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A psychometric study of student attitudes as a measure of academic motivation: a dissertation...

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A PSYCHOMETRIC STUDY OF STUDENT ATTITUDES
AS A MEASURE OF ACADEMIC MOTIVATION

A Dissertation
Presented to
the Faculty of the School of Education
College of the Pacific

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
J. Kenneth Rowland
June 1958
Approval of Dissertation
by
Committee on Studies

Chairman,  

Date  March 12, 1957
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CHAPTER I

INTRODUCTION

Teachers, counselors, and others interested in the academic achievement of high school and college students have long been aware that some pupils who appear to have adequate intellectual ability as measured by standardized tests of intelligence or academic aptitude fail to make satisfactory academic progress in school. These are the students who are commonly referred to as "under-achievers." Observers of this problem at all levels of education have been aware that the "under-achiever" usually lacked some personality factor related to his total development. Various terms such as "Ambition," "Interest," "Drive," or "Emotional Maturity" have been used to describe this factor. Regardless of the term used, there is common agreement that these factors, which for the purpose of this study have been grouped under the term "Academic Motivation," are a necessary requisite for academic success. If evidence were needed that the level of academic motivation can spell the difference between academic success and failure it could be provided by an examination of the records of hundreds of young men who returned to college after the last war. In numerous cases there was a definite improvement in academic achievement as a result of a change in attitudes and
personality factors related to academic achievement.

I. THE PROBLEM

Statement of the problem. The problem under investigation in this study is to determine whether or not students will give an indication of the strength of their academic motivation through the attitudes and opinions they express. In other words, is it possible to construct a paper-and-pencil test or measuring instrument which will utilize the opinions and attitudes of students to gain a significant clue as to their motivation or drive toward academic achievement?

A solution of the problem will be sought by the selection of certain attitudes and opinions, which appear to differentiate between achievers and under-achievers, and by the construction of a measuring instrument based on these attitudes and opinions.

Hypothesis. Stated in the form of a null hypothesis the product-moment coefficient of correlation between academic achievement and the score made on an inventory of academic motivation will be no higher than could be expected according to chance.

Type of research and the measuring instrument. In order to prove the stated hypothesis it became necessary to
construct an instrument for measuring the level of a student's academic motivation, which could be compared with his academic achievement. The details of the construction of the instrument to measure the level of motivation are described in Chapter III. In brief, a number of questions were selected which attempted to get at some of the factors which appeared to distinguish between the achievers and the under-achievers. After the instrument had been refined, it was administered to a sample of more than eight hundred entering freshmen in a public junior college, the records of the students were examined at the close of the first semester to determine the level of their academic achievement in terms of a grade-point average or ratio. Groups of achievers and groups of under-achievers were selected by the use of three different sets of standards. The test scores of these groups were item analyzed to determine a characteristic pattern of response which would differentiate between the achiever and the under-achiever.

After the establishment of a scoring criterion the entire group of student inventories was scored and the scores of each student compared with his first semester grade-point average to determine the correlation which might exist.

Importance of the study. A wide variety of tests has been developed to assist counselors and others to
predict the academic achievement of students. Most of the
aptitude and intelligence tests in current usage as a part
of the counseling program show a low degree of reliability
in predictive value. The correlation between academic
grades and scores on the American Council on Education
Psychological Examination (hereafter designated as ACE) vary
from an r of .27 to .60 as reported by Segel. The great
majority of studies covered by his report showed a
correlation below .50. These findings are cited as an
example because the ACE has been the most extensively used
test of college aptitude.

This study was undertaken in a California public
junior college in which improved counseling and evaluative
instruments are of particular importance because of the legal
admission requirements, which are non-selective. One
common characteristic of the junior college student popula-
tion is the relatively large number of students with good
academic potential who are under-achievers. Early
identification and counseling of these individuals in the
junior college program could make a definite contribution
to their educational development.

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1David Segel, Prediction of Success in College,
United States Office of Education, Bulletin No. 13
Limitations of the study. The physical, intellectual, and emotional factors which may influence academic achievement are so numerous that for a study of this type it is necessary to limit the scope of the investigation to a few of the more easily identified factors which shall be referred to as opinions and/or attitudes.

A group of Modesto Junior College freshmen were used as a basis for this study, but because of the similarities between high school seniors and college freshmen, the results of this study could be applicable to high school seniors.

This study will be limited to the problem of examining the thesis that students give a clue to the strength of their motivation toward academic success through the opinions and attitudes they express. The manner in which these are expressed becomes an important aspect of this investigation. A self-analysis type of multiple-choice inventory was constructed to provide an opportunity to sample the attitudes of students. The limitations of this type of instrument are generally recognized since the validity of responses depend almost entirely upon the honesty and accuracy of the individual in answering the questions. Some students have a great deal more insight into their feelings and attitudes than do their peers. It is quite possible for a student to determine what the most desirable
response should be and mark his paper accordingly.

The measure of academic achievement, as defined in
this paper, was taken from the first semester grade reports
of the students in the sample group. It is recognized that
academic grade reports are but a rough measure of the
achievement of the individual. In addition, there was no
take to separate students by curricular major or
difficulty of subject matter for which they were enrolled.

As a measure of the academic potential of the
students in the sample group, their scores on two standard-
ized group tests were included in the study. There are
basic limitations to the accuracy of academic aptitude tests
of this type which are inherent in any objective, multiple-
choice, group test of intelligence or ability.

No attempt has been made to separate the sample group
by age, sex, or other characteristic; rather they have been
considered as a complete cross-section sample of a rather
typical junior college freshman student population.

II. DEFINITIONS OF TERMS USED

In an attempt to avoid the confusion which might
rise from the terminology employed in this study, the
following definitions are set forth to indicate the meaning
ascribed to each in this paper.
**Academic motivation.** The inner drive or force which causes a student to work toward desirable educational goals or objectives.

**Academic achievement.** The successful completion of a course of study or curriculum as evidenced by grades assigned by the instructors.

