the best single predictor of college grade point average (GPA). The range of reported correlations was .35 to .69 with a median correlation of about .50. This correlation of .50, however, only accounts for about one-quarter of the total variance of college grade point average, indicating that high school GPA does not consistently and sufficiently contribute to predicting college success.

When an additional intellective criterion, normally an aptitude test score, is added to the high school average, the resulting multiple correlation with GPA is usually higher than the correlation of either predictor alone. Fishman and Pasanella (1960) reported multiple correlations ranging from .37 to .83 with a median of .62. The average gain in forecast over the high school grade point average (as a single predictor) was found to be .11. When further intellective measures were employed, however, only very small gains in prediction were noted.

Webb (1967), also, found high school grades the best single predictor of college grades, with the Scholastic Aptitude Test verbal scores adding more than any other variable to predictive efficiency. However, he reported that personality variables contributed more than SAT scores in predicting success in individual fields of study. Dohner (1969) found that high school class ranks in combination with American College Test (ACT) scores best predicted academic success.

Elton (1969) found the ACT mathematics score best in predicting educational outcomes in females and the ACT social studies score best in males.

Baird (1969) found that college grades were predicted by self-ratings on scholarship and high school grades, with the ACT social studies test improving the prediction in males.

Studies into the use of both intellective predictors and intellective criteria have been considered so important

that several articles have dealt with simplified methods of predicting college grade point average (Aiken, 1968) and college success (Merwin, 1964) from input variables such as high school grade point average and the Scholastic Aptitude Test. The Aiken article is of particular interest in that it provides a graphic determination of, first, a triple regression equation prediction of GPA and, next, an approximation of the standard error of estimate, and, lastly, an appropriate cutoff decision strategy.

The American College Testing Program (1965) reported correlations between student-reported grades and corresponding school-reported grades that ranged from .91 for a large sample of ACT examinees. Although the predictive validities of the two sets of grades were not directly compared, a comparison of the predictive power of grades reported by students and high school class ranks revealed no consistent advantage for either variable.

Bogue (1963) found that student-reported grades used with ACT scores of 372 examinees predicted college grades slightly better than did school-reported grades with ACT scores. Comparative predictive validity studies which used examinees younger than high school seniors are not available.

A particularly interesting aspect of predictability is found in the differences of college grades in terms of male and female students. Abelson (1952) and Seashore (1962) have reported that a woman's GPA is significantly

more predictable (by intellective predictors) than is a man's. A similar study by Paraskevopoulos and Robinson (1970) indicated no significant differences in prediction between sexes, but, instead, there were clear indications that a separate regression equation for women was higher (different Y-intercept) than was the mixed-sex regression line. Thus, the combined prediction equation tended to favor the male applicant since each female applicant's predicted GPA was approximately .20 lower on the mixed-sex regression equation.

B. Studies Using Affective Variables

As indicated earlier, multiple regression equations with three or more intellective predictors did little to increase the multiple correlation with GPA beyond .60. But just as it appeared that research into intellective factors had reached the point of diminishing returns in work on prediction, a resurgence seems to have been stimulated by the idea that some nonintellective measure might provide a further explanation of the total variance of the college GPA. In summarizing the studies of non-cognitive variables in relation to academic achievement, Graff and Hansen (1970) made the following statements:

> A thorough review of the literature indicated that many studies of the non-cognitive aspects of achievement have been conducted during the last two decades. Researchers tried to relate social background factors, interests, Rorschach and TAT responses, study habits, and different personality traits to academic achievement. Unfortunately, the results were generally inconsistent or non-significant. Some of the

> investigations produced correlations similar to those found with conventional predictors of academic success. The crucial issue, however, comes in determining how much these nonintellectual components actually added to the prediction validity based on high school records and intellective tests. (P. 120.)

Research in recent years has tested a number of non-intellective predictors of college success. An early study by Hoyt and Norman (1954), for instance, indicated that an "adjusted" student, as determined by his Minnesota Multiphasic Personality Inventory (MMPI) score, was significantly more predictable than his "maladjusted" counterpart. A later study by Anderson and Spencer (1963), however, attempted to replicate the Hoyt and Norman results, but found instead remarkable similarities in aptitude, achievement and predictability between the "adjusted" and "maladjusted" groups.

Similar contradictory results were obtained in various investigations into the nonintellective measure of study habits and attitude questionnaires. Whitla (1969) cites the Brown and Holtzman study which indicated that their survey of study habits increased the multiple correlation to about .70 when ability measures were also included as predictors. As Whitla (1969) mentions, however, a second study by Ahmann used the same inventory with no significant increase in the predictive capacity of the regression equation.

Recently, more encouraging findings have been reported for studies which have approached the prediction of academic attainment by means of prediction-oriented inventories

consisting of items which have been empirically selected and empirically keyed. Illustrative of published scales of this kind is the California Study Methods Survey by Carter (1960), the Brown-Holtzman Survey of Study Habits and Attitudes by Brown and Holtzman (1956), the California Psychological Inventory by Gough (1957), and the Opinion and Attitude Survey by Fricke (1960). Other scales, exemplified by the work of Ward (1959) at the University of Tennessee and Hebenstret (1959) at the University of Washington, have been developed from a conglomerate of items which assess biographical characteristics along with study skills, personality, and motivation. Juola (1963) made the criticism that some of the tests used, be they measures of adjustment, interest, attitudes, values and so forth, have been developed for purposes other than the evaluation of academic adjustment and that it is therefore not surprising that these non-cognitive inventories proved totally inadequate as predictors of academic success. Then he attempted to construct an empirically derived non-cognitive scale that is based upon attitudes and values that students hold for education and educational activities. He reported that the correlation of his trial form of the Academic Attitude Preference Inventory (AAPI) with first quarter GPA for new freshmen was .52 for each sex and that the correlation with the cumulative one-year GPA was .48.

Because "one of the basic assumptions in education is that motivation is a prime requisite for scholastic success"

(McBee and Duke, 1960, p. 3), motivation has been extensively studied (Heckhausen, 1967; McClelland, Atkinson, Clark and Lowell, 1953). In his review of significant research on the prediction of academic success, Travers (1949) stated that motivational factors played a major role in determining success both in high school and in college and measures of interest had been found to correlate with college performance almost as well as measures of aptitude. Not only general motivation but also each of the specific motivational variables was found to be significantly related to academic performance. Atkinson (1958) cautioned that it is unlikely that academic achievement may be predicted by a measure of a single motive since it may satisfy more than one need, such as understanding, power, or affiliation. Furthermore, McKeachie, Isaacson, Milholland and Lin (1968) observed that most of the successful studies relating achievement motive to academic achievement have been done with males, and Klinger (1966) observed more frequent occurrence of significant relationships between need for achievement and academic performance among secondary school students than among college students.

Holland (1966) suggested the usefulness of brief lists of activities and brief lists of competencies for predictors. Baird (1969) found that trait self-ratings and self-evaluation of life goals might be useful predictors. However, it is very difficult to study most of the psychological constructs, because they are intervening variables

and not directly measurable. Lack of agreement on the definition of the construct adds difficulty in designing the study and interpreting the results of the study.

Correlations of interests with grades in related fields are generally below .30, so interest tests add only a small amount to academic prediction (Cronbach, 1970). Interests sometimes predict who stays in training and who drops out. Of those with A and B^+ scores on the Dentist key of the Strong Vocational Interest Blank, 92 percent graduated from dentist training, compared with 67 percent of B's and 25 percent of C's (Strong, 1943, p. 524). It has been suggested that the profile will predict differences in grades between preferred and non-preferred areas. An extensive study by French (1958) shows that prediction of this sort has too little accuracy to be of use.

There have been other attempts to employ nonintellective characteristics. Berdie (1961) found significantly lower predictability for those students whose intra-individual variability on a preadmission test was higher than for those whose variability was low.

Barclay (1965) described Bendig's study which was carried out using the Edwards Personal Preference Schedule (EPPS) as a predictor in a multiple regression equation. The use of the EPPS added .09 to the multiple correlation in this case. Frederiksen and Melville (1954) indicated that a student rated "compulsive" on Strong Vocational Interest Blank is significantly less predictable on his GPA than is the "noncompulsive" student.

In most cases, however, the relationships between personality variables and academic criteria have been found to be quite low. An important recent exception is the Holland and Nichols (1964) study which took a group of students highly homogeneous with respect to intellectual ability (all National Merit Scholarship finalists) and examined them in terms of nonintellective predictors. These nonintellective characteristics were found to be effective predictors of college grades. Two important groups of prediction-related personality factors were identified: (a) motivation to succeed and (b) conformity to a basic socialization and value system. The significance of this experiment is that nonintellective measures were shown to have significant predictive validity when academic ability is held relatively constant.

Finally, much progress has been made in order that students can be helped to improve their academic performance. Baymur and Patterson (1960) and Hatch, Dressel and Costar (1963) pointed out that students benefit from appropriate counseling. Working with urban school, ninth-grade underachievers with low self-concept, Brookover (1962, 1965) found that they could be helped to achieve significantly better by improving their self-concepts through the efforts of "significant others." Wrenn and Humber (1941) suggested that improving students habits may help them improve scholastically, and Stebens (1957) believes that programs for reading skill improvement are very fruitful.

C. Studies Using Other Variables

Biographical inventories were used in an attempt to find nonintellective factors which would significantly add to prediction of criterion variance above and beyond that accounted for by intellective test measures (Cosand, 1953).

In 1911, Pittenger surveyed the freshmen grades of the within-state students at the University of Minnesota. His conclusions were that the graduates of the larger high schools might be expected to do better than those from the small school.

At the State College of Washington, Thornburg (1924) studied freshmen grades on the same variable. He concluded that students from the large high schools achieve superior grades at college. But, in 1949 at Purdue, White (1951) made a study of the University's admission criteria. His findings revealed that size of high school had no relationship to college success at that state university. Shafer (1956), in a study of students entering certain Iowa colleges, came to the same conclusions as did White. This investigation was carried out in 1956. The size groupings used were: 0-99; 100-199; 200-299; 300-499; 500-999; and 1,000 and above.

In 1962, Harmon reported on the relationship between doctorate productivity and size of high school graduating class. The author pointed out that apparently something was happening in the high schools to differentiate the people who, more than a decade later, will earn doctoral

degrees in various scholarly fields. He concluded that size of high school, as reflected in size of graduating class, has a profound effect on the probability of an individual's going on to college, to graduate school and eventually to the doctoral degree.

Bloom (1964) referred to the six variables in the home environment: "achievement press," language models, academic guidance, stimulation to explore various aspects of the larger environment, intellectual interests and activities, and work habits emphasized. Dave (1963) obtained a correlation of .80 between ratings of home environment on these variables and achievement test battery scores of children. The usual correlations between the socio-economic status and achievement are less than .50. Kurtz and Swenson (1951) found that home environment had some influence on achievement. Where parents show interest and pride in their children and children wish to please parents, there seems to be more achievement.

Smith (1965) studied 154 University of Kentucky male freshmen to determine differences between high-ability achieving and non-achieving students. Students in his sample scored in the upper fifth percentile on the College Qualification Tests. He tentatively concluded that students who came from larger metropolitan areas possessed a set of values and attitudes concerning education which seemed to make them more prone to underachievement.

Staton (1962) studied new freshmen from Oklahoma high schools who enrolled in the University of Oklahoma. One of the variables he selected for study was student's high school curriculum. He concluded that the curriculum taken in high school did not influence college grades. Young (1967) analyzed the high school curriculum patterns of closely matched pairs of college students. He found no significant difference in college achievement between students who took 7.9 business and industrial courses in high school and students who took 0.9 such courses.

D. Studies Related to Some Other Problems of Prediction

The basic assumption of the regression formula employed in the statistical analysis of the prediction data is that there is a linear relationship between the predictors and the criteria. Weiss's recent paper (1970) argues that the relationship is more likely non-linear. He employed a non-linear assignment of weights and obtained a Spearman's rank order correlation coefficient between weighted predictors (intellective) and GPA of .89. Although Weiss admits this is but a "first approach to developing a non-linear predictive system," it does appear that the non-linear approach demands some concentrated investigation.

Recent emphasis has been on the use of a combination of variables. There is a distinct superiority in multivariable prediction over prediction by the use of a single factor. Cosand (1953) summarized studies of multiple

correlations. These correlations point out the advantage of using several predictors rather than a single one.

Spiegel (1971) sought to use a stepwise multiple regression method to select from intellectual, attitude, and personality variables linear combinations of variables that might optimize prediction of course points in male and female first year college students. Fifty-four variables were used in the analysis. For males, twelve variables were included in the predictor set which yielded a coefficient of .85. For females, ten variables were included in the predictor set that yielded a coefficient R of .92.

The predictor measures studied usually serve as admissions criteria. Also, students make decisions to apply to one college or to another college. These facts might affect the predictability of GPA because they are closely related to the range of the population in a college. It is interesting to note here that Fishman and Pasanella (1960) found that the highest reported correlations (high .60's and .70's) were all obtained from Southwestern and Western colleges in which selection procedures were minimal.

Low predictability of college success might be due to the fact that the criterion, grade point average, is a very complex and not very valid and reliable measure. Whitla (1969) mentioned that a freshman might have a choice of some 148 possible courses in 39 departments at Yale. In light of this possible variability, to equate one

freshman's GPA with another's is tenuous at best. One other source of the unreliability of grades arises from the variability in grading systems that are prevalent in schools. A student with an "A" grade in one college may be only as able as, or perhaps less able than, a student with a grade of "B" in another college.

Various techniques have been employed to correct for this variability while predicting college achievement from school grades, as discussed by Bloom and Peters (1961). Linn (1966) reviewed the results of several empirical studies that have used "adjusted" grades to predict academic achievement. His paper considered some of the possible techniques which could be used to make grade adjustments for interschool differences. Most researchers, however, have found that the improvement in predictive validity due to the use of adjusted grades has been discouragingly small.

Summary of the Chapter

This chapter consisted of a critical examination of the literature concerned with the construct of intellectual interest, college as a socializing institution and prediction of college success.

With several exceptions, there were few attempts to investigate the construct of intellectual interest. Some researchers have developed scales to measure intellectual interest and have attempted to reveal the characteristics of the domain. Yet the clear identity and structure of

intellectual interest which is the main domain of the present study is not well provided.

In spite of the vagueness of the concept, the domain has been widely employed in studies attempting to understand students, college environment and the role of higher education. Moreover, some attempts to validate the domain of intellectual interest against college success have been made.

The literature contains studies of academic performance at all educational levels and that which pertains to undergraduates in colleges is particularly voluminous. The use of tests in the selection of applicants for admission and in the prediction of academic success, defined in terms of college grades, has been the most explored topic in educational and psychological research.

Many studies indicate that high school grade point average is the best single predictor of college success. With an additional intellective predictor, normally an aptitude test score, the resulting multiple correlation with GPA has usually been significantly higher than the correlation of either predictor alone.

Many researchers have also investigated personality, biographical and demographic variables, primarily in an attempt to increase the predictive efficiency of students' college achievement. The results of many studies have often been inconsistent and, sometimes, contradictory.

Many studies have attempted to isolate non-cognitive correlates of college success. While a considerable number of non-cognitive variables have at one time or other been correlated with student achievement, the direction and magnitude of the relationships have generally not been consistent from study to study.

Despite the many studies which have been done concerning the global prediction of grades, little progress has been made in the prediction of college success by means of multiple regression techniques, differential prediction, moderated regression models and non-linear relationships.

The method of this study, along with the statistical hypotheses to be tested, will be found in Chapter III which follows.

CHAPTER III

METHODOLOGY

Population and Sample

The population examined in this study consisted of all freshmen who entered Michigan State University Fall term, 1970. Five thousand four hundred and sixty-eight freshmen students registered for credit courses during the fall registration period. However, some restrictions were imposed on the population. The following types of students were excluded:

1. All students who previously attended any college or university,
2. All foreign students,
3. Students whose test data were incomplete, and
4. Students who dropped out before the end of Fall term, 1970.

The sample of students used in the study was selected from the restricted population as defined above, and any future references to the population of the study, or generalizations and conclusions to be drawn from the results of the analysis should be interpreted in terms of the restricted population.

Out of the restricted population, 643 students were randomly selected for study. Because of this random selection procedure, the sample of the above 643 students could represent the total restricted population of the study.

Instrumentation and Criterion

The study employed several instruments related to cognitive, affective, demographic, and background characteristics. In addition to them, the composite scale was made to measure the construct of intellectual interest.

A list of the instruments used in the study follows:

A. Instruments used to measure the construct of intellectual interest:
   1. Four subscales from the Stern Activities Index, including Reflectiveness, Humanities-Social Science, Understanding, and Science;
   2. Intellectual Interest Scale of Anderson and Western; and
   3. Intellectualism-Pragmatism Scale of Yuker and Block.

B. Instruments used to measure the affective characteristics:
   1. General Self-Concept of Academic Ability;
   2. Trait Self-Ratings of College Freshmen; and
   3. Life Goals of College Freshmen.

C. Instruments used to measure the cognitive characteristics:

1. Scholastic Aptitude Test;
2. Michigan State University Reading Test;
3. Michigan State University Arithmetic Test and Mathematics Test.

D. Instruments used to measure demographic and background characteristics:

1. Student Questionnaire.

The somewhat detailed information for each of these instruments is discussed in the following pages.

A. Intellectual Interest Scale

Four subscales from the Stern Activities Index, namely, Reflectiveness, Humanities-Social Science, Understanding, and Science; the Intellectual Interest Scale developed by Anderson and Western; and the Intellectualism-Pragmatism Scale developed by Yuker and Block were employed to measure the psychological construct of intellectual interest. The composite scale formed from all of the above three scales was named the Academic Interest Scale in order to deter faking responses. Descriptions of each of the three scales are given below.