**Academic potential.** The capacity to do academic work as measured by certain standardized tests of academic aptitude. This also may be thought of as an indication of the level of intelligence of the individual.

**Non-intellectual.** Those factors in the total personality of the individual, exclusive of measured intelligence, which might influence his academic achievement.

**Under-achiever.** Any one who earns a grade-point average below the level of expectation based on his academic aptitude test scores. Generally speaking this would include students who ranked an average of one grade-point or more below the mean for students with similar academic aptitude test scores.
III. ORGANIZATION OF THE THESIS

In the development of this paper it was necessary to examine existing research in the general area and review the literature for an overview of the problem. Chapter II will give a summary of this review of the literature.

Chapter III will be devoted to the construction of the "Academic Motivation Inventory" and the development of the scoring criterion.

The statistical treatment of the Inventory will be described in Chapter IV using the class of 1955 as a basis.

Chapter V consists of the validation studies which were made with the class of 1956 and the summary of the total statistical data on which the conclusions are based.

A final summary of the problem and the conclusions reached on the basis of evidence presented will be given in Chapter VI.
CHAPTER II

REVIEW OF THE LITERATURE

With the widespread use of intelligence and aptitude tests following the close of the first World War in 1919 it became apparent to guidance workers that there were factors other than intelligence and aptitude which had to be taken into consideration in attempting to predict academic achievement. Research was undertaken by a number of workers using a variety of approaches. As early as 1923 considerable research had been reported in the professional journals. A review of the literature shows that research projects in various methods of predicting academic achievement have been carried on at an ever increasing rate. Nearly every phase of the problem has been subjected to critical investigation. This chapter will not attempt to present a definitive review of all the literature available but will be limited to a sampling of some of the typical research papers.

I. STUDIES IN THE PREDICTION OF ACADEMIC ACHIEVEMENT

Aptitude tests, which are designed to measure the potential ability of students in various academic fields, have been published for use at all levels of education. The publishers of these tests have cited the correlation between their tests and some other test of aptitude or
intelligence as proof of the validity of their instrument. Ruch and Orata made a review of the literature in testing up to 1939 and found a vast accumulation of information dealing with intelligence testing and aptitude testing for school and college work. Nevertheless, they reported that there seemed to be an inadequate predictive value for the tests being used at that time.¹

The American Council on Education Psychological Examination (hereafter designated as ACE) was first published in 1923 and has had extensive use since that time. In the development of norms for the 1938 edition of the ACE 71,084 students in 356 colleges were tested by Thurstone. In his report of the normative study on the ACE Thurstone also presented the results of correlation studies in a variety of colleges between the grade-point average of students and their scores on the ACE. He found the coefficient of correlation to range from .46 to .53 on these studies with an average correlation of .50.²

Osborne, Sanders, and Green found that there was little differential predictive value in the sub scores of the ACE


and that the total score had greater predictive value in certain subject areas such as natural science and language than it did in such other areas as music or the fine and applied arts.  

A study by Brown conducted at the Long Beach Junior College in 1947 showed the correlation between the score on the ACE and first semester grade-point averages to be .40, with a great amount of overlap in the grade-point average when ACE scores were placed in rank order. Brown concludes that students with high ACE scores tend to make better grades and students with low ACE scores tend to make poor grades. There is little or no predictive value for the individual student.

The Army General Classification Test (hereafter designated as AGCT) has been made available in a civilian edition which has been used by many colleges as a part of the battery of tests for entering students. Chappell found at the University of Missouri in 1951 that this civilian edition of the AGCT was as good as the ACE or the Cooperative English Test for predicting first semester grades. There


were all cases in his study and when the first semester
grade-point average of each student was compared with his
score on the ACT the coefficient of correlation was found
to be .41.5

Jackson in a study of Michigan State College freshmen
during the fall semester of 1952, which included 2,333
entering students, found that the Michigan State College
Reading Examination when correlated with first semester
grades gave a coefficient of .50 and when the ACE was
correlated with the first semester grades the coefficient
was .43, while the other tests included in the freshman test
battery produced correlation coefficients ranging between
these two. He concluded that individual prediction of
success or failure in college was not possible with the test
instruments then in use.6

High school grades have been suggested as having a
better predictive value in determining probable success or
failure in college than either intelligence or aptitude
tests and numerous studies have been made to ascertain the
predictive value of the high school record. Segal found

5Tolan L. Chappell, "Note on the Validity of the Army
General Classification Test as a Predictor of Academic
Achievement," Journal of Educational Psychology, 46:53-5,

6Robert A. Jackson, "Prediction of Academic Success
of College Freshmen," Journal of Educational Psychology,
the median correlation between high school grades and college grades to be .55, which is considerably higher than the correlation found between intelligence test scores and college grades. Even this correlation would appear to be of little value for individual prediction because of possible variation in high school grading standards and lack of uniformity in the high school curriculum.

In a review of the literature describing factors affecting college grades, Harris analyzed 323 studies from 1930 to 1937. He concluded that high school grades show higher correlation with college grades than do the scores on intelligence tests. Other factors such as age, sex, family background, and related items were of little or no value in attempting to predict college grades. He also concluded that personality and interest tests showed some promise and should be given further study.

Brown, Ables, and Iscoe reviewed the literature dealing with study factors influencing student success or failure in college and found a pattern of significant personality differences between the good and poor students.

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In summary they observed that:

1. The poor college student is characterized by "Activity Delay." This is demonstrated by a tendency to procrastinate and an unwillingness to conform to academic requirements, routine, and regulations.

2. This activity delay is not limited to the classroom but exhibits itself in other areas.

3. The poor student does not necessarily score low on intelligence tests but factors of interest and motivation are primary contributors toward low scholarship.

Most of the studies of personality differences have used the questionnaire method. When the questions were limited to study habits, the correlation obtained was consistently low ranging from -.20 to .16, but when the studies attempted to identify those personality characteristics which seemed to discriminate between the good and poor student, certain behavior patterns could be identified.9

II. STUDIES OF THE NON-INTELLECTUAL FACTORS INFLUENCING ACHIEVEMENT

In the literature on testing, numerous references are found to the fact that there are certain non-intellectual factors which must be taken into consideration in attempting to predict academic success. A variety of techniques have

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been used to measure these factors.

In a study at Sarah Lawrence College, Tiebout was able to identify four definite characteristics of the poor student, which he described as:

1. A need to rely on strong and immediate motivation to begin to study.

2. A tendency to possess interests of transitory and impermanent nature.

3. A tendency to be governed by strong hedonistic principles.


His observations were made over a three-year period and were designed to discover the syndrome described as "laziness."10

The Occupational Level key of the Strong Vocational Interest Blank has been used by many counselors as a method of determining the strength of the student's motivation or drive toward academic success, but Bardie found a product-moment correlation of only .03 between the OL score on the Strong and college grades.11 Ostrom found that when academic ability was held constant the OL key of the Strong did give significant differences between the high and low achievers. The results do not justify the use of this


instrument as a single measure of motivation, but demonstrated the value of the OL key on the Strong as part of a battery of tests.\textsuperscript{12}

Projective tests of personality such as the Rorschach Ink Blot Test have been investigated as having a possible predictive value by the early identification of traits which might affect academic achievement. Multiple-choice forms of the test were constructed for group administration, and a variety of experimental studies were carried out. Clark has reported one of the more recent experiments at Brigham Young University using the test forms and scoring technique developed in previous studies. His validation studies showed that the group Rorschach, scored by the best techniques which had been developed, gave a product-moment correlation of .10 when compared with academic grades. His conclusion was that this is not a significant figure and that, therefore, the use of the group Rorschach as a predictive instrument could not be justified.\textsuperscript{13}

The measurement of non-intellectual factors related to academic achievement has proved to be a difficult task.


A review of studies prior to 1933 by Stagner showed negligible relationships between various tests of personality and grade averages for college work.\textsuperscript{14} Gough has examined a number of studies concerning the non-intellectual factors related to scholastic achievement and he concludes that the test items in present-day personality tests were not designed to measure academic motivation. He feels that additional research is needed to item analyze test questions in order to construct a personality test which will discriminate more adequately between achievers and under-achievers.\textsuperscript{15}

In an analysis of the Cornell University Orientation Inventory, Chahbazi summarized several studies made at Cornell between 1951 and 1953 and found a correlation between the grade-point average of students in the freshman class and their score on the Cornell Orientation Inventory of .275, but the correlation between the Orientation Inventory and other tests used in the entrance testing program was .10 or below. It was his conclusion that the Inventory measured certain non-intellectual factors which

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made it a useful instrument in the guidance program as evidenced by the fact that when used with the other tests it increased the multiple correlation r. 16

Numerous inventories of study habits have been published during the past twenty-five years, but an analysis of the data by Locke indicated a poor correlation between scores on the various inventories and academic achievement. 17 Brown and Holtzman developed an inventory of study habits and attitudes in which the attitude factors were found to have a higher correlation coefficient than the study skills factors when compared with academic achievement. 18

In a study at De Paul University in 1942 Brooks and Heston prepared a composite study habits inventory made up of items which had appeared in two or more such inventories taken from the hundreds of previous studies they found in the literature. These men showed that study habits and study

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skills inventories were of no statistical value in the prediction of academic success.\textsuperscript{19}

The College Inventory of Academic Adjustment by Borow is an instrument which attempts to measure some of the non-intellectual factors in college achievement. The ninety items in the test are divided into the following sections: curricular adjustment, maturity of goals, personal efficiency, study skills, mental health, and personal relations. The correlation between this test and academic grades has been found to be .32, while the correlation between this test and scores on academic aptitude tests is low. Borow feels that this indicates that his test measures areas not measured by aptitude or intelligence tests.\textsuperscript{20}

The development of an instrument for measuring the non-intellectual factors associated with academic achievement has been under investigation by one of the major test publishers. The College Entrance Board recently underwrote the expense of a study, by Myers and Schultz, to develop such an instrument. Previous attempts to predict

\textsuperscript{19} Fowler D. Brooks and Joseph C. Heston, "The Validity of Items in a Study Habits Inventory," \textit{Journal of Educational Psychology}, 36:257-70, May, 1945.

academic achievement through the use of attitude, interest, motivation, or personality inventories had uniformly shown a positive but discouragingly small relationship between test scores and academic achievement. As described by Myers and Schultz, their study was undertaken in the hope that a better instrument could be developed which would predict academic achievement more accurately by measuring the strength of certain of the non-intellectual factors related to academic achievement. The instrument which they developed contained 145 items classified into three groups: motivation for attending college, intellectual interests, and teacher relations and study habits.21

During the fall semester of the school year 1945-1946 the instrument was administered to the entering freshmen in a college for women. At the close of the first semester the achievement of each student was converted to an achievement quotient using the first semester grade-point average as the dividend and the score on the College Entrance Board Examinations as the divisor. On the basis of this achievement quotient the students who were classed as over-achievers and under-achievers were identified and their answers on the

Attitude-Interest Questionnaire were analyzed to determine which questions would discriminate between the achievers and non-achievers. Scoring keys were prepared on the basis of this item analysis, and the papers of all the students were scored to permit a comparison between the achievement quotient and the Attitude-Interest score.