1. Intellectual Interests Scale of Stern Activities Index.

In developing the Activities Index, Stern (1963a) viewed the college as a system composed of a number of interdependent parts which share, to one degree or another, certain values and characteristics. Furthermore, the college is viewed as a social system in the sense that the

parts involve people--there are individual and group needs to be satisfied. The Scale consists of three hundred items and each subscale has ten items. Stern (1963a) defined intellectual interest which is one aspect of factor three, Intellectual Orientation Dimension, as follows:

> Factor 3. Intellectual Interests. The factors with the highest loadings in this dimension are based on items involving various forms of intellectual activities. These include interests in the arts as well as the sciences, both abstract and empirical. Score sum: Reflectiveness, Humanities-Social Sciences, Understanding, and Science. (P. 14.)

Extensive data for reliability and validity are provided. For the purpose of the present study, four subscales, i.e., Reflectiveness, Humanities-Social Sciences, Understanding and Science, were chosen to make the Intellectual Interest Scale. This scale covers items numbered one through forty on pages 1 and 2 of the Academic Interest Scale in Appendix A. The items are distributed in the Academic Interest Scale as follows: items 1 to 5 and 21 to 25 cover the subscale of Reflectiveness; 6 to 10 and 26 to 30, Understanding; 11 to 15 and 31 to 35, Science; and 16 to 20 and 36 to 40, Humanities-Social Sciences.

The scoring system of the scale was that a score of one was assigned to the response "Blacken space 1--if the item describes an activity or event that you would like, enjoy, or find more pleasant." A score of zero was given to the items having the response "Blacken space 2--if the item describes an activity or event that you would dislike, reject, or find more unpleasant than pleasant." The Scale score was computed by summing raw item scores.

2. Intellectual Interest Scale of Anderson and Western.

Anderson and Western (1966) developed a definition of intellectual interests as a dimension of appreciation and enjoyment of cultural pursuits and an interest in philosophical discussion and discourse. The emphasis of the dimension is based on a liking for, but not necessarily sustained activity in, certain pursuits--hence intellectual interests.

The Scale consists of nine items answered by choosing a category which indicated degree of agreement, or the extent to which a statement is true, resulting in a four-point response key.

Concerning all of the subscales of An Inventory of Students' Attitudes, including the Intellectual Interests Scale, the authors provided the inter-scale correlations found in Table 3.1.

TABLE 3.1.--Inter-Scale Correlations of An Inventory of Students' Attitudes by Anderson and Western

Scale	2	3	4	5	6	7
1 (Intellectual Interest)	-.23	.36	-.49	.15	.15	-.17
2 (Dogmatism)		-.33	.24	-.25	-.05	-.19
3 (Tolerance of Complexity)			-.37	.19	.12	.15
4 (Pragmatism)				-.17	-.11	-.13
5 (Social Liberalism)					.02	.34
6 (Economic Liberalism)						.27
7 (Political Liberalism)						

The Intellectual Interests Scale consists of items numbered 41 through 49 on page 3 of the Academic Interest Scale in Appendix A.

This scale is a nine-item Likert-type scale. "Definitely true" responses were given a weight of 4, "More true than false" was given a weight of 3, "More false than true" was given a weight of 2, and "Definitely untrue" a weight of 1. A scale score is the sum of each of the item scores.

3. Intellectualism-Pragmatism Scale (I-P Scale) of Yuker and Block.

While the instrument, developed by H. E. Yuker and J. R. Block, was originally referred to as The Attitude Toward Intellectualism Scale, the authors renamed it the Intellectualism-Pragmatism Scale (I-P Scale).

They stated their motivation for developing the Scale as follows:

> Although intellectualism is often discussed, there have been comparatively few attempts to develop a measure of intellectual attitudes. Most of us are apparently content to discuss and speculate about these attitudes without operationally defining them, or attempting to empirically determine any of the correlates of intellectualism. The present attitude scale was developed in order to provide an empirical measure of intellectual attitude. (Yuker and Block, 1969, p. 1)

Inspection of items of the Scale, according to the authors, indicates that they all have face validity as measures of intellectual-pragmatic attitudes.

Reliability coefficients, as estimated through the split-half technique corrected using the Spearman-Brown formula with different samples of undergraduate college students, tend consistently toward the mid-eighties with a median of approximately .84. The only evidence of test-retest reliability is available for a group of thirty

undergraduates enrolled in a course in introductory psychology at Hofstra University. The coefficient of reliability when an interval of four months elapsed between test administrations was .84.

Construct validity was used in evaluating the adequacy of the I-P Scale. Only education-related variables have been reported. A correlation coefficient of .56 was found between I-P scores and grade point average for a sample of 120 evening students. Low, but significant, positive correlations were found between I-P scores and scores on the verbal part of the SAT, and between I-P scores and scores on a measure of reading ability.

The I-P Scale consists of items numbered 93 through 121 on page 4 of the Academic Interest Scale in Appendix A.

This scale, a thirty-item Likert-type attitude scale, was developed to measure a continuum of intelectual versus pragmatic attitudes. Some of the statements were worded so that agreement would indicate an intellectual attitude while others were worded so that intellectualism would be reflected by disagreement. This latter type of item included itsms 96, 97, 98, 100, 101, 102, 103, 107, 111, 112, 118, 119 and 122.

Responses contained six categories of agreement and disagreement ranging from +3 to -3. Scoring of the test was accomplished by changing the algebraic sign of the subject's responses to the above fifteen items which are negatively worded. To eliminate negative numbers, a linear

transformation was made by adding 3 to each item. In other words, "Very strongly agree" responses were assigned a weight of 6, "Strongly agree" a weight of 5, "Agree" a weight of 4, "Disagree" a weight of 3, "Strongly disagree" a weight of 2 and "Very strongly disagree" a weight of 1.

The response categories and scoring system of each of the three subscales used to measure the construct of intellectual interest were described earlier. Scores on three separate and independent subscales were obtained to provide a cross-check on their validity. If only one method of measurement is used as a basis for estimating the strength of a trait, there is no check on the validity of the measure relating trait to behavior. When more than one measurement of a trait is used, confidence in the construct and in the methods for measuring it increases when the intercorrelations among the several sets of scores are high. Such results would suggest the various methods of measurement converge on a simple trait.

These are some problems involved in deriving a composite score for the three scales together. This is because the three subscales do not use the same response categories and scoring systems. Since the three subscales have different response categories and scoring systems, several efforts were made to derive the most reasonable composite score. The eleven variables listed below were generated from these efforts. The variables, which are also used in Table 3.2, were named on the basis of the

different subscales and scoring systems used to derive the composite score.

Variable 1: Stern-Reflectiveness based on 2-point scoring system.
Variable 2: Stern-Understanding based on 2-point scoring system.
Variable 3: Stern-Science based on 2-point scoring system.
Variable 4: Stern-Humanities-Social Sciences based on 2-point scoring system.
Variable 5: Stern-Total score based on 2-point scoring system.
Variable 6: Anderson and Western-Total score based on 4-point scoring system.
Variable 7: Yuker and Block-Total score based on 6-point scoring system.
Variable 8: AIS-Total score consisted of summated score of variables 5, 6, and 7.
Variable 9: Anderson and Western-Total score based on 2-point scoring system.
Variable 10: Yuker and Block-Total score based on 2-point scoring system.
Variable 11: AIS-Total score consisted of summated score of variables 5, 9, and 10.

TABLE 3.2.--Intercorrelation Coefficients of Variables Based on the Different Subscales and Different Scoring System of the Intellectual Interests Scale

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1										
2	.32									
3	.20	.52								
4	.31	.16	.03							
5	.62	.76	.72	.55						
6	.43	.28	.08	.56	.48					
7	.30	.23	.09	.29	.33	.46				
8	.50	.46	.30	.50	.65	.69	.91			
9	.40	.29	.06	.54	.46	.93	.44	.66		
10	.32	.26	.10	.30	.35	.50	.86	.83	.49	
11	.61	.66	.52	.59	.89	.70	.64	.88	.70	.74

The correlation coefficients in Table 3.2 led to the development of a rationale for the derivation of a

composite score and also provided the evidence of the convergent validity of the subscales.

Table 3.2 shows that the correlation coefficient of the composite score (variable 11) was .89 with the Stern-Total score, .70 with the Anderson and Western-Total score and .64 with the Yuker and Block-Total score. Even though these scores represented independent efforts to measure the construct of intellectual interest, they were found to agree with one another, as shown by the high inter-correlations among them. It was reasonably certain that they were assessing the same trait with accuracy.

The higher correlation value of variable 11 with the rest of the variables justified the use of a 2-point scaling system for all of the subscales. Furthermore, all of these three subscales were summated rating scales. Items in a summated rating scale or Likert-type scale are considered to be of approximately equal value. Any subset of the universe of items is theoretically the same as any other subset of the universe. This problem is related to the response variance. Because response variance was determined by the number of possible categories, response set should be the same for all items.

B. Michigan State University Student Survey

1. General Self-Concept of Academic Ability.

This scale was developed by W. B. Brookover (1965) for his study of self-concept of ability and achievement of senior high school students. It consists of eight

five-choice items. Items were coded from five to one with the higher self-concept alternatives receiving the higher values. These eight items were originally written to form a Guttman scale and received coefficients of stability of .95 for males and .96 for females in the tenth grade. High correlations of self-concept of ability in subject matter areas with general self-concept of ability supports the validity of the instrument. Although no direct data were provided for either twelfth graders or college freshmen, some of the author's unpublished data suggest that the scale would be valid for use with college freshmen. The scale is shown as Part C (items numbered 43 through 50) of the M.S.U. Student Survey in Appendix B.

2. Trait Self-Ratings of College Freshmen.

This factor analytic scale, developed by J. M. Richards, Jr. (1966), grew out of the American College Survey which was conducted by the American College Testing Program to obtain a more complete description of the typical American college student and the variation among students from college to college. This scale consists of thirty-one self-ratings on common traits for both sexes. Each of the subjects rates himself or herself on each of the thirty-one traits using the four-point response key: "Below Average," "Average," "Above Average," and "Top Ten Percent." Scores from 1 to 4 were assigned to these responses so that a higher score indicates a greater possession of the trait in question. Seven factors were found.

In adapting the scale for this study the three items having the highest loading for each factor were selected. The same number of items made comparing each factor much easier.

The scale has twenty-one items. Correlations among Promax Oblique Factors provided by the author of the scale are found in Table 3.3.

TABLE 3.3.--Correlations among Promax Oblique Factors of Trait Self-Ratings of College Freshmen*

Factor**	A	B	C	D	E	F	G
A		.24	.26	.39	-.11	.51	.03
B	.27		.39	.46	-.12	.26	-.09
C	.44	.21		.52	-.24	.45	-.04
D	.31	.39	.30		-.25	.46	-.13
E	.46	.33	.22	.33		-.23	.19
F	-.03	.09	.08	-.07	-.01		-.02
G	.38	.19	.32	.29	.25	-.01	

*Correlations for males are shown above the diagonal and for females below. Factors are reflected as appropriate.

**A--Physical well-being; B--Scholarship; C--Esthetic-ism; D--Pragmatism; E--Technical-scientific ability; F--Sociability; and G--Sensitivity to others.

The Trait Self-Ratings of College Freshmen scale is shown as Part A (items numbered 1 through 21) of the M.S.U. Student Survey in Appendix B.

3. Life Goals of College Freshmen.

J. M. Richards, Jr. (1966), using a sample of 6,289 male and 6,143 female college freshmen, developed 35 items pertaining to life goals of college freshmen. This scale, like Trait Self-Ratings of College Freshmen, grew

out of the American College Survey project conducted by the American College Testing Program in an attempt to obtain a more complete description of the typical American college student. Each of the thirty-five specific life goal items is rated by the subject on a four-point scale such as "Of little or no importance," "Somewhat important," "Very important," and "Essential for me." Scores from 1 to 4 were assigned to the responses so that a higher score indicates a greater possession of the life goal in question. Seven factors common to both sexes and one unique factor for each sex were found. Common factors are prestige, personal happiness, humanistic-cultural, religious, scientific, artistic and hedonistic. The unique factor for male is athletic and that for female is altruistic. The present edition of the scale includes only the seven factors common to both sexes. For each factor, the three items having the highest factor loading on it were selected.

Intercorrelations of the factors for the sample of the present study are given in the following table (3.4). The data show that these seven factors are substantially independent.

The Life Goals of College Freshmen scale is shown as Part B (items numbered 22 through 42) of the M.S.U. Student Survey in Appendix B.

4. Student Questionnaire.

The original form of the Student Questionnaire was developed by the Office of Evaluation Services, Michigan

TABLE 3.4.--Intercorrelations of the Factors of the Life Goals of College Freshmen for the Present Sample

Factor*	1	2	3	4	5	6	7
1							
2	.07						
3	.29	.14					
4	.22	.25	.20				
5	.16	-.10	.10	.08			
6	.10	.14	.17	.14	.09		
7	.30	.21	-.02	.01	.06	.13	

*1--prestige; 2--personal happiness; 3--humanistic-cultural; 4--religious; 5--scientific; 6--artistic; and 7--hedonistic.

State University. It consisted of sixty items relating to biographical, demographic and background information, and opinions related to current social issues. For the purpose of the present study, several relevant items were chosen. This short-form questionnaire was used to obtain the biographical, demographic and background information about each student in the sample.

The Student Questionnaire is shown as Part D (items numbered 101 through 132) of the M.S.U. Student Survey in Appendix B.

C. Scholastic Aptitude Test

The Scholastic Aptitude Test (SAT) of the College Entrance Examination Board assessed the basic verbal and mathematical abilities a student has acquired. This test, which is generally administered to college-bound students in the senior year of high school, assesses the ability

to reason rather than to remember facts and requires no special preparation. The student receives three scores, Verbal (SAT-V), Mathematical (SAT-M), and Total (SAT-Total). These scores are reported nationally as three-digit standard scores where 500 was initially set as a national college-bound senior average score. Each score can be as high as 800, thereby making 1,600 the maximum possible total score. Test-retest reliability coefficients of .89 for the Verbal scale and .85 for the Mathematical scale are reported. Much validity data have been published.

D. Michigan State University Reading Test

The MSU Reading Test was developed by the Office of Evaluation Services, Michigan State University. The Test was designed to measure a student's ability to comprehend ideas expressed in paragraphs representative of those found in textual materials of various academic areas at MSU. The Test consists of 50 items and is used on a supplementary basis for selecting students for the Preparatory English Program as well as for selection into honors programs.

Reliability of the Test has been estimated on several occasions by the Office of Evaluation Services to be approximately .80. Correlation between the Reading Test and first quarter GPA for the sample in this study was .45 for males and .49 for females.

E. The Michigan State University Arithmetic Test and Mathematics Test

The MSU Arithmetic Test is a forty-item test of elementary arithmetic problems. Scores range from zero to forty. Students are assigned to an "Arithmetic Improvement Service" course when their scores are 24 or lower.

The MSU Mathematics Test is a thirty-item test based upon concepts covered in high school algebra. The scores are used to place students in beginning courses in mathematics. Scores range from zero to thirty.

The composite score which was called the MSU Quantitative score is based upon the seventy-item sum of the Arithmetic and Mathematics scores. This measure is indicative of directly applied quantitative skills and knowledge. It differs from the SAT Mathematics score which emphasizes the power to reason with quantitative concepts.

Criterion

The criterion employed in this study was the cumulative grade point average at the end of the Fall term, 1971. This criterion was assumed to be the best indication of the student's academic standing after completing one term at the University. The Michigan State University grade system is a 10-point scale ranging from zero to 4.5. Each student's numeric grade is multiplied by the number of credit hours in the course for which the grade was given. The sum of the products of numeric grade by credit hours for all of the student's courses is divided by the sum of the credit hours. The quotient is the student's grade point average.

Collection of Data

During the orientation week, September 21-22, 1970, the following instruments were administered to the sample of students in the study at Michigan State University: the Academic Interest Scale and the MSU Student Survey. As pointed out in the "Instrumentation" section above, the Academic Interest Scale contains the Intellectual Interests Scale of Stern (Part 1); the Intellectual Interest Scale of Anderson and Western (Part 2); and the Intellectualism-Pragmatism Scale of Yuker and Block (Part 3). The MSU Student Survey contains several scales, including the Trait Self-Ratings of College Freshmen (Part A); the Life Goals of College Freshmen (Part B); the General Self-Concept of Academic Ability (Part C); and the Student Questionnaire (Part D).

The results of Scholastic Aptitude Test, the MSU Reading Test, the MSU Arithmetic Test, the MSU Mathematics Test, the MSU Quantitative Test and high school grade point average were obtained in December of 1970 with the cooperation of the Office of Evaluation Services, Michigan State University. The college cumulative grade point averages of the subjects which form the criterion of the measurement in the validity part of the study were also made available to the writer through the cooperation of the Office of Evaluation Services.

The Statistical Models

After a review of several possible statistical models the factor analytic method was selected as the most appropriate technique for the purpose of reaching a clear understanding of the structure and pattern of intellectual interest. Factor analysis is a means by which the regularity and order in phenomena can be discerned. It can be applied in order to explore a content area, structure a domain, map unknown concepts, classify or reduce data, test hypotheses, formulate theories, or make inferences. Factor analysis is most familiar to researchers as an exploratory tool for discovering the basic empirical concepts in a field of investigation. Representing patterns of relationship between phenomena, these basic concepts may corroborate the reality of prevailing concepts or may be so new and strange as to defy immediate labeling.

Factor analysis is often used to discover such concepts reflecting unsuspected influences at work in a domain. The delineation of these interrelated phenomena enables generalizations to be made and hypotheses to be posed about the underlying influences bringing about the relationships. The factor analytic technique was supplemented by analysis of variance for several qualitative variables. In the analysis of variance, hypotheses were tested at $\alpha = .01$.

The purpose of the second part of the study was to measure the validity of intellectual interest in the prediction of college success. Several procedures were

employed. Since there is no guarantee that all psychological relationships of either theoretical or applied nature are linear in form, testing for linear and non-linear regression was carried out to answer this question. Also, the relationship between the criterion and the predictive variable was plotted on a scatter diagram and graphically examined for possible departures from linearity.

After testing the regression model, the predictive validity of the construct of intellectual interest in the prediction of college success was assessed. The validity of the intellectual interest scale was also determined. A simple regression equation was also developed with intellectual interest as the predictor and college grade point average as the criterion variable.

The multiple regression technique was also used to determine the ability to predict using several variables simultaneously. For practical prediction situations in college admissions, it is seldom the case that only one item of prior information is known about the individual subject. Usually several tests are given. The admission officer in a college may have college entrance scores, high school achievement test scores, high school grade point average, and a great many other items of information about individual students.

Under such circumstances, it is valuable to know whether information regarding intellectual interest improves the prediction of college success when it is

added to other predictors. For this purpose of determining the incremental validity, the variance-ratio technique was utilized. A detailed description of the statistical models used in the study is presented below.

A. Factor Analytic Method

The principle axis method of factor analysis developed by Hotelling (1935) was used because it gives the smallest number of factors which extract the maximum amount of variance with a mathematically unique solution. Because unities were used in the diagonal of the matrix, all variance, reliable or unreliable, was factored. The results of the factoring method include all variance in the sample with the unreliable variance randomly distributed among factors. The factors do not refer to the population but to the empirically functioning components within the sample. The components describe the source of the variance. The principle axis method gives a unique resolution of the common factors or components for each sample when unities are inserted in the diagonal. Factor loadings define (1) a pattern of relationship and (2) the association of each characteristic with each pattern. In general, for any of the Y variables of equations, we may write:

$$Y = \alpha_1 F_1 + \alpha_2 F_2 + \cdots + \alpha_m F_m \ ,$$

with the F's representing factors and the α's representing loadings. These common factors aid in the interpretation of the construct of intellectual interest because they are based on empirical observation.

The further facilitation of an interpretation was offered by rotation. The purpose of the rotation was to transform the initial factor solution to a "preferred" solution to achieve simple structure, factor invariance, and interpretability. The unrotated factors successively define the most general patterns of relationship in the data. This is not so with the rotated factors. They delineate the distinct clusters of relationships, if such exist. Each solution is correct but psychologically certain solutions are preferred as being more interpretable.

Two objective methods of rotation were available: the Quartimax method of Wrigley and Neuhaus (1954) and the Varimax method of Kaiser (1959). Both methods attempt to achieve simple structure principles based on the following criteria of Thurstone(1947).

1. Each row of the factor matrix should have at least one zero.

2. If there are m common factors, each column of the factor matrix should have at least m zeroes.

3. For every pair of columns of the factor matrix, there should be several whose entries vanish in one column but not in the other.

4. For every pair of columns of the factor matrix, a large proportion of the variables should have vanishing entries in both columns when there are four or more factors.

5. For every pair of columns of the factor matrix, there should be only a small number of variables with non-vanishing entries in both columns.

A simple structure rotation has several characteristics that are of interest here:

1. Each variable is identified with one or a small proportion of the factors.

2. The number of variables loading highly on a factor is minimized.

3. A major ontological assumption underlying the use of simple structure is that, whenever possible, our model of reality should be simplified.

4. A goal of research is to generalize factor results. The unrotated factor solution, however, depends on all the variables.

In comparison to the Quartimax method, which stresses the simplification of each row or variable, the Varimax method places emphasis on the simplification of factors. To quote Harman (1960), "The Varimax method proposed by Kaiser is a modification of the Quartimax method which more nearly approximates simple structure" (p. 304). For this reason, the principle axis and the Varimax methods were employed to identify the structure and pattern of intellectual interest.

B. Simple and Multiple Regression Technique

When we want to predict the relative status of an individual on the criterion variable a regression equation provides the best estimate in terms of minimal squared error.

When Y is the predicted score and X is the known score on the independent variable, it is simple to develop the regression equation for prediction of Y from X. The linear model which was applied in the present study takes the form of:

$$Y_{ij} = \mu_Y + \beta_{y \cdot x} (X_j - u_X) + e_{ij} ,$$

where

$$\beta_{y \cdot x} = \rho_{xy} \frac{\sigma y}{\sigma x}$$

which is called the simple regression coefficient of Y on X. This model has the following basic assumptions:

1. Within each population j, the distribution of Y_{ij} values is normal;
2. Within each population j, the variance σ_e^2 is the same; and
3. The errors e_{ij} are completely independent.

Given a random sample, the value of the sample regression coefficient b_{yx} is our best available estimate of $\beta_{y \cdot x}$, the population regression coefficient. Moreover, the best estimate of $\beta_{y \cdot x}$ (μ_x) is given by b_{yx} (M_x). Our best estimate of μ_y is simply M_y.

Furthermore, it is important to be able to predict the value of Y given the combination of several variables considered simultaneously.

In general, in K-variable problems, the squared value of the multiple correlation coefficient turns out to be:

$$R^2 \, 1.2 \cdots K = (b_{12.3 \cdots K}) \, r_{12} + \cdots + (b_{iK. \, \cdots \, K-1}) \, r_{1K} ,$$

where $R_{1.2 \, \cdots \, K}$ denotes the correlation between a weighted combination of independent variables and the criterion variable. The squared multiple correlation coefficient indicates the proportion of variance in the criterion variable Y accounted for by the set of K predictor variables. Also,

the hypothesis about the multiple regression equation was tested to see if the addition of intellectual interest score really increased the value of R^2.

C. The Variance-ratio Test

The variance-ratio test was used to test the increment in the criterion variance when the intellectual interest score was added to the other predictor variables. The test for significance was suggested by Baggaley (1962). The ratio is given by:

$$F = \frac{(R_+^2 - R^2)\ (N - m - 2)}{1 - R_+^2},$$

where R is the multiple correlation involving m predictors and R_+ is the multiple correlation involving m + 1 predictors. The quotient should be referred to an F table with d.f. = 1 for the "greater mean square" and d.f. = N - m - 2 for the "lesser mean square."

Statistical Hypotheses

In order to make the statistical tests of significance, the following testable null hypotheses were formulated from the previously stated purposes of the study and substantive hypotheses.

Hypothesis 1: There is no difference in intellectual interest, as measured by the Academic Interest Scale, between males and females and among:

a. Students majoring in different curricula;

b. Students who lived a major portion of their lives on a farm, in a village, town, small city, or large city;

c. Students who were in different sized high school graduating classes;

d. Students whose fathers and/or mothers completed grade school, high school, college, graduate or professional school;

e. Students who plan to receive one, two, three or four years of college education and those who plan to attend graduate or professional school;

f. Students whose fathers are executives, business owners, white-collar workers, skilled craftsmen, semi-skilled workers, low or unskilled laborers, farm owners, public service workers, or professional personnel (doctor, lawyer, dentist, and so forth).

Hypothesis 2: There is no relationship between intellectual interest and aptitude scores on the Scholastic Aptitude Test and Michigan State University Reading Test, MSU Arithmetic Test, MSU Mathematics Test and MSU Quantitative Test.

Hypothesis 3: There is no relationship between intellectual interest and the following seven factors of trait self-ratings measured by the Trait Self-Ratings of College Freshmen:

a. Trait--Physical well-being;

b. Trait--Scholarship;

c. Trait--Estheticism;

d. Trait--Pragmatism;

e. Trait--Technical-scientific;

f. Trait--Sociability; and

g. Trait--Sensitivity to others.

Hypothesis 4: There is no relationship between intellectual interest and the following seven factors of life goals of college freshmen measured by the Life Goals of College Freshmen:

a. Life goal--Prestige;

b. Life goal--Personal happiness;

c. Life goal--Humanistic-cultural;

d. Life goal--Religious;

e. Life goal--Scientific;

f. Life goal--Artistic; and

g. Life goal--Hedonistic.

Hypothesis 5: There is no relationship between intellectual interest and general self-concept of academic ability measured by the General Self-Concept of Academic Ability.

Hypothesis 6: The use of a linear model to predict the MSU grade point average with the predictor of intellectual interest does not explain any variance in the criterion variable.

Hypothesis 7: The validity coefficient of intellectual interest in the prediction of college success, based on the nonlinear model, is not statistically significant.

Hypothesis 8: The coefficient of the predictive validity of intellectual interest with MSU grade point average as a criterion variable does not differ whether it is based on the linear model or on the nonlinear model.

Hypothesis 9: The intellectual interest score does not improve prediction of the cumulative college grade point average when it is added to either of the following:

a. Scholastic Aptitude Test;

b. High school grade point average;

c. SAT-Total plus high school GPA;

d. General Self-Concept of Academic Ability;

e. General Self-Concept of Academic Ability plus self-reported high school GPA.

Summary of the Chapter

The population under study consisted of all freshmen who entered Michigan State University Fall term, 1970. However, students with one or more of the following characteristics were excluded from the population: foreign students, transfer students, lack of complete data, and students who dropped out before the end of Fall term, 1970.

From this restricted population, 643 students were randomly selected.

The Academic Interest Scale and MSU Student Survey were given to the sample students during the orientation week, September 21-22, 1970.

The Academic Interest Scale included the Intellectual Interest Scale of Stern (Part 1); the Intellectual Interest Scale of Anderson and Western (Part 2); and the Intellectualism-Pragmatism Scale of Yuker and Block (Part 3). The MSU Student Survey contained several scales, including the Trait Self-Ratings of College Freshmen (Part A); the Life Goals of College Freshmen (Part B); the General Self-Concept of Academic Ability (Part C); and the Student Questionnaire (Part D).

Other data, including score on the Scholastic Aptitude Test, MSU Reading Test, MSU Arithmetic Test, MSU Mathematics Test, MSU Quantitative Test, high school grade point average, and MSU grade point average were obtained with the cooperation of the Office of Evaluation Services, Michigan State University.

The criterion for measuring the predictive validity of intellectual interest was the cumulative college grade point average subjects obtained at the end of the Fall term, 1970.

Ten testable statistical null hypotheses were formulated from the purposes of the study and substantive hypotheses in Chapter I.

As one of the major statistics used in the study, the principle axis method of factor analysis with the Varimax rotation was employed to identify the structure and pattern of intellectual interest. For the purpose of measuring the validity of intellectual interest in the prediction of college success, several procedures were used. They involved testing for linear and nonlinear regression, plotting the distributions on a scatter-diagram and simple and multiple regression techniques. The variance-ratio technique was used to test whether the variable "intellectual interest" improves in accuracy of predicting grade point average when it is added to the most readily available predictors.

Chapter IV will deal with the results from analysis of the data.

CHAPTER IV

ANALYSIS OF THE DATA

This chapter presents the analysis of the data and the results relating to the main purposes of the study. The main purposes of the study were, as stated in Chapter I, to determine the identity and structure of intellectual interest and, secondly, to test its validity in the prediction of college success in higher education.

Parallel with these purposes, the analysis of data is presented in three sections: Section 1 presents the results of factor analysis and the resulting identity and pattern of the construct of intellectual interest. Section 2 deals with tests of relationship between intellectual interest as a predictor and the criterion of college success. Data in regard to validity and reliability are also presented in Section 2.

Finally, Section 3 deals with the incremental validity. It indicates whether the test of intellectual interest improves the predictability of college success when it is added to other predictors such as results of a scholastic aptitude test, self-concept of academic ability and actual and self-reported high school grade point average.

Section 1: The Results of Factor Analysis and Analysis of Variance

Thirty different variables were employed to test the statistical hypotheses 1 through 5. The main technique used was factor analysis. In addition, the analysis of variance method was also utilized in testing hypotheses related to the qualitative variables. In this section, first, null hypotheses which were tested are listed; second, a description of variables used in the factorial analytic procedure is presented and, finally, results of the factorial analysis are reported, including an interpretation of factored dimensions. Results of the analysis of variance are also presented in this section.

A. Hypotheses Tested

Hypothesis 1: There is no difference in intellectual interest, as measured by the Academic Interest Scale, between males and females and among:

a. Students majoring in different curricula;

b. Students who lived a major portion of their lives on a farm, in a village, town, small city, or large city;

c. Students who were in different sized high school graduating classes;

d. Students whose fathers and/or mothers completed grade school, high school, college, graduate or professional school;

e. Students who plan to receive one, two, three or four years of college education and those who plan to attend graduate or professional school;

f. Students whose fathers are executives, business owners, white-collar workers, skilled craftsmen, semi-skilled workers, low or unskilled laborers, farm owners, public service workers, or professional personnel (doctor, lawyer, dentist, and so forth).

Hypothesis 2: There is no relationship between intellectual interest and aptitude scores on the Scholastic Aptitude Test and Michigan State University Reading Test, MSU Arithmetic Test, MSU Mathematics Test and MSU Quantitative Test.

Hypothesis 3: There is no relationship between intellectual interest and the following seven factors of trait self-ratings measured by the Trait Self-Ratings of College Freshmen:

a. Trait--Physical well-being;

b. Trait--Scholarship;

c. Trait--Estheticism;

d. Trait--Pragmatism;

e. Trait--Technical-scientific;

f. Trait--Sociability; and

g. Trait--Sensitivity to others.

Hypothesis 4: There is no relationship between intellectual interest and the following seven factors of life goals of college freshmen measured by the Life Goals of College Freshmen:

a. Life goal--Prestige;

b. Life goal--Personal happiness;

c. Life goal--Humanistic-cultural;

d. Life goal--Religious;

e. Life goal--Scientific;

f. Life goal--Artistic; and

g. Life goal--Hedonistic.

Hypothesis 5: There is no relationship between intellectual interest and general self-concept of academic ability measured by the General Self-Concept of Academic Ability.

B. Desctiption of Variables Used in the Factor Analysis Procedure

Thirty variables relating to cognitive, affective, demographic and background characteristics were collected and used to identify the pattern and structure of the intellectual interest trait. The content of each variable is presented below.

Variable 1: Intellectual Interest
The summated score of 79 items in three subscales of the Academic Interest Scale scored on the basis of a 2-point scaling system, as discussed in Chapter III. The score distribution is shown in Appendix C.

Variable 2: Trait Self-Rating--Physical well-being
The content of this variable consisted of item 1 (Athletic ability), item 8 (Physical energy) and item 15 (Physical health) of Trait Self-Ratings of College Freshmen (TSCF), Part A of the MSU Student Survey.

Variable 3: Trait Self-Rating--Scholarship
The content of this variable consisted of items 2 (Mathematical ability), 9 (Scholarship) and 16 (Intellectual self-confidence) of the TSCF.

Variable 4: Trait Self-Rating--Estheticism
The content of this variable consisted of items 3 (Originality), 10 (Artistic ability) and 17 (Expressiveness) of the TSCF.

Variable 5: Trait Self-Rating--Pragmatism
The content of this variable consisted of items 4 (Self-control), 11 (Independence) and 18 (Practical mindedness) of the TSCF.

Variable 6: Trait Self-Rating--Technical-scientific ability
The content of this variable consisted of items 5 (Mechanical ability), 12 (Scientific ability) and 19 (Research ability) of the TSCF.

Variable 7: Trait Self-Rating--Sociability
The content of this variable consisted of items 6 (Leadership), 13 (Sociability) and 20 (Cheerfulness) of the TSCF.

Variable 8: Trait Self-Rating--Sensitivity to others
The content of this variable consisted of items 7 (Understanding of others), 14 (Sensitivity to the needs of others) and 21 (Sense of humor) of the TSCF.

Variable 9: Life Goal--Prestige
The content of this variable consisted of items 22 (Becoming a community leader), 29 (Becoming influential in public affairs) and 36 (Obtaining awards or recognition) of the Life Goals of College Freshmen (LGCF), Part B of MSU Student Survey.

Variable 10: Life Goal--Personal happiness
The content of this variable consisted of items 23 (Becoming happy and content), 30 (Becoming a mature and well-adjusted person) and 37 (Becoming a good husband and wife) of the LGCF.

Variable 11: Life Goal--Humanistic-cultural
The content of this variable consisted of items 24 (Developing a meaningful philosophy of life), 31 (Writing good fiction) and 38 (Keeping up to date with political affairs) of the LGCF.

Variable 12: Life Goal--Religious
The content of this variable consisted of items 25 (Making sacrifice for the sake of the happiness of others), 32 (Following a formal religious code) and 39 (Being active in religious affairs) of the LGCF.

Variable 13: Life Goal--Scientific
The content of this variable consisted of items 26 (Inventing or developing a useful product or device), 33 (Making a theoretical contribution to science) and 40 (Making a technical contribution to science) of the LGCF.

Variable 14: Life Goal--Artistic
The content of this variable consisted of items 27 (Becoming accomplished in one of the performing arts), 34 (Producing good artistic work) and 41 (Becoming an accomplished musician) of the LGCF.

Variable 15: Life Goal--Hedonistic
The content of this variable consisted of items 28 (Becoming well-off financially), 35 (Having the time and means to relax and enjoy life) and 42 (Avoiding hard work) of the LGCF.

Variable 16: General self-concept of academic ability
The content of this variable consisted of eight items describing different self-concepts of ability and achievement.

Variable 17: Sex
Male was assigned a score weight of zero and female a score weight of one.

Variable 18: Community lived
Ten categories were in order of urban to rural area. A weight of zero was given to "Suburb of a metropolitan area of more than one million population," 1 to "Suburb of metropolitan area of 100,000 to 999,999," 2 to "Suburb of metropolitan area of 25,000 to 99,999," 3 to "In a city (not a suburb) of more than one million," 4 to "In a city (not a suburb) of 100,000 to 999,999," 5 to "In a city (not a suburb) of 25,000 to 99,999," 6 to "In a city of 10,000 to 24,999," 7 to "In a town of 2,500 to 9.999," 8 to "In a village of 250 to 2,499," and 9 to "In a farming or rural community."

Variable 19: Father's educational level
Ten categories were made in the order from lower to higher educational level. A score weight of zero was given to "Attended grade school," 1 to "Completed 8th grade," 2 to "Attended high school," 3 to "Graduated from high school," 4 to "Technical or business school beyond high school," 5 to "Attended college but did not graduate," 6 to "Graduated from college," 7 to "Some education beyond Bachelor's degree but did not earn another degree," 8 to "Earned a Master's degree," and 9 to "Earned a graduate or professional degree beyond the Master's level.

Variable 20: Mother's educational level
Ten categories which are exactly the same as for Variable 19.