The same process was repeated with the entering class of 1949-1950 to determine the consistency of results and to further validate the results obtained on the first group. Correlation studies show a small but persistent relationship (r = .11 to .16) between the achievement index and the scores on the Attitude-Interest Questionnaire. This seems to indicate the existence of certain measurable factors which can be identified by such a method. A combination of scores on the College Entrance Board Examinations and the Attitude-Interest Questionnaire gave an increased predictive value to the measurement of possible academic success in college.\(^22\)

III. SUMMARY

In summary it may be said that a review of the literature indicates that during the past four decades
considerable attention has been devoted to the prognosis of scholastic achievement. The hundreds of studies reported include many different approaches to the problem. A number of aptitude, intelligence, study skill, interest, and personality tests have been developed and used in an attempt to answer the question. Despite this vast amount of research, the results obtained have shown that additional work is needed to develop instruments in those areas which have shown promise.
CHAPTER III

DEVELOPMENT OF THE ACADEMIC MOTIVATION INVENTORY

In order to design an experimental program to test the hypothesis on which this study is based, it became necessary first to select the paper-and-pencil measuring instrument to be used. After an extensive survey of the literature and an examination of test reviews published by Buros, the investigator decided to attempt the construction of an original test in the hope that it would be better suited to this particular program. This chapter will describe the steps involved in the preparation of the "Academic Motivation Inventory," the manner in which the items were selected, the construction and pre-testing, the development of the scoring keys, and some of the rationale involved.

I. SELECTION OF TEST ITEMS

During the spring semester of 1955 a personal interview program was conducted to secure the responses of a number of counselors, instructors, and students to the

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question, "What behavior patterns, attitudes, and opinions seem to differentiate students who achieve academic success from those who fail to achieve?" Responses were secured by interviews with twenty-four teachers and counselors in the junior college and senior high schools of Modesto. Seventy-two students from the senior high schools and thirty-six students from the junior college also contributed to the responses received. The notes taken during the conferences with teachers and counselors were analyzed, together with the written comments of the students, to determine whether there was any uniformity of response which would indicate a pattern of attitudes and opinions. It soon became evident that both the faculty and students mentioned many of the same items and there was sufficient agreement that it was possible to identify certain characteristics as an indication of ideas, opinions, or attitudes which seem to differentiate the achiever from the under-achiever. The factors which were most frequently mentioned could be grouped under the following headings:

Value structure and conformity to the peer group.

Parental expectation, encouragement, and understanding.

Attitude toward teachers and respect for the requirements of the school.

Relative orientation to vocational or educational objective.
Regularity of attendance, work habits, and general dependability.

There were numerous references by teachers and counselors to the fact that the under-achievers seemed to have a false sense of values. They were reported to be overly concerned with making an impression on their peers. The following is an example of a question used in the "Academic Motivation Inventory" which was directed toward that group of attitudes:

Question No. 10. Getting in with the right crowd in school is the most important step toward academic and social success.

Parental relations were cited as an important factor by nearly every person interviewed. An example of the questions, which were written to test this factor, is shown by the following item:

Question No. 24. The way in which parents react to the grades on a student's report card will often determine how hard he tries.

The way students reacted toward their teachers, the way they felt about required courses, and their general attitude toward school seemed to be a commonly reported factor. The students who responded, placed this factor near the top of the list. It is possible that the students who do not achieve, tend to place the blame on the teacher or the course of study. Question No. 26 is an example of one approach to this factor.
Question No. 66. If a particular subject, which you are required to take, does not interest you, do you pay attention and try to do your best?

Academic motivation is closely related to the vocational or educational objective of the student. The interview responses cited numerous cases where academic motivation had been influenced by an immediate vocational objective. An example of a question directed to this factor is found in No. 88.

Question No. 89. Do you see a definite relationship between the courses you study and your vocational objective?

Work habits, use of time, attendance, dependability, and related ideas were combined in the last group. They are really behavior characteristics which may be an indication of an attitude. The following question is an attempt to measure one of these work habits.

Question No. 101. Are you able to complete your homework assignments and turn them in on time?

In the development of the "Academic Motivation Inventory" the factors mentioned above were used as a basis for the questions written but no attempt was made to place the questions in groups or classification. In fact, there was a deliberate attempt to avoid any grouping by factors.

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2A complete copy of the "Academic Motivation Inventory" will be found in the Appendix, pages 71-87.
II. CONSTRUCTION OF THE INVENTORY

One of the more difficult problems which the investigator had to solve was how to write questions which would elicit responses that would be indicative of the real attitudes and opinions of the student without being so obvious that the student could determine the "correct" or desirable response and thus not give a true expression of his own opinions and attitudes.

The type of question in Part I of the inventory asks the student to react to a group of questions about students in general. The questions may be answered by checking "Yes," "No," or "No Opinion." It was hoped that by asking the students to respond to the questions in terms of the way they thought other students felt and behaved it might be possible actually to discover how they themselves thought.

Part II was designed to secure the student response to a set of questions in terms of the degree in which the particular statement applied to the student answering the question. These questions were not worded so that a simple "yes" or "no" response could be used but instead they required an indication of relative frequency. It was decided to provide a five-point scale ranging from "Always" to "Never" rather than attempt to set up a numerical or percentage scale. Because the test was intended to be
scored on the I.B.M. test scoring machine, its physical organization was dependent upon the selector fields available on the machine.

A pool of questions was prepared for the two parts of the inventory and a preliminary copy of the instrument was reproduced for experimental use. This experimental edition was first administered to a summer session class in guidance at the College of the Pacific during the summer of 1955. The class was composed of twenty-five teachers and counselors, most of whom were experienced workers in the upper secondary field, and thus were familiar with the vocabulary appropriate for use with high school seniors and college freshmen.

These adults were asked to put themselves mentally in the position of a typical June graduate from high school who would be entering junior college in the fall and to answer the questions from that point of view. After they had completed the inventory they were asked to react to it and indicate how well it seemed to be suited to the students for whom it was intended. During the discussion which followed, a number of suggestions were made concerning the vocabulary used and the wording of certain questions which they felt would not be interpreted properly by students.

On the basis of the reactions of this group a number of the questions were rewritten completely and in others a
few words were substituted for those used originally. Copies of this revised form of the inventory which consisted of fifty questions in Part I and seventy-five questions in Part II were then reproduced.