Variable 21: High school size
High school size was classified into five categories ranging from small to big size and scored from zero to 4 in that order.

Variable 22: Self-reported high school GPA
The subject was asked to respond in terms of nine categories ranging from A^+ through C^- or lower.

Variable 23: MSU Reading Test.

Variable 24: MSU Arithmetic Test.

Variable 25: MSU Mathematics Test.

Variable 26: MSU Arithmetic Test plus Mathematics Test.

Variable 27: Scholastic Aptitude Test--Verbal.

Variable 28: Scholastic Aptitude Test--Mathematics.

Variable 29: Scholastic Aptitude Test--Total.

Variable 30: Actual high school grade point average.

Mean scores and standard deviation for each of these thirty variables are shown in Table 4.1.

TABLE 4.1.--Mean Score and Standard Deviation of Each of the 30 Variables Used in the Factorial Analysis

Variable Number	Mean Score	Standard Deviation	Variable Number	Mean Score	Standard Deviation
1	48.36	10.41	16	31.76	3.57
2	7.44	1.90	17	.51	.50
3	7.61	1.88	18	3.93	3.03
4	6.82	1.74	19	4.46	2.35
5	8.17	1.62	20	3.91	1.75
6	6.61	1.71	21	2.80	1.14
7	7.60	1.76	22	2.90	1.40
8	8.39	1.71	23	33.47	7.15
9	5.43	1.79	24	34.46	4.39
10	10.38	1.56	25	18.19	7.02
11	7.16	1.59	26	52.65	10.59
12	6.30	1.95	27	517.94	114.32
13	4.57	1.95	28	556.32	121.34
14	4.69	1.92	29	1073.28	217.85
15	6.69	1.61	30	3.25	.39

C. Dimensions Identified through Factor Analysis

The intercorrelations of the 30 variables described above are presented in Appendix D. Principle axis components were extracted from the intercorrelation matrix of these 30 variables and factored into 30 dimensions. The principle axis method extracts as many factors as variables entered in the matrix. So, it provided 30 unrotated factors. These unrotated 30 factors with rounded loadings for the 30 variables are presented in Appendix E.

The factor eigenvalues are shown in Table 4.2.

TABLE 4.2.--Eigenvalues of 30 Factors Extracted through Principle Axis Method

Factor Number	Eigenvalue	Factor Number	Eigenvalue
1	6.9137	16	.5874
2	3.1134	17	.5529
3	1.9486	18	.5324
4	1.8248	19	.4961
5	1.5425	20	.4888
6	1.3256	21	.4403
7	1.2393	22	.4091
8	1.1725	23	.3994
9	1.0527	24	.3889
10	.9559	25	.3238
11	.7980	26	.2763
12	.7499	27	.2148
13	.7241	28	.1521
14	.6958	29	.0081
15	.6730	30	.0000

Ten of the unrotated factors were of acceptable magnitude with eigenvalues which exceeded .9559. Usually, an eigenvalue greater than 1.00 is assumed to be acceptable. According to Table 4.2, factor 10 was short of factor 9 by

.0968 and greater than factor 11 by .1579. In other words, factor 10 had a negligible difference with factor 9 which exceeded 1.00 in terms of the eigenvalue and a significant difference from factor 11. So, ten factors were included in a Varimax procedure.

The ten factors were ranked in terms of their eigenvalues and then rotated; first, the two largest at a time, then, the three largest, four largest and so on until all ten were rotated.

The 30 variables with loadings on the ten accepted factors are shown in Table 4.3 and the 30 variables with loadings above .50 on the ten factors are shown in Table 4.4.

As noted in Tables 4.3 and 4.4, factor 10 has high loadings on the intellectual interest variable. The interpretation of factor 10 is directly involved with the testing of hypotheses which were listed in Part A of this chapter. However, for convenience of presentation, the labeling and interpretation of the other 9 factors will precede the testing of the hypotheses.

Each of the individual factors, variable number, content and loadings exceeding .50 are tabled as a means of interpretation.

Factor 1: Scholastic aptitude

The content of "Factors" was concerned primarily with scholastic aptitude per se as well as self-rating and

TABLE 4.3.-- Varimax Rotation Analysis - Rotated 10 Factors with Rounded Loadings for the 30 Variables.

Factor No.	1	2	3	4	5	6	7	8
Variable No.								
1 (Intellectual Interest)	198	-008	-115	058	237	-064	113	-227
2 (T-Physical Well-being)	-096	-596	059	139	-141	069	-108	-205
3 (T-Scholarship)	581	-340	-324	-005	087	-120	050	-296
4 (T-Estheticism)	031	-342	-079	047	666	-046	081	-102
5 (T-Pragmatism)	196	-641	155	-085	241	-024	067	-115
6 (T-Technical-Scientific)	303	-268	-073	032	134	-034	100	-684
7 (T-Sociability)	-137	-704	-161	078	003	-120	-083	046
8 (T-Sensitivity to Others)	-010	-712	-003	-015	135	-088	-149	147
9 (LG-Prestige)	-081	-172	-084	004	-099	086	-128	-139
10 (LG-Personal Happiness)	013	-229	012	038	226	-085	-657	238
11 (LG-Humanistic-Cultural)	023	-131	025	-014	093	075	-197	-006
12 (LG-Religious)	-041	-062	-036	-083	-028	036	-769	-099
13 (LG-Scientific)	095	095	042	-064	093	-056	-009	-789
14 (LG-Artistic)	-145	025	-012	014	778	022	-221	-121
15 (LG-Hedonistic)	-102	-019	022	-069	187	-059	-042	051
16 (Self-Concept of Ability)	524	-328	-380	057	101	-003	122	-204
17 (Sex)	-330	099	-423	026	216	-138	-234	226
18 (Community Lived)	-018	053	-054	024	-077	802	-048	029
19 (Father's Ed. Level)	128	-065	034	832	043	-073	043	047
20 (Mother's Ed. Level)	098	-004	-013	851	018	-016	019	-014
21 (High School Size)	049	-091	019	119	-054	-798	-080	-028
22 (Self-Reported HS GPA)	416	-023	-762	-069	072	148	024	-020
23 (MSU Reading Test)	680	040	-141	068	144	-061	218	158
24 (MSU Arithmatic Test)	796	-047	-085	030	-160	041	-060	-185
25 (MSU Mathematic Test)	780	051	-171	038	-220	-055	-160	-303
26 (MSU Arith. & Math. Test)	847	014	-149	038	-212	-019	-131	-278
27 (SAT-V)	771	070	-083	106	241	-046	193	182
28 (SAT-M)	897	056	-021	079	-058	005	-007	-073
29 (SAT-Total)	917	068	-049	101	096	-020	088	053
30 (High School GPA)	471	051	-747	006	-043	060	-038	-026

* All decimal points are omitted.

TABLE 4.3.--Varimax Rotation Analysis - Rotated 10 Factors with Rounded Loadings for the 30 Variables (continued).

Variable No.	9	10	Communality
1	257	600	607
2	-048	-170	498
3	-044	011	674
4	011	189	627
5	062	-030	563
6	105	-024	679
7	-137	172	619
8	-010	195	616
9	-646	448	714
10	-135	-097	629
11	-068	768	665
12	015	223	667
13	-119	174	705
14	-103	065	707
15	-824	-196	777
16	-109	205	652
17	507	029	680
18	-002	-040	662
19	021	005	728
20	038	014	738
21	-011	-101	683
22	-025	001	789
23	056	208	633
24	031	-103	722
25	-031	-104	823
26	-007	-112	895
27	136	227	819
28	019	-021	825
29	075	104	895
30	038	033	795

* All decimal points are omitted.

TABLE 4.4.-- Varimax Rotated 30 Variables Loading above .50 on 10 Factors Which Provided the Factor Interpretations.

Factor No.	1	2	3	4	5	6	7	8	9	10
Variable No.										
1										5995
2		-5960								
3	5815									
4					6669					
5		-6411								
6								-6842		
7		-7041								
8		-7122								
9									-6458	
10							-6570			
11										7675
12							-7690			
13								-7899		
14					7780					
15									-8237	
16	5242									
17									5072	
18						8025				
19				8328						
20				8517						
21						-7984				
22			-7624							
23	6797									
24	7963									
25	7799									
26	8474									
27	7710									
28	8975									
29	9172									
30			-7471							

* All decimal points are omitted.

self-concept about scholastic aptitude. It is labeled "Scholastic aptitude."

TABLE 4.5.--Variable Content of Factor 1--Scholastic Aptitude

Variable Number	Content	Loading
3	Mathematical ability Scholarship Intellectual self-confidence	.5815
16	Value of self-concept of ability and achievement	.5242
23	MSU Reading Test	.6797
24	MSU Arithmetic Test	.7963
25	MSU Mathematics Test	.7799
26	MSU Qualitative Test	.8474
27	SAT--Verbal	.7710
28	SAT--Mathematics	.8975
29	SAT--Total	.9172

Factor 2: Social sensitivity

Sociability and sensitive interaction with others are interpreted as the major components. Physical and practical self-control had somewhat low negative loadings. The name "Social sensitivity" is given to this factor.

Factor 3: High school achievement

Factor 3 was strongly related to high school grade point average expressed either in the form of self-report

TABLE 4.6.--Variable Content of Factor 2--Social Sensitivity

Variable Number	Content	Loading
2	Athletic ability Physical energy Physical health	-.5960
5	Self-control Independence Practical mindedness	-.6411
7	Leadership Sociability Cheerfulness	.7041
8	Understanding of others Sensitivity to the needs of others Sense of humor	.7122

TABLE 4.7.--Variable Content of Factor 3--High School Achievement

Variable Number	Content	Loading
22	Self-reported high school GPA	-.7624
30	Actual high school GPA	-.7471

or that reported directly by transcripts to the registrar. The factor is called "High school achievement."

Factor 4: Parents' educational level

Level of education completed by father and mother have high loadings on factor 4; thus, it is called "Parents' educational level."

TABLE 4.8.--Variable Content of Factor 4--Parents' Educational Level

Variable Number	Content	Loading
19	Father's educational level	.8328
20	Mother's educational level	.8517

Factor 5: Aesthetic

Throughout the six items of the variables, there is an aesthetic element running through each. This is true regardless of whether the individual conceives of himself as "expressive" or as a musical performer. This factor is labeled "Aesthetic."

TABLE 4.9.--Variable Content of Factor 5--Aesthetic

Variable Number	Content	Loading
4	Originality Artistic ability Expressiveness	.6669
14	Becoming accomplished in one of the performing arts Producing good artistic work Becoming an accomplished musician	.7780

Factor 6: Community size

Community and high school size characterize factor 6. Community size is described in descending order of large to small and high school size is described in the opposite order. The positive direction of community size and the

negative direction of high school size actually go in the same direction. Factor 6 is called "Community size."

TABLE 4.10.--Variable Content of Factor 6--Community Size

Variable Number	Content	Loading
18	Community size	.8025
21	High school size	-.7984

Factor 7: Conforming-religious

Religious confirmity is the major characteristic. A traditional outlook of happiness and adjustment has somewhat lower loadings on this factor. This factor is labeled "Conforming-religious."

TABLE 4.11.--Variable Content of Factor 7--Conforming-Religious

Variable Number	Content	Loading
10	Becoming happy and content Becoming a mature and well-adjusted person Becoming a good husband and wife	-.6570
12	Making sacrifices for the sake of the happiness of others Following a formal religious code Being active in religious affairs	-.7690

Factor 8: Scientific

The major loadings of mechanical and scientific nature led to naming of factor 8 as "Scientific."

TABLE 4.12.--Variable Content of Factor 8--Scientific

Variable Number	Content	Loading
6	Mechanical ability Scientific ability Research ability	-.6842
13	Inventing or developing a useful product or device Making a theoretical contribution to science Making a technical contribution to science	-.7899

Factor 9: Social hedonism

Hedonistic context was the largest loading and masculine attitude toward social affairs had the next high loading on factors. Thus, it is called "Social hedonism."

TABLE 4.13.--Variable Content of Factor 9--Social Hedonism

Variable Number	Content	Loading
9	Becoming a community leader Becoming influential in public affairs Obtaining awards or recognition	-.6458
15	Becoming well-off financially Having the time and means to relax and enjoy life Avoiding hard work	-.8237
17	Male was assigned a score weight of zero and female a score weight of one	.5072

D. The Hypotheses Testing and Definition of the Construct of Intellectual Interest

In this section the testing of various hypotheses generated for this study is discussed in greater detail and factor 10 is described.

First and foremost, the variable number, name and loadings on factor 10 are presented in Table 4.14.

TABLE 4.14.--Variable Content of Factor 10--Intellectual Interest

Variable Number	Content	Loading
1	Intellectual interest	.5995
11	Life goal--Humanistic-cultural	.7675

As Tables 4.3, 4.4, and 4.14 indicate, the result of factor analysis failed to reject Hypothesis 1(b), (c) and (d) and it was concluded that there was no difference in intellectual interest between males and females, community size, high school size and parents' educational level.

Hypothesis 2 was also not rejected since it was found that there was no relationship between intellectual interest and the five different aptitude measures used in this study.

Hypothesis 3 was not rejected, i.e., it can be concluded that there was no relationship between intellectual interest and each of seven factors of trait self-ratings.

All subsets of Hypothesis 4 except (c) were not rejected and it was concluded that there was no relationship between intellectual interest and these six factors

of life goals of college freshmen, namely, prestige, personal happiness, religious, scientific, artistic and hedonistic.

Again, Hypothesis 5 was not rejected and it was concluded that there was no relationship between intellectual interest and general self-concept of ability.

Finally, Hypothesis 4(c) was the only one which was rejected and it was concluded that not only was there a relationship between intellectual interest and "Life goal--Humanistic-cultural," but that both of these constructs are expressions of the same trait and, furthermore, they make up a single psychological construct.

The factor analysis indicated that variable 1 (intellectual interest) and variable 11 (Life goal--Humanistic-cultural) measure the same construct and they make up one common factor. Therefore, a detailed content of each of these variables is paramount in understanding the nature and identity of the factor. In effect, the understanding of that factor, which is the tenth factor of our factor analytic procedure, relates to the first purpose of the study which was aimed at investigating the identify and structure of the construct of intellectual interest.

A somewhat detailed description of the content of these two variables is given below.

As explained in Chapter III, this study employed three subscales to measure the construct of intellectual interest. Each of the subscales was developed by a

different author. Also, these three subscales were assumed to be based on a similar or very congruent operational definition of the construct. In addition, it has value to note that these three subscales evidenced the convergent validity by showing considerably high intercorrelations.

A summary of the operational definition drawn by each of the subscales and the content of variable 11 are shown below.

1. Stern's Intellectual Interest Scale

This scale is a subscale of Stern Activities Index and consists of items involving various forms of intellectual activities. These activities are based upon interests in the arts as well as the sciences, both abstract and empirical.

2. Anderson and Western's Intellectual Interest Scale

Intellectual interest is defined as a dimension of appreciation and enjoyment of cultural pursuits, and an interest in philosophical discussion and discourse. According to the authors, there are three aspects to the "Involvement in Intellectual Activity" complex of items of the scale.

The first concerns interest in research and intellectual and academic matters. The second implies an interest in social and epistemological matters. The third concerns itself with philosophical and cultural pursuits. In other words, "Involvement in Intellectual Activity" as assessed by this scale describes the extent to which individuals

enjoy intellectual enquiry and have philosophical and cultural pursuits (Anderson and Western, 1966; p. 8).

3. Yuker and Block's I-P Scale

An intellectualism-pragmatism dichotomy was used not only in the item content but also in the definitions of intellectualism and pragmatism. Since, according to the authors, a pragmatic attitude is essentially anti-intellectual, intellectual attitude is, in turn, anti-pragmatic.

4. Variable 11: Life goal--Humanistic-cultural

Variable 11 consisted of the following items of the MSU Student Survey: item 24--"Developing a meaningful philosophy of life;" item 31--"Writing good fiction;" and item 38--"Keeping up to date with political affairs."

A critical examination of these operational definitions and the content of "Humanistic-cultural life goal" reveals three essential aspects to the construct of intellectual interest:

The first aspect implies an appreciation and enjoyment of cultural pursuits, the second concerns academic and philosophical enquiry, and the third aspect concerns anti-pragmatic interests in the arts as well as in science, both abstract and empirical.

As indicated above, three hypotheses related to the qualitative variables were tested with the application of analysis of variance technique. They were hypotheses 1(a), 1(e) and 1(f).

Hypothesis 1(a) stated:

> There is no difference in intellectual interest, as measured by the Academic Interest Scale, among students majoring in different curricula.

Mean and standard deviation of intellectual interest test score on ten categories of different major fields are presented in Table 4.15, and the result of analysis of variance is shown in Table 4.16.

TABLE 4.15.--Mean Score and Standard Deviation of Intellectual Interest Test Score on Ten Categories of Major Fields

Major Fields	Mean	Standard Deviation
1. Agriculture or Natural Resources	42.15	13.79
2. Arts and Letters	50.14	8.44
3. Business	41.50	8.87
4. Communication Arts	49.70	8.68
5. Education	47.07	9.41
6. Home Economics	40.68	9.23
7. Science or Engineering	50.39	10.40
8. Social Science	49.79	9.87
9. Veterinary or Human Medicine	51.18	9.43
10. No idea what my major field will be	47.97	10.49

TABLE 4.16.--Analysis of Variance of the Variable of "Major Field" with the Dependent Variable of "Intellectual Interest" Score

	SS	d.f.	MS	F
Major Field (Between categories)	6,287	9	698.56	7.24*
Error (Within categories)	61,324	633	96.42	
Totals	67,324	642		

*Significant at $\alpha = .01$.

The test rejected the null hypothesis at the .01 level of significance, and it was concluded that there are overall differences of intellectual interest scores among students majoring in different curricula. Major field was classified into ten categories.

Hypothesis 1(e) is stated as follows:

> There is no difference in intellectual interest, as measured by the Academic Interest Scale, among students who plan to receive one, two, three or four years of college education and those who plan to attend graduate or professional school.