The revised instrument was administered to two senior problems classes in one of the local high schools to secure the reactions of a representative group of students. These high school seniors felt that the questions were not difficult to understand or to answer. One fact which became apparent in the classroom administration of the inventory was the difference in the rate at which students worked as a result either of difference in reading skill or of differences in the facility with which they could respond to the questions.

As a result of the experience with this preliminary group administration it was decided to add a third section of open-end or essay type of questions which would provide an opportunity, for those who completed Parts I and II before the end of the test period, to make additional evaluation of the level of their academic motivation. The questions included in Part III were intended only to provide material to keep the entire group occupied until the end of the testing period, and it was not anticipated that they would be of any particular value as a part of the inventory. After the inventory had been administered to the entering
freshmen in the fall of 1955, it was discovered that in many cases the students had given a good self-evaluation. The counselors who worked with the instrument felt that these "filler" questions have in some cases provided valuable clues which could be developed in the counseling interview.

III. PREPARATION OF SCORING KEYS FOR THE MOTIVATION INVENTORY

The "Academic Motivation Inventory" was administered during the fall semester of 1955 as a part of the battery of tests included in the freshman orientation program at the Modesto Junior College. The other tests included in the freshman testing program included: The American Council on Education Psychological Examination (hereafter designated as ACE), the Army General Classification Test (hereafter designated as AGCT), the Cooperative English Test, the

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Cooperative General Achievement Test,⁶ as measures of aptitude and achievement, and the Kuder Vocational Preference Record,⁷ as a measure of the vocational interest.

After the close of the fall semester the grade-point average was computed for each student who had completed the semester with more than a half-time program. At this time the college was on the three-point grading system; each unit of work with a grade of "A" counting for three grade-points or honor-points, each unit of "B" work counting for two points, each unit of "C" work counting for one point, and no points being counted for work of less than "C" grade.⁸

Three separate pairs of sample groups were selected, as shown in Table I, to provide a basis on which to item analyse the responses to the questions in Part I and Part II of the "Academic Motivation Inventory." The first pair consisted of two hundred students with a first semester grade-point average between 1.00 and 1.49 (mean average of


⁸The term "three-point grading system" is commonly used by college registrars but this is really a four-point system since the work of "D" or "F" grade receives zero grade-points.
<table>
<thead>
<tr>
<th>Group</th>
<th>&quot;A&quot; (Achievers)</th>
<th>&quot;B&quot; (Non-Achievers)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=100</td>
<td>N=100</td>
</tr>
<tr>
<td>Grade-point average</td>
<td>ACE Score</td>
<td>ACE Score</td>
</tr>
<tr>
<td>1.00 to 1.49</td>
<td>85 or less</td>
<td>101 to 150</td>
</tr>
<tr>
<td>Group II</td>
<td>N=100</td>
<td>N=100</td>
</tr>
<tr>
<td>ACE Score not considered</td>
<td>GPA</td>
<td>GPA</td>
</tr>
<tr>
<td></td>
<td>2.00 to 2.99</td>
<td>2.50 or less</td>
</tr>
<tr>
<td>Group III</td>
<td>N= 67</td>
<td>N= 66</td>
</tr>
<tr>
<td>ACE Score 90 to 120</td>
<td>GPA</td>
<td>GPA</td>
</tr>
<tr>
<td></td>
<td>1.75 or more</td>
<td>0.90 or less</td>
</tr>
</tbody>
</table>
the group being 1.255). The first group, of this pair, which was designated as the A section, consisted of one hundred students who had a total score of 65 or less on the ACE and were selected as representing those who had achieved as well or better than would have been expected on the basis of the ACE raw score. The second group, which was designated as the B section, consisted of one hundred students who had total scores of 101 to 160 on the ACE, and were selected as representing those who had not achieved as well as might be expected on the basis of their ACE raw scores.

The second pair consisted of two hundred students selected on the basis of their grade-point average without regard to the ACE test scores. The first group, of this second pair, which was designated as the A section, consisted of one hundred students who had earned a grade-point average of 2.00 to 2.99. The second group, which was designated as the B section, consisted of one hundred students who had earned a grade-point average of 0.50 or less.

The third pair consisted of 150 students with a total raw score on the ACE between 90 and 120. The first group, of this pair, designated as the A section, consisted of sixty-seven students who had earned a grade-point average of 1.75 or better. The second group, designated as the B
section, consisted of sixty-six students who had earned a grade-point average of 0.90 or less.

Each pair was a separate and distinct group and no student was included in more than one section. The groups described above gave six sets of answer sheets which were item analyzed to determine whether there were any characteristic patterns of responses on the inventory which would distinguish between the achievers and the non-achievers.

A count was made of the number of responses given for each possible answer to every question in Part I and Part II. There were three possible responses to each of the fifty questions in Part I and five possible responses to each of the seventy-five questions in Part II, or a total of 525 possible responses to be counted for each set of papers. As might have been expected, there were no questions which made an absolute distinction between the achievers and the non-achievers, but the total pattern of responses did show a difference between the A and B sections of each group. Sample questions have been reproduced in Table II to illustrate the manner in which the frequency of response in each scoring position was used to establish the scoring key.

Answers which were selected more frequently by achievers than by non-achievers were counted as "Right" and answers which were selected more frequently by non-achievers
### TABLE II

**Sample Questions from the Academic Motivation Inventory to Illustrate the Method Used to Establish the Scoring Key**

<table>
<thead>
<tr>
<th>Part I</th>
<th>Scoring Response of Sample Groups</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Per cent</td>
<td>Per cent</td>
<td>Per Cent</td>
</tr>
<tr>
<td></td>
<td>Agree</td>
<td>Disagree</td>
<td>No Opinion</td>
</tr>
</tbody>
</table>

#### Question No. 10.
Getting in with the right crowd in school is the most important step toward academic and social success.

| A Section (achievers) | 33 | 53 | 9 |
| B Section (under-achievers) | 55 | 38 | 7 |

**SCORING KEY** count

#### Question No. 24.
The way in which parents react to the grades on a student's report card will often determine how hard he tries.

| A Section (achievers) | 62 | 11 | 7 |
| B Section (under-achievers) | 63 | 24 | 13 |

**SCORING KEY** count

eliminate
### TABLE II (continued)

<table>
<thead>
<tr>
<th>Question No. 66.</th>
<th>Always</th>
<th>Generally</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>If a particular subject, which you are required to take, does not interest you, do you pay attention and try to do your best.</td>
<td>26</td>
<td>51</td>
<td>9</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>A Section (achievers)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Section (under-achievers)</td>
<td>18</td>
<td>43</td>
<td>9</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>SCORING KEY</td>
<td>R</td>
<td>R</td>
<td>eliminate</td>
<td>W</td>
<td>W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question No. 69.</th>
<th>Always</th>
<th>Generally</th>
<th>Frequently</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you see a definite relationship between the courses you study and your vocational objective.</td>
<td>49</td>
<td>32</td>
<td>5</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>A Section (achievers)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B Section (under-achievers)</td>
<td>35</td>
<td>33</td>
<td>7</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>SCORING KEY</td>
<td>R</td>
<td>eliminate</td>
<td>eliminate</td>
<td>W</td>
<td>eliminate</td>
</tr>
</tbody>
</table>
TABLE II (continued)

<table>
<thead>
<tr>
<th>Question No. 101.</th>
<th>Scoring Response of Sample Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Always</td>
</tr>
<tr>
<td>Are you able to complete your homework assignments and turn them in on time.</td>
<td></td>
</tr>
<tr>
<td>A Section (achievers)</td>
<td>39</td>
</tr>
<tr>
<td>B Section (under-achievers)</td>
<td>14</td>
</tr>
<tr>
<td>SCORING KEY</td>
<td>R</td>
</tr>
</tbody>
</table>

NOTE: The International Business Machines Company has provided for an elimination key to be used with their electric test scoring machine. By using the elimination key it is possible to count the "Right" and "Wrong" masters, and to eliminate those answers which are not to be counted.
than by achievers were counted as "wrong" while answers which were marked with the same frequency by both groups were eliminated from the scoring.

An attempt was made first to develop a system of weighted scores for the questions in Part II, but the problem of adapting this to the I.B.M. test scoring machine made it seem advisable to use an alternate system with an elimination key to reject all response positions which did not show any discrimination between the achievers and non-achievers. By use of the selector switches on the I.B.M. test scoring machine, it was possible to count a plus score for each response chosen most frequently by the A sections and to count a minus score for each position chosen most frequently by the B sections. This scoring system results in some students receiving a minus score on either part of the inventory or on both parts. This presented no problem in the development of the statistical data or in the use of the instrument by counselors since the raw scores could be easily converted to standard scores using a score of 50 for the mean and scaling upward and downward in intervals of .1 sigma.
IV. SUMMARY

In this chapter the investigator has reviewed the steps involved in the development of the "Academic Motivation Inventory" and has suggested reasons for its development. The test questions were selected on the basis of an investigation into some of the attitudes and opinions which seem to differentiate between the achievers and non-achievers as suggested by selected teachers, counselors, and students. The two parts of the inventory attempt to secure the same kind of information from different types of questions in the hope that a more accurate response may be obtained. The responses of a group selected as representing the achievers were compared with the responses of a group selected as representing the non-achievers, and by item analysis a scoring key was developed. Chapter IV will describe the use of the inventory and the statistical treatment of the data obtained.
CHAPTER IV

STATISTICAL STUDY OF THE ACADEMIC
MOTIVATION INVENTORY

The study described in this chapter was undertaken
to determine the relationships which might exist between
the first semester grade-point averages of the students in
the 1955 freshman class at the Modesto Junior College and
their scores on the "Academic Motivation Inventory." In
addition, the scores made on the American Council on
Education Psychological Examination (hereafter designated
as ACE) and the Army General Classification Test (hereafter
designated as ACCT) were also compared with the grade-point
average to provide a basis for determining the relative
predictive value of the "Academic Motivation Inventory." An
achievement quotient was derived for each student and was
compared with the score on the inventory to give an
additional measure of the predictive value of the motivation
inventory. The purpose of these various comparisons was to
secure data relative to the solution of the problem posed by
the hypothesis stated in Chapter I. The null hypothesis
stated was that the product-moment coefficient of correlation
between academic achievement and the score made on an
inventory of academic motivation will be no higher than could
be expected according to chance.
I. CONVERSION OF RAW SCORES TO "T" SCORES FOR PROCESSING DATA

Because of the scoring technique developed for the "Academic Motivation Inventory" it was necessary to convert the raw scores into some type of standard score to avoid the necessity of working with negative scores.

The standard score selected was the "T" score which assigns a score of 50 to the mean of the raw score distribution and is scaled in each direction from the mean in units of .1 sigma. With an approximately normal distribution of raw scores on the various parts of the test the scores ranged three standard deviations each way from the mean and gave a "T" score distribution from 20 to 80, as shown in Table III.

Raw scores on the ACE and the AGCE were also converted to "T" scores in the same manner. The grade-point averages were likewise converted to "T" scores to make possible the direct comparison of scores using an equal interval scale.