Mean and standard deviation of intellectual interest test scores on six different categories of educational expectation are presented in Table 4.17 and the result of analysis of variance is shown in Table 4.18.

TABLE 4.17.--Mean Score and Standard Deviation of Intellectual Interest Test Score on Six Categories of Educational Expectation

Educational Expectation	Mean	Standard Deviation
1. A year of college	47.00	14.25
2. Two years of college	48.42	6.10
3. Three years of college	48.40	15.50
4. Four years of college	45.56	9.68
5. Master's degree	49.80	9.57
6. Graduate or professional work	51.96	9.97

TABLE 4.18.--Analysis of Variance of the Variable of "Educational Expectation" with the Dependent Variable of "Intellectual Interest" Score

	SS	d.f.	MS	F
Educational Expectation (Between categories)	5,613	5	1,122.71	11.58*
Error (Within categories)	61,710	637	96.87	
Totals	67,324	642		

*Significant at $\alpha = .01$.

The F-value of the test statistic rejected the null hypothesis at the $\alpha = .01$ level of significance, and it was concluded that there are statistically significant differences of intellectual interest scores among the students with different educational expectation.

Hypothesis 1(f) is stated as follows:

> There is no difference in intellectual interest, as measured by the Academic Interest Scale, among students whose fathers are executives, business owners, white-collar workers, skilled craftsmen, semi-skilled workers, low or unskilled laborers, farm owners, public service workers, or professional personnel (doctor, lawyer, dentist, and so forth).

Mean and standard deviation of intellectual interest test scores on nine categories of fathers' occupations are presented in Table 4.19 and the result of analysis of variance is shown in Table 4.20.

TABLE 4.19.--Mean Score and Standard Deviation of Intellectual Interest Test Score on Nine Categories of Father's Occupation

Father's Occupation	Mean	Standard Deviation
1. Semi-skilled worker	45.32	9.90
2. Skilled worker	48.51	9.61
3. Farm owner or operator	44.26	11.71
4. Small business proprietor	47.69	10.82
5. Skilled clerical worker	45.86	9.90
6. Public service employee	51.70	9.42
7. Executive or managerial	49.35	10.37
8. Professional	49.27	9.77
9. Deceased, retired	51.23	9.23

TABLE 4.20.--Analysis of Variance of the Variable of Father's Occupation with the Dependent Variable of Intellectual Interest Score

	SS	d.f.	MS	F
Father's Occupation (Between Categories)	2,438	8	304.86	2.97*
Error (Within Categories)	54,885	634	102.86	
Totals	57.323	642		

*Significant at $\alpha = .01$.

The test rejected the null hypothesis at the .01 level of significance and it was concluded that there are statistically significant differences of intellectual interest according to the different levels of father's occupation. For the test, the variable of father's occupation was classified into nine categories.

Section 2: Reliability, Validity, and Regression Model

This section presents the results of hypothesis testing concerning the validity of intellectual interest in the prediction of college success. The reliability of the scale used to measure the trait and the testing of the regression model are also discussed.

Specifically, Hypothesis 6 is related to the validity of intellectual interest as a predictor of college grade point average. While Hypothesis 6 is based on the linear model, Hypothesis 7 is based on the curvilinear model--although both of them concern predictive validity. Testing of the appropriateness of either the linear or the curvilinear regression model is dealt with in Hypothesis 8.

Yet, before making these hypotheses testings, it seems to be worthwhile to present information on the reliability of the composite scale used to measure the construct of intellectual interest.

As indicated by Mehrens and Lehmann (1969, pp. 40-41), how reliable a test should be in order for it to be useful cannot be answered in a simple manner. It depends upon the purposes for which the test is to be used. If it is to be used to help make decisions about individuals, then it should be more reliable than if it is to be used to make decisions about groups of people. Although there is no universal agreement, it is generally accepted that tests used to assist in making decisions about individuals should

have reliability coefficients of at least .80. For group decisions, a reliability coefficient of about .65 may suffice.

For the composite, homogeneity of the scale items was measured by employing the Kuder-Richardson formula 21 (KR 21). Although the formula can be described in several different forms, the following form was used:

$$r_{tt} = \frac{n}{n - 1} \cdot 1 - \frac{M_t \cdot (1 - \frac{M_t}{n})}{S_t^2},$$

where n represents the number of items in the test,

M_t refers to the mean value of the test, and

S_t^2 refers to the variance of the test.

The KR 21 estimate of reliability was .83. Using the above argument, the reliability coefficient value KR 21 = .83 indicated that the composite scale was reasonably reliable.

Hypothesis 6 states that:

> The use of a linear model to predict the MSU grade point average with the predictor of intellectual interest does not explain any variance in the criterion variable.

The Pearson product-moment correlation method was employed to derive the validity coefficient of intellectual interest in the prediction of college success. The coefficient of validity was .1189 and the coefficient of determination turned out to be .0141.

To test the statistical significance of the validity coefficient, the technique of analysis of variance for overall regression was applied. The result of the analysis of variance of intellectual interest in predicting college grade point average is presented in Table 4.21.

TABLE 4.21.--Analysis of Variance for Overall Regression of Intellectual Interest with Cumulative College GPA as a Criterion Variable

Source of Variance	SS	d.f.	MS	F
Regression	467.11	1	467.11	9.19*
Error	3,259.64	641	50.84	
Totals	3,726.75	642		

*Significant at $\alpha = .01$.

Consequently, the null Hypothesis 6 was rejected at the .01 level of significance and the alternative hypothesis was accepted. It was concluded that the predictive validity of intellectual interest in the prediction of college success, based on the linear model, was statistically significant, and, therefore, a linear model did explain some of the criterion variance.

Since the relation between intellectual interest and cumulative GPA was found to be statistically significant, a simple regression equation was set up. Regression coefficients, standard errors of regression coefficients, standardized beta weights and its standard errors are presented in Table 4.22.

TABLE 4.22.--Regression Coefficient and Its Standard Errors and Standardized Beta Weights and Its Standard Errors of Intellectual Interest with Cumulative College GPA as a Criterion

	Regression Coefficients	Standard Errors	Standardized Beta Weights	Standard Errors of Betas
Y-intercept	2.3932	0.1336		
Slope	0.0082	0.0027	0.12	0.039

The least squares regression equation becomes

$$Y_e = a + bX$$

where "a" represents the Y-intercept and "b" the slope of the line. Both the constants a and b are called regression coefficient.

Following the information given in Table 4.22, the least square simple regression equation with intellectual interest score as a predictor and cumulative college grade point average as a criterion was found to be

$$Y = 2.39 + (0.0082)\ X_i$$

Hypothesis 7 states that:

> The validity coefficient of intellectual interest in the prediction of college success, based on the nonlinear model, is not statistically significant.

The correlation ratio indicated by η_{yx} and η_{xy} is a measure of the relationship which is useful in two circumstances:

1. When both variables are continuous but the regression is not linear, and
2. When one variable is continuous and the other is discrete.

The procedure for computing the value of Eta (E_{yx}), the correlation ration of Y on X, was suggested by Walker and Lev (1953, pp. 276-278).

The formula suggested by them and used in the study is as follows:

$$E^2_{yx} = \frac{\sum \frac{(T'_j)^2}{N_j} - \frac{(T'_j)^2}{N}}{\sum N_i \cdot (y'_i)^2 - \frac{(T'_y)^2}{N}} = \frac{\text{SS Between}}{\text{SS Total}}$$

where N_i is the total frequency in the i-th row,

$T'_j = \sum_{i=1}^{n} N_{ij} \cdot y'_i$ is the sum of y' scores in the j-th column, each multiplied by the appropriate frequency, and h is the number of rows,

N_j is the total frequency in the j-th column, and

$T'_y = T'_j$ is the sum of the y' score in the j-th column.

With intellectual interest test score as a predictor and cumulative college GPA as a criterion variable, the formula was applied after constructing twenty-four categories for each of the variables. Each category was one-fourth standard deviation in width. The Eta was found to be .24.

Furthermore, the test for the null hypothesis $\eta_{yx} = 0$ was tested by the F ratio of

$$F_{n_1, n_2} = \frac{E^2_{yx}}{1 - E^2_{yx}} \cdot \frac{N - k}{k - 1}$$

with k representing the number of levels and with $n_1 = k - 1$, and $n_2 = N - k$ degrees of freedom.

The value of F = 1.52 rejected the null hypothesis $\eta_{yx} = 0$ and it was concluded that the population values of the correlation ratios was not zero and, in effect, the validity coefficient of η_{yx} was significantly greater than zero.

Hypothesis 8 states that:

> The coefficient of the predictive validity of intellectual interest with MSU grade point average as a criterion variable does not differ whether it is based on the linear model or on the nonlinear model.

Linearity of regression assumes that the relationship between the criterion and the predictor can be explained by a linear model. The usual test for linearity of regression is the test that $\eta_{yx} = \rho_{yx}$. Since both the Pearson product-moment and the Eta validity coefficient were found to be statistically significant, it was reasonable to formulate Hypothesis 8 and test for significance.

The test for linearity of regression is that $\eta_{yx} = \rho_{yx}$ and is made by computing the ratio

$$F_{n_1,n_2} = \frac{E_{yx}^2 - r^2}{1 - E_{yx}^2} \cdot \frac{N - k}{k - 2}$$

with k representing the number of levels and degrees of freedom, $n_1 = k - 2$ and $n_2 = N - k$.

The value of F = 1.09 failed to reject the null hypothesis at the .01 level of significance, and it was

concluded that the linear model was sufficient. In other words, the conclusion indicates that, in predicting college GPA with intellectual interest as a predictor, the curvilinear model provides no better prediction than the linear model.

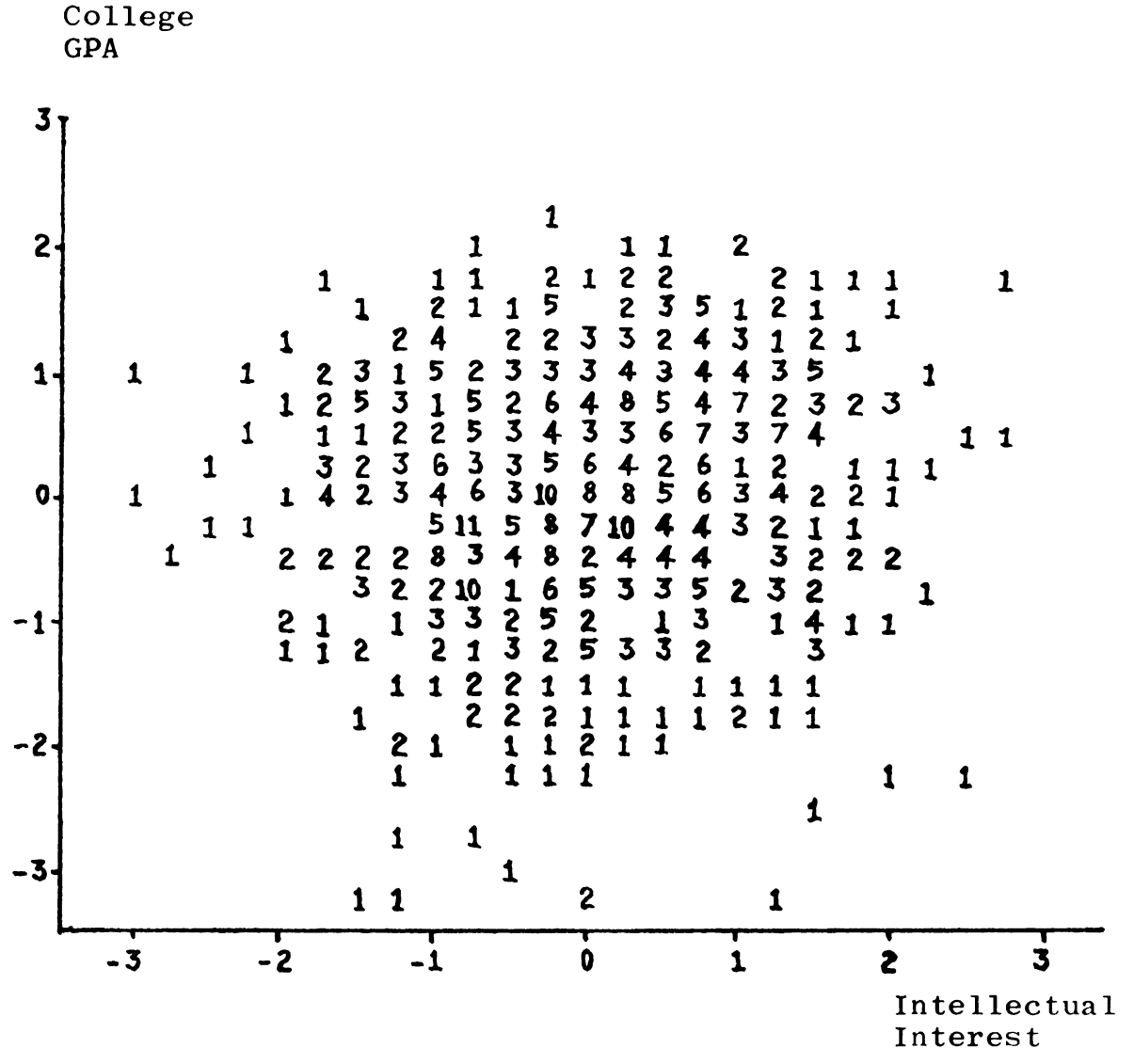
In addition to the hypothesis testing, a scatterdiagram is provided in Table 4.23. The table represents the relationship between the predictor and the criterion variable. Again, each of these variables is based on twenty-four categories, each of which was one-fourth of a standard deviation wide.

Section 3: Incremental Validity of Intellectual Interest with Cumulative College GPA as a Criterion and Some Cognitive and Affective Variable Predictor(s).

As Campbell and Fiske (1959) have suggested, any measuring instrument must show information regarding convergent and discriminant validity. In other words, it is necessary to demonstrate not only that a measure covaries with certain other connotatively similar variables, but also that it's covariance with other connotatively dissimilar variables is limited.

Yet the most recent developments in measurement theory suggest that an additional validity evidence should be presented concerning any test which is intended for predictive use. Cronbach and Gleser (1957, pp. 30-32) and Conrad (1950) have both discussed the problem of the base against which the predictive power of a test is to be

TABLE 4.23.--Scatter Diagram of Intellectual Interest Score, Based on 24 Categories, on College GPA.



evaluated. Cronbach and Gleser declare, "Tests should be judged on the basis of their contribution over and above the best strategy available, making use of prior information" (1957, p. 31). Such an increase in validity coefficient is called incremental validity.

The incremental validity provides evidence of the extent to which the test adds to or increases the validity of predictions made on the basis of data which are already available.

When a test is added to a battery, the usual way of expressing its contribution is either as a positive or a negative improvement to multiple correlation or as no increment.

The coefficient of correlation between observed scores on some trait and scores predicted for that trait by a multiple regression is called a "multiple correlation coefficient." In a multiple regression equation, scores on two or more variables will be combined to predict scores on another variable called the criterion.

Following this line of reasoning, this section tested and provided the incremental validity or the increase of predictive validity when intellectual interest variable is added to one or more of the usually available predictors.

The statistical model employed to test the null hypothesis generated for these purposes was a "variance ratio test" suggested by Baggaley (1962, p. 21). The statistic test was:

$$F = \frac{(R_+^2 - R^2)\ (N - m - 2)}{1 - R_+^2}$$

where R is the multiple correlation involving m predictors

R_+ is the multiple correlation involving m + 1 predictors or m predictor(s) plus intellectual interest variable,

N is the number of subjects, and

m is the number of predictor(s).

The quotient should be referred to an F table with d.f. = 1 for the numerator mean square and d.f. = N - m - 2 for the denominator mean square.

Hypothesis 9 was generated in the null form, in order to assess the contribution of intellectual interest to other predictor(s) in predicting college success in terms of the cumulative college GPA.

Hypothesis 9 states that:

> Intellectual interest score does not improve prediction of the cumulative college grade point average when it is added to either of the following:
>
> a. Scholastic Aptitude Test,
>
> b. High school grade point average,
>
> c. SAT-Total plus high school GPA,
>
> d. General Self-Concept of Academic Ability,
>
> e. General Self-Concept of Academic Ability plus self-reported high school GPA.

The mean score and standard deviation of each of the predictors used for testing the hypothesis are presented in Table 4.24, and their intercorrelation coefficients are shown in Table 4.25.

TABLE 4.24.--Mean Score and Standard Deviation of the Criterion Variable of MSU GPA and Five Predictors Used in the Multiple Regression Equation

	Mean	Standard Deviation
1. MSU GPA	2.78	.71
2. Intellectual Interest	48.36	10.41
3. General Self-Concept of Academic Ability	31.76	3.57
4. Self-reported high school GPA	7.00	1.40
5. Actual high school GPA	3.25	.39
6. SAT-Total	1,073.28	217.85

TABLE 4.25.--Intercorrelation Coefficient of Criterion Variable of MSU GPA and the Five Predictors Used in the Multiple Regression Equation

	1	2	3	4	5
1. (MSU GPA)					
2. (I.I.)	.12				
3. (GCAA)	.34	.31			
4. (SR HS GPA)*	.44	.17	.47		
5. (HS GPA)	.48	.19	.46	.72	
6. (SAT-Total)	.42	.27	.49	.44	.67

*The intercorrelation coefficient value of self-reported high school grade point average was multiplied with (-1), because its content in the questionnaire was written in the format of high value to low value.

Hypothesis 9(a) was tested first. The correlation coefficient involving the predictor of SAT-Total only was .4217 and the multiple correlation coefficient involving predictors of SAT-Total and Intellectual Interest test was .4221. Related results are provided in Table 4.26.

The value of F = 0.31 of the test statistic of a variance ratio test failed to reject the null hypothesis 9(a), and it was concluded that intellectual interest score did not significantly increase the predictability of college success when it was added to SAT-Total as a predictor.

The correlation coefficient of "High school grade point average" with college GPA was .4812 and the multiple correlation coefficient involving HS GPA and the predictor of intellectual interest was .4820.

The value of the test of a "variance ratio technique" F = 0.67 failed to reject the null hypothesis 9(b), and it was concluded that the addition of intellectual interest test to "High school grade point average" did not increase the predictive validity.

The validity coefficient of "SAT-Total and high school GPA" was .5300 and the addition of the predictor of intellectual interest to these two predictors made the validity coefficient .5304.

The F-value of 0.36 of "variance ratio method" failed to reject the null hypothesis 9(c), and it was concluded

TABLE 4.26.--Simple and Multiple Correlation Coefficients and Constants and Regression Coefficients of Simple and Multiple Regression Equations

	Equations	Constant	Regression Coefficient					R
			I.I.	GCAA	SR HSGPA	HSGPA	SAT-T	
1.	SAT-Total only	1.29					0.0014	0.4217
2.	SAT-Total plus Intellectual Interest	1.29	0.0002				0.0015	0.4221
3.	HS GPA only	-0.02				0.0087		0.4812
4.	HS GPA plus Intellectual Interest	-0.08	0.0019			0.0086		0.4820
5.	SAT-Total plus HS GPA	-0.22				0.0068	0.0012	0.5300
6.	SAT-Total and HS GPA plus Intellectual Interest	-0.18	0.0240			0.0068	0.0012	0.5304
7.	GCAA and SR HS GPA	2.22		0.0345	0.1824			0.4649
8.	GCAA and SR HS GPA plus Intellectual Interest	2.21	0.0003	0.0342	0.1823			0.4650

that the addition of the predictor of intellectual interest to "SAT-Total and HS GPA" did not increase the validity.

The F-value of 0.14 failed to reject the null hypothesis 9(d), and it was concluded that the predictor of intellectual interest did not enhance the prediction of college success when it was added to the predictor of "General self-concept of academic ability."

The validity coefficient for predicting college grade point average involvind the predictors of "General self-concept of academic ability" and Self-reported high school grade point average" was .4649, and the addition of intellectual interest to these two predictors had the multiple correlation coefficient of .4650.

The F-value of 0.081 failed to reject the null hypothesis 9(e), and it was concluded that the predictor of intellectual interest did not enhance the prediction of college success when it was added to "General self-concept of academic ability" and "Self-reported high school grade point average."

In short, as shown through the test of hypothesis 9(a) through 9(e), the use of variance ratio test failed to reject the null hypothesis 9. It was concluded that the predictor of "intellectual interest" did not improve the efficiency of the prediction of college success when it was added to one or more than one of the other four predictors: Scholastic Aptitude Test, high school grade point average, general self-concept of academic ability

and self-reported high school grade point average. In other words, the results suggest that the predictor "intellectual interest" does not have incremental validity in relation to the above predictors.

Summary of the Chapter

The analysis of the data and the results relating to the main purposes of the study were presented in three sections.

For the purpose of investigating the identity and structure of the psychological construct of intellectual interest, the factor analysis method was employed. In this procedure, thirty variables concerning the cognitive, affective and some background characteristics were used. Principle axis components were extracted from an inter-correlation matrix of these 30 variables and factored into 30 dimensions. Out of these 30 unrotated factors, ten factors of acceptable magnitude as indicated by their eigenvalues were rotated. They were labeled scholastic aptitude, social sensitivity, high school achievement, parents' educational level, aesthetic, community size, conforming-religious, scientific, social hedonism and intellectual interest.

Three subscales of the composite scale of intellectual interest and the content of the "humanistic-cultural life goal" formed a common factor which was called "intellectual interest factor."

From the critical examination of the operational definitions drawn in the three subscales of intellectual interest, which were highly related, and the content of the "humanistic-cultural life goal," it was suggested that there were three aspects of the construct of intellectual interest. They were an appreciation and enjoyment of cultural prusuits, academic and philosophical enquiry, and anti-pragmatic interests in the arts as well as in the sciences.

The test of analysis of variance indicated that there were significant differences in intellectual interest, measured by the Academic Interest Scale, among (1) students majoring in different curricula, (2) students having different levels of educational expectations, and (3) students whose fathers have different occupations.

The results of the factorial analysis and analysis of variance were included in Section 1.

Section 2 concerned the validity of intellectual interest in the prediction of college success with the criterion of academic grade point average. Also, the reliability and regression model were tested.

The KR 21 estimate of reliability was .83. It suggested that the composite scale used to measure the trait of intellectual interest was very reliable.

The Pearson product-moment correlation coefficient $r = .12$ and the correlation ratio $\eta_{yx} = .24$ were obtained. The former was based on the linear regression model and

the latter on the curvilinear model. Both of the predictive validities were found to be statistically significant, but they were not significantly different. Therefore, the linear model of regression was adopted and it was concluded that the curvilinear model would provide no better prediction of college success than the linear model.

Section 3 tested whether or not the addition of intellectual interest to four other commonly used predictors increased the predictability of college success. Very slight gain in multiple correlation could be obtained by each addition, but none of these increases was statistically significant. Therefore, it was concluded that intellectual interest had no incremental validity when added to these predictors.

Chapter V will deal with the summary of the study, discussion of the results and implications for further study.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Overview of Purpose and Instrumentation

The basic purpose of the study was to determine the identity and structure of the psychological construct of intellectual interest and to measure the validity of this construct in the prediction of the academic success in an institution of higher learning.

The total population selected for this study consisted of all freshmen entering Michigan State University in Fall term, 1970. However, students in one or more of the following categories were excluded from the population: foreign students, transfer students, students on whom there was a lack of complete data and students who dropped out before the end of Fall term, 1970. Five thousand four hundred and sixty-eight students who registered for credit courses during the fall registration period were classified as freshmen.

From this restricted population, 643 students were randomly selected.

The Academic Interest Scale and the MSU Student Survey were given to the sample of students during the orientation week, September 21-22, 1970. The Academic Interest Scale included the Intellectual Interest Scale of Stern (Part 1), the Intellectual Interest Scale of Anderson and Western (Part 2), and the Intellectualism-Pragmatism Scale of Yuker and Block (Part 3). The MSU Student Survey contained several scales including the Trait Self-Ratings of College Freshmen (Part A), the Life Goals of College Freshmen (Part B), the General Self-Concept of Academic Ability (Part C), and the Student Questionnaire (Part D).

The other data, such as scores on the Scholastic Aptitude Test, the MSU Reading Test, the MSU Arithmetic Test and the MSU Mathematics Test, high school grade point average and MSU grade point average, were obtained with the cooperation of the Office of Evaluation Services, Michigan State University.

Four subscales of the Stern Activities Index, namely, Reflectiveness, Humanities-Social Sciences, Understanding, and Science; the Intellectual Interest Scale developed by Anderson and Western; and the Intellectualism-Pragmatism Scale developed by Yuker and Block were employed to measure the psychological construct of intellectual interest. All of these subscales were included under the name of the Academic Interest Scale in order to deter faking responses. The operational definitions of the trait of intellectual

interest drawn by each of these three subscales were similar to each other. The use of three independent measures also made possible a check on their validity.

The composite score of intellectual interest in the Academic Interest Scale was derived by applying a 2-point scaling system to all of the 79 items in the three subscales. The equal value was assigned to each of these items through this method.

The correlation coefficient of the composite score based on the 2-point scaling system was .89 with the Stern-total score, .70 with the Anderson and Western-total score and .63 with the Yuker and Block-total score. These high intercorrelation coefficients evidenced both the convergent validity of the three subscales of intellectual interest and the justification of the method of the derivation of the composite score. This manner of deriving a composite score from these three Likert-type scales was further justified because items in Likert-type scales were considered to be of approximately equal value.

Data Analysis, Results and Discussion

Part A

The first aspect of the purpose of the study was addressed to reaching a clear understanding of the identity and structure of the construct of intellectual interest. This purpose was expressed in the null hypotheses 1 through 5. They are as follows:

Hypothesis 1: There is no difference in intellectual interest, as measured by the Academic Interest Scale, between males and females and among:

a. Students majoring in different curricula;

b. Students who lived a major portion of their lives on a farm, in a village, town, small city, or large city;

c. Students who were in different sized high school graduating classes;

d. Students whose fathers and/or mothers completed grade school, high school, college, graduate or professional school;

e. Students who plan to receive one, two, three or four years of college education and those who plan to attend graduate or professional school;

f. Students whose fathers are executives, business owners, white-collar workers, skilled craftsmen, semi-skilled workers, low or unskilled laborers, farm owners, public service workers, or professional personnel (doctor, lawyer, dentist, and so forth).

Hypothesis 2: There is no relationship between intellectual interest and aptitude scores on the Scholastic Aptitude Test and Michigan State University Reading Test, MSU Arithmetic Test, MSU Mathematics Test and MSU Quantitative Test.

Hypothesis 3: There is no relationship between intellectual interest and the following seven factors of Trait Self-Ratings of College Freshmen:

a. Trait--Physical well-being;

b. Trait--Scholarship;

c. Trait--Estheticism;

d. Trait--Pragmatism;

e. Trait--Technical-scientific;

f. Trait--Sociability; and

g. Trait--Sensitivity to others.

Hypothesis 4: There is no relationship between intellectual interest and the following seven factors of live goals of college freshmen measured by the Life Goals of College Freshmen:

a. Life goal--Perstige;

b. Life goal--Personal happiness;

c. Life goal--Humanistic-cultural;

d. Life goal--Religious;

e. Life goal--Scientific;

f. Life goal--Artistic; and

g. Life goal--Hedonistic.

Hypothesis 5: There is no relationship between intellectual interest and general self-concept of academic ability measured by the General Self-Concept of Academic Ability.

These hypotheses were examined through the factor analytic method. Specifically, the principle axis method developed by Hotelling (1935) was used. Principle axis components were extracted from an intercorrelation matrix of 30 variables related to cognitive, affective, and some background characteristics. Thirty unrotated factors were derived.

The following thirty variables were used in the factorial analysis:

A. The biographical and demographic data

1. Sex
2. Community the student lived most of his/her life
3. Father's educational level
4. Mother's educational level
5. Size of graduating class of high school

B. The cognitive variables

1. MSU Reading Test

2. MSU Arithmetic Test
3. MSU Mathematics Test
4. MSU Quantitative Test
5. Scholastic Aptitude Test--Verbal
6. Scholastic Aptitude Test--Mathematics
7. Scholastic Aptitude Test--Total
8. Self-reported high school grade point average
9. Actual high school grade point average

C. The affective variables

1. Seven factors of trait self-ratings of college freshmen
2. Seven factors of life goals of college freshmen
3. General self-concept of academic ability
4. Intellectual interest

Facilitation of interpretation was further enhanced by the Varimax method of rotation (1959). Out of 30 unrotated factors, ten factors of acceptable magnitude, as indicated by their eigenvalues, were rotated. The purpose of the rotation was to transform the initial factor solution to achieve simple structure, factor invariance and interpretability. The ten rotated factors were labeled scholastic aptitude, social sensitivity, high school achievement, parents' educational level, aesthetic, community size, conforming-religious, scientific, social hedonism and intellectual interest.

The result showed that the construct of intellectual interest had no relationship with the variables of sex, community size, where student lived most of his/her life, parents' educational level, size of graduating class of high school, four kinds of MSU aptitude measures, scholastic aptitude test and high school grade point average. Also, it had little or no relationship with seven

independent factors of trait self-ratings of college freshmen, general self-concept of academic ability and with six factors of life goals of college freshmen including prestige, prestige, personal happiness, religious, scientific, artistic and hedonistic.

Three subscales of the composite scale of intellectual interest which had high intercorrelations with each other and the content of the "humanistic-cultural life goal" formed a common factor which was called the "intellectual interest factor."

A critical examination of the contents of the items of the composite scale and the "humanistic-cultural life goal" suggested three aspects of the construct of intellectual interest. The first aspect implied an appreciation and enjoyment of cultural pursuit, the second concerned academic and philosophical enquiry, and the third aspect concerned anti-pragmatic interests in the arts as well as in science, both abstract and empirical.

Thus, the person who scores high on the test of this construct has a high level of interest in ideas, in development of philosophical outlook and in what is thought of as "culture." He is also interested in social issues. Because the construct is not in itself observable, it must be inferred from the observation of the characteristic transaction process in which he engages. The evidence in this study provides the preliminary foundation for further investigation of the construct and the development of a reliable and valid measure.

For the hypothesis testing related to the demographic variables which were qualitative, the analysis of variance method was employed. The analysis of variance test indicated that there were significant differences in intellectual interest, measured by the Academic Interest Scale, among (1) students majoring in different curricula, (2) students having different levels of educational expectations, and (3) students whose fathers have different occupations.

Results of the study of the relationship between the trait of intellectual interest and major field and level of educational expectation are especially interesting. As far as the trait of intellectual interest is concerned, it is apparent that Michigan State University is no longer, if it ever was, homogeneous. Students in its different colleges are apt to differ. To the degree that curricula are sources of diversity, we would expect that there must be differential predictors. Whether the construct of intellectual interest can be established as a predictor of the field the person will enter is an unanswered question. However, data in this study do suggest that there is the possibility such predictions can be made.

Part B

The second aspect of the present study was an attempt to measure the predictive as well as incremental validity of intellectual interest in the prediction of college success. This effort was reflected in hypotheses 6 through 9.

Hypothesis 6: The use of a linear model to predict the MSU grade point average with the predictor of intellectual interest does not explain any variance in the criterion variable.

Hypothesis 7: The validity coefficient of intellectual interest in the prediction of college success, based on the nonlinear model, is not statistically significant.

Hypothesis 8: The coefficient of the predictive validity of intellectual interest with MSU grade point average as a criterion variable does not differ whether it is based on the linear model or on the nonlinear model.

Hypothesis 9: The intellectual interest score does not improve prediction of the cumulative college grade point average when it is added to either of the following:

a. Scholastic Aptitude Test;

b. High school grade point average;

c. SAT-Total plus high school GPA;

d. General Self-Concept of Academic Ability;

e. General Self-Concept of Academic Ability plus self-reported high school GPA.

Prior to discussing these hypotheses testings, it seems worthwhile to note again that this study used three different subscales to measure the psychological construct of intellectual interest and their high intercorrelations evidenced their convergent validity. Homogeneity of the scale items was assessed by employing Kuder-Richardson formula 21. The KR 21 estimate of reliability was .83, and it suggested that the composite scale used to measure the trait of intellectual interest was also very reliable.

The validity of intellectual interest in the prediction of the cumulative college grade point average for

the first term at college was determined to be .12, in terms of the Pearson product-moment method. Also, this value of the predictive validity was statistically significant at $\alpha = .01$. In addition to that, the validity coefficient η_{yx} based on the curvilinear model was assessed, and it was found to be .24. This value was also statistically significant at $\alpha = .01$.

To estimate the regression model between intellectual interest as a predictor and the first term grade point average at college as a criterion variable, testing for linearity of regression was carried out. The test used was $\eta_{yx} = \rho_{yx}$. The test concluded that the use of a linear model in predicting college grade point average, with intellectual interest as a predictor, would explain a significant amount of the criterion variance and the use of a curvilinear model would not reduce the amount of error of prediction more than the linear mode. A graphical examination provided the same conclusion.

In practical prediction situations it is seldom that only one item of information is known about the individual subject. Therefore, it is valuable to test whether intellectual interest can improve the prediction of college success when it is added to one or more of the commonly used academic predictors. This notion was implied in Hypothesis 9.

When the variable of intellectual interest was added to a score on the Scholastic Aptitude Test, a slight gain

of .0004 in multiple correlation could be obtained. Increases of .0008, .0004, .0003 and .0001 in multiple correlations were obtained when the test of intellectual interest was respectively added to high school grade point average, SAT-Total plus high school grade point average, the test of general self-concept of academic ability, and the test of general self-concept of academic ability plus high school grade point average. None of these additions of intellectual interest significantly increased the predictive validity for the first term college grade point average, and it was concluded that the construct of intellectual interest did not have statistically significant incremental validity for the predictors investigated. This finding suggests that, although intellectual interest is related to a limited extent to college success, it does not improve the prediction of academic success in college when it is added to any of four commonly used academic predictors or typical combinations of them.

The results agree with Goldman (1961) who made the following observation regarding the relationship between interests and abilities:

> A chronic source of frustration is the failure of research reports to confirm what seems to be a perfectly logical expectation, that it, that interests and abilities will be closely related, and that most people will be interested in doing the things which they are most capable of doing. Counselors are tempted to see as vexing exceptions those cases in which interests and abilities point in different directions. (P. 327.)

Yet, the fact seems to be, as concluded by Darley and Hagenah (1955) after a review of the literature, that ". . . there is a low relation between measured interests and measured ability and scholastic achievement" (p. 57).

The low correlation and, consequently, small proportion of explained variance might be due to either factors which interfere with their agreement or due to lack of true relationship in the data. Several factors seem to be plausible in the explanation of the present result.

The range of the population upon which the regression equation is based is restricted to only those who are admitted to college. The self-selection of students who decided to apply to Michigan State University rather than another school also serves to restrict the range. When a population range is restricted in this manner, the correlation is necessarily reduced.

It is noteworthy that the highest correlations in other studies were all obtained in Southwestern and Western colleges in which selective procedures were either so new or so restricted by statute that they had little effect on the range of accepted talent (Fishman and Pasanella, 1960). Fishman (1957) also observed a relationship between scores on college board tests and various characteristics of students and colleges. The university used in this study evidently does not represent the spectrum of colleges in the United States, so general conclusions cannot be drawn from the results.

It is possible to hypothesize that people work harder on the areas in which they feel weak, sometimes because they feel challenged, sometimes because it is expected of them by the elements which influence them such as family and social values. It is apparent that the findings of the study leave unanswered the question of what personality dynamics are operating to produce achievement which is disparate with our expectation from the intellectual interest score. Even though this study was not planned for answering that question, it encourages those who seek to understand the dynamics of achievement through the study of personality.

In addition, the sample size should be considered. If the sample size of the groups involved in the study is large, a statistical test will show a small difference as significant. In relation to this point, the predictive validity of intellectual interest seems to be not substantially meaningful even though it was statistically significant in this study.