II. COMPARISON OF SCORES ON MOTIVATION INVENTORY WITH ACHIEVEMENT QUOTIENT

This part of the investigation was an attempt to compare the score on the "Academic Motivation Inventory" with
### TABLE III

"T" Score Conversion of Raw Scores on Academic Motivation Inventory for 845 Students Entering Modesto Junior College in 1955

<table>
<thead>
<tr>
<th>&quot;T&quot; Score</th>
<th>Raw Score Part I</th>
<th>Raw Score Part II</th>
<th>Raw Score Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>36</td>
<td>47</td>
<td>71</td>
</tr>
<tr>
<td>75</td>
<td>33</td>
<td>43</td>
<td>64</td>
</tr>
<tr>
<td>70</td>
<td>30</td>
<td>37</td>
<td>57</td>
</tr>
<tr>
<td>65</td>
<td>27</td>
<td>31</td>
<td>51</td>
</tr>
<tr>
<td>60</td>
<td>23</td>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>55</td>
<td>20</td>
<td>20</td>
<td>37</td>
</tr>
<tr>
<td>50</td>
<td>16</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>45</td>
<td>13</td>
<td>6</td>
<td>29</td>
</tr>
<tr>
<td>40</td>
<td>10</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>35</td>
<td>6</td>
<td>-3</td>
<td>10</td>
</tr>
<tr>
<td>30</td>
<td>3</td>
<td>-6</td>
<td>4</td>
</tr>
<tr>
<td>25</td>
<td>0</td>
<td>-14</td>
<td>-3</td>
</tr>
<tr>
<td>20</td>
<td>-3</td>
<td>-19</td>
<td>-10</td>
</tr>
</tbody>
</table>
a measure of the level of achievement. In order to have a score which would be indicative of the level of achievement for each student it was decided to derive an achievement quotient for each student.

Achievement in the academic aspects of college work is usually measured in terms of grades earned in the courses undertaken. During the year that this phase of the study was being carried out, Modesto Junior College was using the three-point system of computing honor points or grade-points. This is the usual mathematical device of assigning a value to each grade so that the arithmetic mean can be computed for easy comparison.

Under this three-point system each unit of work with a grade of "A" earns three grade-points, each unit of work with a grade of "B" earns two grade-points, and each unit of work with a grade of "C" earns one grade-point. There are no points assigned for work with a grade of "D" or "F" but points are not deducted for work with a grade of "F" as is the custom in some colleges.

The grade-point average (hereafter designated as the GPA) is computed by dividing the total number of grade-points the student has earned for the semester by the total number of units attempted. This plan makes no distinction between "D" and "F" grades, which results in a slightly different distribution from the four-point system which will
be described in connection with the validation studies made on the freshman class of 1956.

Two achievement quotients were derived for each student. The first was based on the ACE. The second achievement quotient was based on the AGCT.

Using the "T" scores, which were derived in the manner described in Section I of this chapter, the grade-point average, or GPA, was taken as the dividend and the ACE score was used as the divisor for the achievement quotient. The second achievement quotient was computed with the GPA as the dividend and the score on the AGCT as the divisor.

There were 845 cases included in this study, which was based on the group of freshmen who entered Modesto Junior College during the school year 1955-1956 and completed their Freshman Orientation program during the fall or spring semester. Only those students who completed more than a half-time schedule for one semester were included, as those with less than a half-time program were, in many cases, special students who were not representative of the typical college freshman.

It was felt desirable to use achievement quotients based on both the ACE and the AGCT, as the two tests are needed to measure adequately the aptitudes of students at both the upper and lower levels of academic ability. Experience at Modesto Junior College has shown that the ACE
does not measure the ability of the less able students; and while the ACCT does a better job of measuring the ability of the students of lower ability, it does not discriminate adequately at the upper levels of ability.

Using the achievement quotient based on the ACCT as the "X" axis and the "T" score for Part I of the "Academic Motivation Inventory" as the "Y" axis, the Pearson r was found to be -0.13 with a standard error of .0337. With Part II of the "Academic Motivation Inventory" as the "Y" axis the r was -0.09 with a standard error of .0311. When the combined scores of Part I and Part II of the inventory were used as the "Y" axis the r was -0.05 with a standard error of .0344.

Similar product-moment correlation coefficients were computed using the achievement quotient based on the ACCT as the "X" axis and the "T" scores on the "Academic Motivation Inventory" as the "Y" axis. For Part I of the inventory this gave an r of 0.04 with a standard error of .0344, for Part II the r was 0.11 with a standard error of .0310, and when the scores on Part I and Part II were combined the total score gave an r of 0.11 with a standard error of .0310. The results of these correlation studies are shown in Table IV.

With 845 cases to be compared a product-moment coefficient of correlation of .062 is significant at the
### Table IV

**Correlation Coefficients and Standard Error on Comparison of Instruments Used in the Study of the Class of 1953 at Modesto Junior College**

<table>
<thead>
<tr>
<th>Name of Instrument</th>
<th>GPA</th>
<th>Achievement Outlets</th>
<th>No. 1</th>
<th>No. 2</th>
<th>Ace</th>
<th>Ace</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>S.E.</td>
<td>S.E.</td>
<td>S.E.</td>
<td>S.E.</td>
</tr>
<tr>
<td>ACE</td>
<td>.41</td>
<td>.0286</td>
<td>.313</td>
<td>.13</td>
<td>.0354</td>
<td>.04</td>
</tr>
<tr>
<td>AGCT</td>
<td>.40</td>
<td>.0289</td>
<td>.333</td>
<td>.04</td>
<td>.0344</td>
<td>.03</td>
</tr>
<tr>
<td>&quot;Academic Motivation Inventory&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part I</td>
<td>.30</td>
<td>.0213</td>
<td>-.13</td>
<td>.0357</td>
<td>.04</td>
<td>.0344</td>
</tr>
<tr>
<td>Part II</td>
<td>.45</td>
<td>.0265</td>
<td>-.09</td>
<td>.0341</td>
<td>.11</td>
<td>.0340</td>
</tr>
<tr>
<td>Total I/II</td>
<td>.52</td>
<td>.0251</td>
<td>-.33</td>
<td>.0344</td>
<td>.11</td>
<td>.0340</td>
</tr>
</tbody>
</table>

N = 845
5 per cent level of confidence and a score of .02 is significant at the 1 per cent level. It would appear that the achievement quotient based on the ACCT correlated with the "Academic Motivation Inventory" to give a coefficient which was slightly better than a chance relationship while the achievement quotient based on the ACE correlated with the inventory to produce an $r$ which was no better than a chance relationship.