Although grade point average is a socially significant, objectively quantifiable, and convenient measure of academic success, it is somewhat inadequate as a single criterion of college success. It is generally acknowledged that many kinds of academic learning are not reflected in the GPA. Measuring success in college with the criterion of grade point average is not entirely satisfactory. The need for newer and more relevant criteria is apparent, especially

those which offer possibilities for relating the role of predictors to the specific behaviors contributing to GPA and the function of the college to the total development of the individual.

The implications of the study for the college counselor are apparent. One obvious implication is that incongruency between measured intellectual interest and academic achievement is to be expected in a considerably large number of cases and is not to be considered as prima facie evidence of the invalidity of one or both tests. Another implication is that it may have some value to be sensitive to the possible presence of one or more factors emphasized by current learning theories as being sources of discrepancy between interests and achievement: family pressures, other needs of the individual which conflict with his interests, emotional disturbances, and lack of experience in utilizing certain abilities of which he is relatively unaware.

Suggestions for Further Research

Based on the information obtained through the review of the literature, findings of the study and unanswered questions and possibilities the study has brought into focus, certain recommendations for further studies can be made:

1. The present study should be cross-validated to determine whether the findings when another sample is used would be congruent with the findings of this study. The

population of the present study does not represent the spectrum of American colleges. Thus, a cross-validational study based on different populations is encouraged. Also, the factorial approach employing a considerably larger number of variables and, as a next step, the known-group method would be worthwhile to attempt. These studies might establish foundations for construction of reliable and valid instruments for measuring the construct as well as for a clearer understanding of the construct of intellectual interest.

2. Longitudinal studies should be made to include criteria of college success during the first, second, third, and fourth years of study at the undergraduate level. Through extension of the present study, it can be determined whether the same results found in this study hold across time. The present study used the first term GPA only, and it would seem promising to perform follow-up studies after the students have attended college long enough for their performance to be adequately evaluated.

3. Studies should be made to discover whether a test of intellectual interest can be established as a predictor of the field of study the student will enter. Obviously the present study did not aim at answering the question. However, the results of the analysis of variance suggest a considerable association between the construct and different major fields. This finding indicates the possibility that the test of intellectual interest can serve as a

determinant or predictor of the major field of study in college.

4. Studies should be made to explore the construct of intellectual interest as a major variable related to collegiate persistence. It is possible to hypothesize that dropouts and non-dropouts in college can be characterized by their interest in academic work and related level of educational expectation.

5. Studies should be made to specify behaviors contributing to college cumulative grade point average. Also, specification of the criteria for the total development of the individual should be attempted. Then it will be possible to relate the intellective as well as non-intellective predictors to these criteria.

6. Studies should be made to determine whether high school achievement and achievement in college have the same factors influencing them. Through such studies, exploration of the variables contributing to high school achievement will also serve in understanding of the dynamics of college achievement and will be valuable in finding the predictors of college success.

7. Studies should be made for further pursuit of possible factors associated with congruence and with discrepancy between an individual's academic interest and academic achievement. It might be hypothesized, for example, that correlations between a person's interest and achievement will be highest in students with the best level of personality integration.

8. Studies should be made to explore whether institutions and groups of institutions may be differentially selective or attractive with respect not only to ability, but also to certain other attributes of personality. It would be valuable to know what are the interrelationships among the image or expectations of the university held by freshmen, the objectives of the institution and the unique environment of the college. Such information would be helpful to prospective students as well as college and university officials.

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APPENDICES

APPENDIX A.

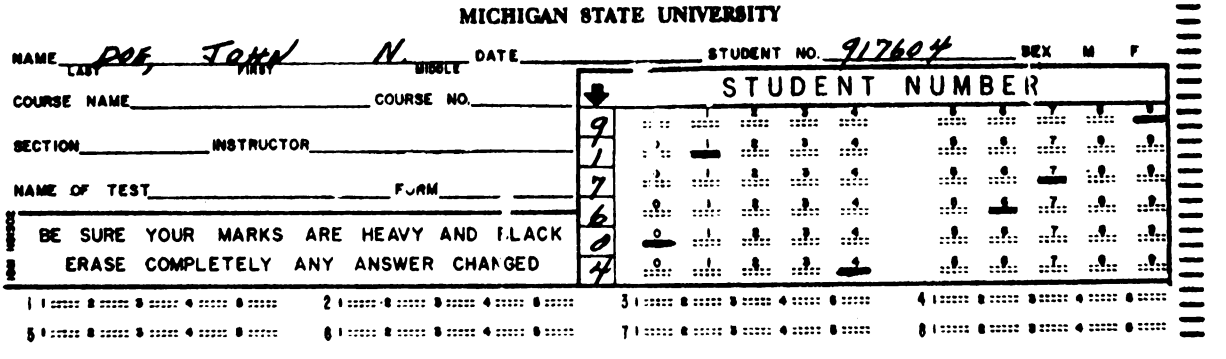
ACADEMIC INTEREST SCALE

This booklet contains a number of brief statements describing many different kinds of activities. You will like some of these things. They will seem more pleasant than unpleasant to you, perhaps even highly enjoyable. There will be others that you dislike, finding them more unpleasant than pleasant. The activities listed in this scale have been obtained from a great many different persons. People differ in the kinds of things they enjoy, like to do, or find pleasant to experience. You are to decide which of these you like and which you dislike.

It is hoped that you will give frank and sincere responses. Our only reason for asking your name and student number is to enable us to collate the data. Your replies will be held in strict confidence and will be read only be the research staff.

Do not begin working until you have read, understood and carried out the directions given.

1. On each of the answer sheets, print in the appropriate places your name (LAST NAME FIRST) and student number.
2. Unless your STUDENT NUMBER IS CORRECTLY MARKED in pencil in the rows of spaces under words STUDENT NUMBER, your answer sheet CANNOT BE PROCESSED. First, WRITE your student number in the vertical column of blank boxes under the heavy arrow. Then, MARK ONE SPACE IN EACH of the SIX ROWS of ten spaces that corresponds to each number of your student number.



For each part of the scale pay particular attention to the directions. Make sure that you record your responses in the appropriate spaces on the answer sheet.

PART 1

The questions on this part are to be answered in the spaces on your answer sheet numbered 1 through 40.

Blacken space
1 - if the item describes an activity or event that you would like, enjoy, or find more pleasant than unpleasant.
2 - if the item describes an activity or event that you would dislike, reject, or find more unpleasant than pleasant.
Ignore columns 3, 4 and 5 on the answer sheet.

1. Understanding myself better.
2. Thinking about different kinds of unusual behavior, like insanity, drug addiction, crime, etc.
3. Imagining life on other planets.
4. Trying to figure out why the people I know behave the way they do.
5. Thinking about what the end of the world might be like.
6. Concentrating intently on a problem.
7. Finding the meaning of unusual or rarely used words.
8. Spending my time thinking about and discussing complex problems.
9. Working crossword puzzles, figuring out moves in checkers or chess, playing anagrams or scrabble, etc.
10. Being a philosopher, scientist, or professor.
11. Learning how to prepare slides of plant and animal tissues and making my own studies with a microscope.
12. Studying wind conditions and changes in atmospheric pressure in order to better understand and predict the weather.
13. Reading articles which tell about new scientific developments, discoveries, or inventions.
14. Doing experiments in physics, chemistry or biology in order to test a theory.
15. Studying the stars and planets and learning to identify them.
16. Learning about the causes of some of our social and political problems.
17. Studying the music of particular composers, such as Bach, Beethoven, etc.
18. Listening to TV or radio programs about political and social problems.
19. Comparing the problems and conditions of today with those of various times in the past.
20. Studying different types of government, such as the American, English, Russian, German, etc.

PLEASE GO ON TO NEXT PAGE

Blacken space
1 - if you like, enjoy or find pleasant
2 - if you dislike, reject or find unpleasant
Ignore columns 3, 4 and 5 on the answer sheet.

21. Seeking to explain the behavior of people who are emotionally disturbed.
22. Reading stories that try to show what people really think and feel inside themselves.
23. Imagining what it will be like when rocket ships carry people through space.
24. Thinking about the meaning of eternity.
25. Concentrating so hard on a work of art or music that I don't know what's going on around me.
26. Losing myself in hard thought.
27. Engaging in mental activity.
28. Solving puzzles that involve numbers or figures.
29. Following through in the development of a theory, even though it has no practical applications.
30. Working out solutions to complicated problems, even though the answers may have no apparent, immediate usefulness.
31. Going to scientific exhibits.
32. Collecting data and attempting to arrive at general laws about the physical universe.
33. Reading scientific theories about the origin of the earth and other planets.
34. Reading about how mathematics is used in developing scientific theories, such as explanations of how the planets move around the sun.
35. Studying rock formations and learning how they developed.
36. Talking about music, theatre or other art forms with people who are interested in them.
37. Finding out how different language have developed, changed, and influenced one another.
38. Learning more about the work of different painters and sculptors.
39. Studying the development of English or American literature.
40. Reading editorials or feature articles on major social issues.

PLEASE GO ON TO NEXT PAGE

PART 2

The questions on this part are to be answered in the spaces on your answer sheet numbered 41 through 49.

Blacken space
1 - if you rate the statement DEFINITELY TRUE
2 - if you rate the statement MORE TRUE THAN FALSE
3 - if you rate the statement MORE FALSE THAN TRUE
4 - if you rate the statement DEFINITELY UNTRUE
Ignore column 5 on the answer sheet.

41. University subjects which deal with theoretical principles are generally of greater value to the student than those which provide information which has a direct practical application.
42. I am more interested in the critical consideration of principles and theories than in their practical application.
43. I would like to learn more about the history of human thought.
44. I enjoy reading essays on serious or philosophical subjects.
45. I enjoy reading about artistic or literary achievements.
46. I am interested in discussions about such topics as the ideal society, freedom, etc.
47. I have spent a lot of time listening to serious music.
48. I like to read poetry.
49. I have frequent discussions with friends about the causes and possible solutions of various national and international problems.

PLEASE GO ON TO NEXT PAGE

PART 3

The questions on this part are to be answered in the spaces on your answer sheet numbered 93 through 122. Note that you are to skip the spaces numbered 50 through 92 on the answer sheet.

For the statement in each item, blacken space
1 - if you VERY STRONGLY AGREE
2 - if you STRONGLY AGREE
3 - if you AGREE
4 - if you DISAGREE
5 - if you STRONGLY DISAGREE
6 - if you VERY STRONGLY DISAGREE
Ignore columns 7, 8, 9 and 10 on the answer sheet.

93. The primary purpose of higher education should be individual growth and development.
94. Americans are too materialistic.
95. It is important for Americans to understand communism.
96. Intellectuals should try to be more like normal folks.
97. Most deep thinkers are too liberal.
98. Too many gifted people have communistic tendencies.
99. Eggheads get along well with most people.
100. Ideas are all right, but it's getting the job done that counts.
101. Colleges and schools should spend more time getting students ready for jobs and less time filling them with useless information.
102. Too many new ideas come from radicals and trouble makers.
103. People with new ideas are usually radicals who are trying to cause trouble.
104. The greatest contributions to civilization have been made by practical men.
105. Too few college students are intellectually inclined.
106. Philosophy is a very valuable study.
107. Nations are built by hard work, not abstract ideas.
108. Eggheads should be given more say in politics and government.
109. People should study many religions before making a choice.
110. Poetry and art have made many real contributions to civilization.
111. Bookworms are usually dull people.
112. Being a philosophy major tends to separate one from reality.
113. If high-brow thinkers would leave well enough alone, we would all be better off.
114. Thinkers are more important today than doers.
115. In today's society we need thinkers more than trained personnel.
116. If I were going to see a play, I would prefer a serious drama to a musical or light comedy.
117. A person who goes to a concert is enriching his life.
118. Music and art courses are usually a waste of time
119. Most eggheads are snobs.
120. Colleges should concentrate more on the humanities and less on specialization.
121. If I had money, I would rather take a trip to Europe than buy a new car.
122. Artists should go back to painting things as they really are.

- END OF THE SCALE -

APPENDIX B.

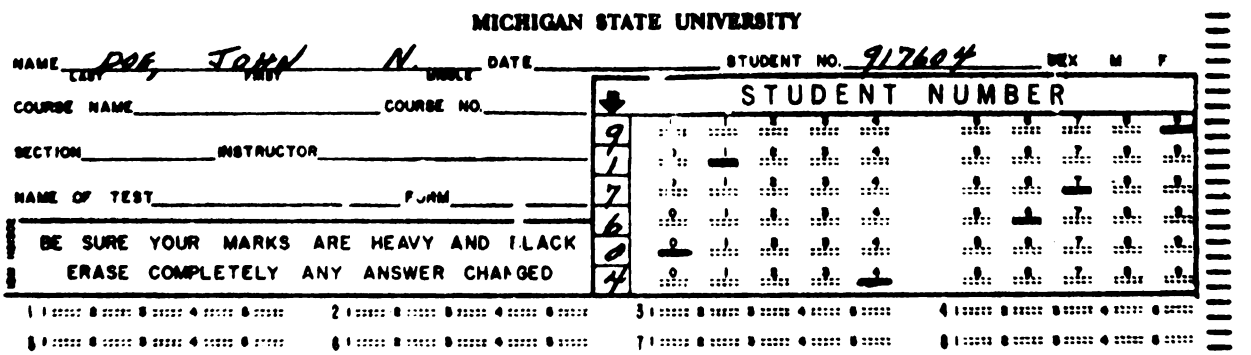
M.S.U. STUDENT SURVEY

Michigan State University would like to know as much as possible about its students so that it can develop programs and experiences that will be most beneficial to them. This year, a study is being made of students entering MSU: their attitudes toward a variety of subjects, their behavior and their background.

It is hoped that you will give frank and sincere responses. Our only reason for asking your name and student number is to enable us to collate the data. Your replies will be held in strict confidence and will be read only by the research staff.

Do not begin working until you have read, understood and carried out the directions given.

1. On each of the answer sheets, print in the appropriate places your name (LAST NAME FIRST) and student number.
2. Unless your STUDENT NUMBER IS CORRECTLY MARKED in pencil in the rows of spaces under words STUDENT NUMBER, your answer sheet CANNOT BE PROCESSED. First, WRITE your student number in the vertical column of blank boxes under the heavy arrow. Then, MARK ONE SPACE IN EACH of the SIX ROWS of ten spaces that corresponds to each number of your student number.



For each part of the survey pay particular attention to the directions. Make sure that you record your responses in the appropriate spaces on the answer sheet.

PART A

The questions on this part are to be answered in the spaces on your answer sheet numbered 1 through 21.

Read each item carefully. Answer all questions as honestly and frankly as you can. Only in this way, will the results be meaningful.

As you read each item, mark space
1 - if you rate yourself on the item BELOW AVERAGE
2 - if you rate yourself on the item AVERAGE
3 - if you rate yourself on the item ABOVE AVERAGE
4 - if you rate yourself on the item TOP TEN PER CENT

Ignore column 5 on the answer sheet.

1. Athletic ability
2. Mathematical ability
3. Originality
4. Self-control
5. Mechanical ability
6. Leadership
7. Understanding of others
8. Physical energy
9. Scholarship
10. Artistic ability
11. Independence
12. Scientific ability
13. Sociability
14. Sensitivity to the needs of others
15. Physical health
16. Intellectual self-confidence
17. Expressiveness
18. Practical mindedness
19. Research ability
20. Cheerfulness
21. Sense of humor

PLEASE GO ON TO NEXT PAGE

PART B

The questions on this part are to be answered in the spaces on your answer sheet numbered 22 through 42.

As you read each item, blacken space
1 - if you rate the statement OF LITTLE OR NO IMPORTANCE
2 - if you rate the statement SOMEWHAT IMPORTANT
3 - if you rate the statement VERY IMPORTANT
4 - if you rate the statement ESSENTIAL FOR YOU

Ignore column 5 on the answer sheet.

22. Becoming a community leader.
23. Becoming happy and content.
24. Developing a meaningful philosophy of life.
25. Making sacrifice for the sake of the happiness of others.
26. Inventing or developing a useful product or device.
27. Becoming accomplished in one of the performing arts.
28. Becoming well-off financially.
29. Becoming influential in public affairs.
30. Becoming a mature and well-adjusted person.
31. Writing good fiction.
32. Following a formal religious code.
33. Making a theoretical contribution to science.
34. Producing good artistic work.
35. Having the time and means to relax and enjoy life.
36. Obtaining awards or recognition.
37. Becoming a good husband and wife.
38. Keeping up to date with political affairs.
39. Being active in religious affairs.
40. Making a technical contribution to science.
41. Becoming an accomplished musician.
42. Avoiding hard work.

PLEASE GO ON TO NEXT PAGE

PART C

The questions on this part are to be answered in the spaces on your answer sheet numbered 43 through 50.

As you read each item, on your answer sheet, blacken the number before the statement that best answers each question.

43. How do you rate yourself in school ability compared with your close friends?
1. I am the poorest
2. I am below average
3. I am average
4. I am above average
5. I am the best

44. How do you rate yourself in school ability compared with those in your class at school?
1. I am among the poorest
2. I am below average
3. I am average
4. I am above average
5. I am among the best

45. Where do you think you ranked in your class in high school?
1. among the poorest
2. below average
3. average
4. above average
5. among the best

46. Do you think you have the ability to complete college?
1. no
2. probably not
3. not sure either way
4. yes, probably
5. yes, definitely

47. Where do you think you would rank in your class in college?
1. among the poorest
2. below average
3. average
4. above average
5. among the best

48. In order to become a doctor, lawyer, or university professor, work beyond four years of college is necessary. How likely do you think it is that you could complete such advanced work?
1. most unlikely
2. unlikely
3. not sure either way
4. somewhat likely
5. very likely

49. Forget for a moment how others grade your work. In your own opinion how good do you think your work is?
1. my work is much below average
2. my work is below average
3. my work is average
4. my work is good
5. my work is excellent

50. What kind of grades do you think are capable of getting?
1. mostly E's
2. mostly D's
3. mostly C's
4. mostly B's
5. mostly A's

PLEASE GO ON TO NEXT PAGE

PART D

The questions on this part are to be answered in the spaces on your answer sheet numbered 121 through 132. Note that you are to skip the spaces numbered 51 through 120.

As you read each item, on your answer sheet, blacken the number before the statement that best answers each question.

121. Sex
1. Male
2. Female

122. In which of the broad areas listed below do you expect to major?
1. Agriculture or Natural Resources
2. Arts and Letters
3. Business
4. Communication Arts
5. Education
6. Home Economics
7. Science or Engineering
8. Social Sciences
9. Veterinary or Human Medicine
10. I have no idea what my major field will be.

123. Before coming to college, in what kind of a community did you live most of your life?
1. Suburb of a metropolitan area of more than one million population
2. Suburb of a metropolitan area of 100,000 to 999,999
3. Suburb of a metropolitan area of 25,000 to 99,999
4. In a city (not a suburb) of more than one million
5. In a city (not a suburb) of 100,000 to 999,999
6. In a city (not a suburb) of 25,000 to 99,999
7. In a city of 10,000 to 24,999
8. In a town of 2,500 to 9,999
9. In a village of 250 to 2,499
10. In a farming or rural community

124. What kind of high school or secondary school did you attend (or spend most of your high school years)?
1. Public high school
2. Private, nonreligious, nonmilitary
3. Parochial
4. Others

PLEASE GO ON TO NEXT PAGE

125. Highest level of education completed by your father.
(Blacken in ONLY ONE space)
1. Attended grade school (grades 1 to 8 but did not finish)
2. Completed 8th grade
3. Attended high school (grades 9 to 12 but did not graduate)
4. Graduated from high school
5. Technical or business school beyond high school
6. Attended college but did not graduate
7. Graduated from college (Bachelor's Degree)
8. Some education beyond Bachelor's Degree but did not earn another degree
9. Earned a Master's Degree
10. Earned a graduate or professional degree beyond the Master's level

126. Highest level of education completed by your mother.
(Blacken in ONLY ONE space)
1. Attended grade school (grades 1 to 8 but did not finish)
2. Completed 8th grade
3. Attended high school (grades 9 to 12 but did not graduate)
4. Graduated from high school
5. Technical or business school beyond high school
6. Attended college but did not graduate
7. Graduated from college (Bachelor's Degree)
8. Some education beyond Bachelor's Degree but did not earn another degree
9. Earned a Master's Degree
10. Earned a graduate or professional degree beyond the Master's level

127. Father's occupation (select the category that seems to fit best).
1. Semi-skilled worker (e.g., factory worker, service station attendant)
2. Skilled worker (e.g., plumber, electrician)
3. Farm owner or operator
4. Small business proprietor
5. Office, sales, or skilled clerical worker (e.g., salesman, bookkeeper, stock clerk)
6. Public service employee
7. Executive or managerial position
8. Professional
9. Deceased, retired

PLEASE GO ON TO NEXT PAGE

128. As you see your situation at the present time, how much education would you like to get?
1. A year of college
2. Two years of college
3. Three years of college
4. Four years of college (Bachelor's Degree)
5. Master's Degree
6. Professional Degree or graduate work beyond Master's level

129. Which of the following statements BEST describes you?
(Choose ONE only)
1. I am committed to a particular field of study and am in college primarily to obtain training for my chosen career.
2. I am primarily concerned with the scholarly pursuit of knowledge, and the cultivation of the intellect.
3. I believe that the social and extracurricular activities of college life are just as important as the academic activities.
4. I am committed to a philosophy that emphasized individualistic interests and styles, concern for personal identity, and often, contempt for many aspects of organized society.

130. Of the three purposefully extreme statements, which one comes closest to describing your parents' policy in regard to your upbringing?
1. All policy in the hands of parents;
parents only source of control;
parents domineering and authoritarian
2. Parents suggest without coercing;
parents hope that children will understand reasons for regulations;
parents ready and willing to explain and interpret
3. Great permissiveness; few controls on behavior;
complete freedom for children

131. Size of your high school graduating class
1. Under 25
2. 25 - 99
3. 100 - 199
4. 200 - 399
5. Over 400

132. Approximately what was your overall grade-point-average in high school?
1. A+
2. A
3. A-
4. B+
5. B
6. B-
7. C+
8. C
9. C- or lower

- END OF THE SURVEY -

APPENDIX C. Score Distribution of The Academic Interest Scale

RAW SCORE	f	cf	PR	z-score
76	2	2	99	76.9
75	1	3	99	75.9
74	1	4	99	74.0
73	1	5	99	73.0
72	2	7	99	72.0
71	1	8	99	71.1
70	2	10	99	70.1
69	8	18	98	69.1
68	6	24	97	68.1
67	5	29	96	67.2
66	7	36	95	66.2
65	14	50	93	65.2
64	12	62	91	64.2
63	14	76	89	63.2
62	12	88	87	62.3
61	9	97	86	61.3
60	13	110	84	60.3
59	19	129	81	59.3
58	14	143	79	58.4
57	21	164	76	57.4
56	21	185	73	56.4
55	16	201	70	55.4
54	30	231	66	54.5
53	19	250	63	53.5
52	14	264	60	52.5
51	25	289	57	51.5
50	21	310	53	50.6
49	35	345	49	49.6
48	16	361	45	48.6
47	34	395	41	47.6
46	22	417	37	46.7
45	21	438	34	45.7
44	18	456	30	44.7
43	20	476	28	43.7
42	19	495	24	42.7
41	17	512	22	41.8
40	21	533	19	40.8
39	14	547	16	39.8
38	15	562	14	38.8
37	11	573	12	37.9
36	14	587	10	36.9
35	12	599	8	35.9
34	12	599	8	35.9
33	4	603	7	34.9

APPENDIX C. Score Distribution of The Academic Interest Scale (Continued)

RAW SCORE	f	cf	PR	z-score
32	7	610	6	34.0
31	10	620	4	33.0
30	7	627	3	32.0
29	4	631	2	31.0
28	1	632	2	30.1
27	3	635	1	29.1
26	3	638	1	28.1
23	2	640	1	25.2
21	1	641	0	23.2
19	1	642	0	21.3
17	1	643	0	19.3

Mean 48.43
Standard Deviation 10.24
Variance 104.92

APPENDIX D. Intercorrelation Matrix of 30 Variables used in the Factor Analysis.

Variable No.	1	2	3	4	5	6	7	8
1 (Intellectual Interest)								
2 (T-Physical Well-being)	-.067							
3 (T-Scholarship	.227	.126						
4 (T-Esthetiticism)	.246	.058	.259					
5 (T-Pragmatism)	.104	.219	.310	.287				
6 (T-Technical-Scientific)	.224	.172	.468	.225	.298			
7 (T-Sociability)	.073	.287	.165	.274	.248	.111		
8 (T-Sensitivity to Others)	.119	.233	.155	.308	.341	.080	.516	
9 (LG-Prestige)	.050	.125	.088	.135	.078	.026	.253	.154
10 (LG-Personal Happiness)	-.060	.119	.032	.066	.122	-.050	.220	.248
11 (LG-Humanistic-Cultural)	.322	.020	.101	.218	.110	.056	.147	.205
12 (LG-Religious)	-.031	.087	-.008	.052	.018	-.006	.133	.155
13 (LG-Scientific)	.234	.029	.206	.077	.085	.459	-.012	-.029
14 (LG-Artistic)	.177	.006	.004	.401	.076	.007	.106	.145
15 (LG-Hedonistic)	-.207	.086	-.046	-.001	.022	-.067	.104	.063
16 (Self-Concept of Ability)	.308	.102	.621	.239	.288	.385	.193	.184
17 (Sex)	.096	-.089	-.147	.068	-.106	-.160	.038	.027
18 (Community Lived)	-.047	-.030	-.094	-.114	-.074	-.086	-.082	-.101
19 (Father's Ed. Level)	.075	.077	.081	.101	.044	.061	.053	.067
20 (Mother's Ed. Level)	.077	.037	.077	.046	.021	.077	.055	.006
21 (High School Size)	-.002	.064	.138	.042	.115	.045	.112	.093
22 (Self-Reported Hs GPA)	.171	-.036	.421	.113	.031	-.199	.017	.023
23 (MSU Reading Test)	.271	-.137	.399	.118	.090	.205	-.037	-.034
24 (MSU Arithmetic Test)	.137	.013	.496	-.014	.112	.322	-.046	-.017
25 (MSU Mathematic Test)	.153	-.024	.561	-.068	.065	.344	-.098	-.086
26 (MSU Arith. & Math. Test)	.158	-.010	.577	-.051	.090	.362	-.084	-.064
27 (SAT-V)	.323	-.154	.408	.180	.115	.211	-.102	.004
28 (SAT-M)	.192	-.054	.495	-.025	.095	.304	-.125	-.050
29 (SAT-Total)	.275	.113	.495	.082	.119	.281	-.124	-.026
30 (High School GPA)	.191	.124	.446	.028	.021	.197	-.029	.010

APPENDIX D. Intercorrelation Matrix of 30 Variables Used in the Factor Analysis (continued).

Var. No.	9	10	11	12	13	14	15	16	17	18	19
1											
2											
3											
4											
5											
6											
7											
8											
9											
10	.073										
11	.292	.141									
12	.219	.257	.202								
13	.158	-.097	.101	.082							
14	.103	.144	.169	.144	.086						
15	.298	.208	-.015	-.018	.064	.134					
16	.158	.005	.182	.020	.192	.043	-.039				
17	-.164	.153	.031	.090	-.194	.142	-.170	-.158			
18	.067	-.063	-.003	.021	-.040	-.049	-.015	-.049	-.019		
19	-.048	.016	.011	-.084	-.067	-.011	-.060	.125	-.011	-.056	
20	-.035	.033	-.007	-.071	-.026	-.010	-.103	.107	-.017	-.040	.490
21	-.048	.077	-.098	.018	.023	-.010	.035	.023	.047	-.352	.145
22	.021	-.002	.033	.044	.070	-.015	-.048	.478	.064	.069	-.016
23	-.074	-.068	.096	-.106	.024	-.054	-.124	.436	-.097	-.038	.139
24	-.047	-.080	-.022	-.040	.128	-.139	-.124	.410	-.249	.014	.111
25	.005	-.021	-.052	.027	.225	-.179	-.088	.449	-.234	-.019	.108
26	-.016	-.047	-.043	.001	.202	-.176	-.110	.468	-.259	-.007	.118
27	-.105	-.072	.096	-.095	.053	-.036	-.181	.437	-.053	-.071	.208
28	-.060	-.054	-.032	-.050	.149	-.155	-.123	.448	-.263	.002	.144
29	.085	.063	.034	-.074	.113	-.103	-.158	.486	-.179	-.031	.191
30	.007	-.022	.071	.051	.046	-.065	-.127	.457	.082	.081	.040

APPENDIX D. Intercorrelation Matrix of 30 Variables Used in the Factor Analysis (continued).

Var. No.	20	21	22	23	24	25	26	27	28	29	30
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21	.085										
22	.004	-.125									
23	.148	.040	-.362								
24	.094	.038	-.385	.456							
25	.089	.091	-.373	.414	.706						
26	.099	.076	-.407	.463	.883	.955					
27	.168	.019	-.398	.703	.446	.403	.452				
28	.159	.065	-.403	.484	.691	.709	.757	.659			
29	.179	.054	-.436	.634	.633	.613	.669	.887	.920		
30	.072	-.012	-.723	.385	.423	.497	.505	.426	.440	.469	

APPENDIX E. Principle Axis Matrix - Unrotated 30 Factors with Rounded Loadings for the 30 Variables.

Factor No.	1	2	3	4	5	6	7	8	9	10
Variable No.										
1	352	-261	-400	-155	390	-004	-043	-180	145	-148
2	-027	-394	359	237	-121	059	329	-154	004	070
3	723	-287	128	015	-006	-149	108	034	-120	-045
4	146	-594	-312	001	225	-040	034	187	-157	202
5	217	-504	111	201	086	-103	279	192	167	-216
6	483	-282	239	054	398	-170	174	-218	-158	121
7	-016	-666	064	130	-230	026	222	021	048	216
8	035	-666	-036	127	-221	-018	186	102	241	-017
9	-007	-436	302	-307	-011	395	-239	032	-020	-351
10	-068	-377	002	027	-526	-037	-302	-036	054	328
11	082	-446	-219	-319	111	255	-202	-135	368	-193
12	-040	-309	085	-294	-316	-061	-308	-444	222	171
13	234	-184	325	-177	563	-090	-193	-292	-157	014
14	-101	-439	-274	-174	167	-031	-290	084	-298	432
15	-170	-212	397	-063	-129	199	-360	466	-368	-013
16	688	-330	004	-089	007	039	123	065	-110	-156
17	-220	-054	-571	-109	-270	-348	045	-259	-161	000
18	-043	182	056	-422	-098	459	362	-094	-014	288
19	196	-060	-243	561	-051	452	-047	-240	-208	-003
20	190	-022	-240	497	-035	471	-038	-327	-254	-004
21	074	-141	044	533	-078	-413	-350	-033	-040	-260
22	590	-018	-143	-389	-281	-094	188	034	-353	-135
23	674	075	-293	024	019	072	-058	248	101	063
24	784	150	220	038	-094	-005	007	-045	095	115
25	803	166	297	-001	-109	-067	-124	-166	003	041
26	858	172	288	015	-111	-047	-079	-128	041	075
27	744	085	-389	051	048	085	-094	247	148	046
28	846	199	077	072	-052	065	-111	058	137	129
29	871	154	-154	069	-007	084	-120	163	156	105
30	643	056	-162	-323	-306	-101	105	-093	-284	-204

* All decimal points are omitted

** Variable names are same with Appendix D.

APPENDIX E. Principle Axis Matrix - Unrotated 30 Factors with Rounded Loadings for the 30 Variables (continued).

	11	12	13	14	15	16	17	18	19	2	21
1	-088	365	087	038	-166	-172	162	101	-050	-220	-268
2	-079	-124	622	-007	-261	-043	-004	024	-026	065	-071
3	015	006	-006	-187	028	149	055	-076	-136	-066	181
4	299	-068	-034	-047	092	212	-222	060	-239	019	-247
5	-154	-161	-318	-345	-098	-198	082	200	210	005	-064
6	-225	-081	-059	064	079	211	-129	-028	032	051	-006
7	119	188	-071	331	033	221	112	-051	099	035	017
8	090	161	-138	282	094	-278	-150	-048	014	068	089
9	155	-088	-056	-069	-137	137	014	372	-057	-026	059
10	-445	169	-026	-032	119	118	089	-004	-237	-094	-052
11	-155	046	122	-326	114	-006	-183	-209	027	271	072
12	175	-434	-067	127	-024	-023	036	-067	127	-145	-110
13	-213	-014	-126	283	-056	-084	-058	-044	022	058	072
14	301	109	178	-041	-041	-134	201	-069	118	082	183
15	-214	110	016	048	-099	-063	-135	-031	186	001	-106
16	-034	-081	033	-095	044	-027	203	-132	-032	-269	243
17	-126	127	012	-020	-223	177	-181	270	198	038	184
18	028	136	-261	-008	-433	087	-006	-198	-104	040	005
19	037	-007	-023	-069	-006	-111	-336	-093	070	-301	048
20	-064	-053	-109	021	138	013	304	100	009	279	-061
21	114	-019	-153	-103	-411	-028	025	-206	-145	130	-046
22	-059	-133	056	065	075	-185	-031	-010	-045	058	-145
23	-093	-095	047	055	-086	286	122	-203	295	-038	-135
24	195	204	059	-053	059	031	-066	017	162	112	-091
25	108	190	-017	-096	045	036	-020	052	034	-068	-015
26	152	211	012	-086	054	047	-041	042	090	001	-048
27	-108	-195	050	176	-111	025	-056	052	-013	011	053
28	008	-005	023	125	-071	-091	-024	131	-147	087	109
29	-047	-101	033	159	-105	-043	-045	105	-098	060	095
30	-019	-058	-087	-074	021	-172	-017	-054	-022	113	-081

APPENDIX E. Principle Axis Matrix - Unrotated 30 Factors with Rounded Loadings for the 30 Variables (continued).

	22	23	24	25	26	27	28	29	30
1	-108	-090	-034	042	038	016	-008	-000	-000
2	011	084	028	017	-061	020	-003	-001	-000
3	-192	035	066	353	182	029	-014	-000	-000
4	-047	081	157	-085	-069	015	-033	001	-000
5	109	-038	081	026	-009	022	-003	001	000
6	-078	-201	-359	-071	-020	-022	018	-001	000
7	188	-270	158	056	-043	-005	013	-000	-000
8	-173	252	-178	-001	-007	-024	-002	-001	000
9	112	102	-191	-002	037	-001	-001	000	000
10	160	074	-056	-027	023	034	000	000	-000
11	001	-084	074	-019	-012	-051	009	000	-000
12	-157	-084	039	025	033	016	-006	000	000
13	165	218	224	024	017	037	-025	000	-000
14	120	-047	-129	048	-017	-025	010	000	000
15	-250	-111	085	-005	-013	025	000	000	000
16	-091	024	089	-337	-047	044	005	001	001
17	-103	045	084	-067	012	-011	-023	001	000
18	-035	009	-003	-021	005	-015	027	001	-000
19	156	-044	-023	060	037	-009	-027	001	000
20	-176	060	050	-023	008	-008	022	-000	-000
21	030	-011	-056	-085	033	-029	030	001	-000
22	117	-013	009	-041	200	-232	063	000	000
23	060	232	-097	039	-017	-075	-126	-001	000
24	059	014	-001	-150	262	200	003	001	-000
25	-033	064	045	055	-243	-168	091	-001	-000
26	003	049	029	-025	-052	-028	062	-001	000
27	022	-008	001	059	-030	101	240	035	000
28	-023	-155	036	-035	-007	-089	-221	-043	-000
29	-002	102	026	000	-008	001	-016	-070	-000
30	081	-021	-087	101	-220	232	-080	-001	-000