The scores of individual students were analyzed to determine whether there were factors, which had not been taken into consideration, that might account for the low correlations described above. It was noted that the concept of the achievement quotient as used in this study placed entirely too much emphasis on the two tests of academic aptitude, which are of themselves a rather poor measure of academic ability. A hypothetical case may be cited to show how a student who made the highest score on the ACCT and earned the highest GPA would be given an achievement quotient of 100. Another student who had a "T" score of 20 on the ACE could have a "T" score of 40 on his GPA and have an achievement quotient of 200. A third student who had a "T" score of 40 on his GPA could have a "T" score of 50 on the ACE and have an achievement quotient of 50.

Analysis of a sampling of the cases seemed to show that in many cases a high achievement quotient really
indicated that the student had under-achieved on the ACB because of poor reading skill, poor comprehension, or for a variety of other reasons which might even include a negative attitude toward aptitude tests.

When the achievement quotient based on the AGCT was analyzed in the same manner, it was noted that the same limitations were inherent in the use of this instrument to measure the level of achievement. The higher correlation between the "Academic Motivation Inventory" and the achievement quotient based on the AGCT is probably due to the fact that the AGCT gives a more accurate measure of ability at the lower level and thus does not give a premium score to the low ability student.

The fact that the achievement quotient method of measuring the level of student achievement led to rather inconclusive results in measuring the correlation between the student's score on the "Academic Motivation Inventory" and his actual performance suggested that further analysis and study were needed.
III. COMPARISON OF THE GRADE-POINT AVERAGE WITH SCORES OF
THE AMERICAN COUNCIL ON EDUCATION PSYCHOLOGICAL
EXAMINATION, ARMY GENERAL CLASSIFICATION TEST,
AND THE ACADEMIC MOTIVATION INVENTORY

When the achievement quotient had proved to be a
poor measure of the level of achievement, it was decided to
use the GPA itself without any attempt to adjust for the
difference in academic aptitude. Academic grades themselves
are subject to question as a real measure of the level of
student achievement but there does not seem to be a better
measure available at this time.

A public junior college must, by California law, admit
any student who is a high school graduate or any adult over
eighteen years of age. This gives the junior college a
student population composed of individuals with a greater
range of academic ability than would be found in the typical
two-year college. Because of the nature of the junior
college curriculum, however, students tend to select
courses within the scope of their abilities, and this results
in at least a partial equating of grades and ability.

When the "T" score of the GPA for each student was
compared with the "T" score of his ACE the Pearson r was
found to be .41 with a standard error of .023. A similar
comparison between the "T" scores on the ACCT and the "T"
scores of the GPA produced an r of .40 with a standard error of .0289.

When the "T" scores of the GPA were correlated with the "T" scores on the two parts of the "Academic Motivation Inventory" as well as with the "T" scores for the combined parts it was found that the Pearson r for Part I was .30 with a standard error of .0613; for Part II the r was .45, with a standard error of .0655; and for the combined scores the r was .52 with a standard error of .0651.

In terms of the prognosis of academic achievement as it is measured by the grade-point average, it would appear that the motivation inventory alone had a slightly higher correlation with grades than did the ACE or the ACT, but the question remained whether the inventory could add to the effectiveness of the freshman test battery.

The "Academic Motivation Inventory" was compared with the "T" scores on the ACE, and the correlation was found to be .24, with a standard error of .0324, which seemed to indicate that the motivation inventory measured some of the factors which are not measured by the ACE; and, therefore, might make a contribution to the total battery of freshman tests.

Inspection of the individual cases included in the study had suggested that the addition of the "Academic
Motivation Inventory" score would increase the predictive ability of the aptitude test scores, and the correlation studies appear to substantiate this observation. When a multiple correlation was computed to compare the relationship between the GPA, ACE, and the "Academic Motivation Inventory," it was found that the multiple r was .58, with a standard error of .0141.

IV. SUMMARY

The work dealing with the statistical study of the "Academic Motivation Inventory" has been described in this chapter as it was carried out with the freshman class of 1955. The process of converting raw scores to "T" scores was explained together with some of the reasons why it was necessary to make the conversion. An achievement quotient was derived from the GPA and scores on the ACE and ACEE in an attempt to measure the "Academic Motivation Inventory" against an adjusted index of academic achievement. Correlation studies with the achievement quotient were not conclusive and some of the reasons suggested were explained. Direct comparison of the "Academic Motivation Inventory" with the "T" scores on the ACE was made and the results, as shown in Table IV, page 46, indicated that the two instruments measure different factors. When the GPA was
compared with the "Academic Motivation Inventory" the 
correlation was better than that of either of the aptitude 
tests, as can be seen from an examination of Table IV, 
page 46.

The fact that some of the same students who were 
included in these statistical studies were also in the group 
used to establish the scoring key for the motivation inven-
tory would raise the question of how these findings would 
hold up if the study were repeated with a new group using 
the same instruments and scoring keys and keeping all other 
factors as nearly constant as possible.

The total score of the "Academic Motivation Inventory" 
proved to have a better predictive value when compared with 
semester grades than did either of the two part scores. 
The ACE had a slight edge over the AGCT when scores on these 
instruments were compared with grade-point averages.

In the validation studies with the class of 1936, 
which will be described in Chapter V, only the total score 
on the "Academic Motivation Inventory" and the "T" score on 
the ACE will be used since the addition of other items would 
not make any significant contribution to the study.
CHAPTER V

VALIDATION OF THE ACADEMIC MOTIVATION INVENTORY WITH
THE ENTERING CLASS OF 1956 AT
MODESTO JUNIOR COLLEGE

In Chapter IV the statistical treatment of the "Academic Motivation Inventory" with the class of 1955 was described and the correlation studies made with other instruments used in the freshman testing program were reported. Since the class of 1955 had been used to make up the scoring key for the inventory, it was assumed that there was a higher correlation between the grade-point average and scores on the motivation inventory than would be found in a validation study made with a new group.

The complete testing program was repeated with the class entering Modesto Junior College in the fall of 1956. No changes or improvements were attempted with the "Academic Motivation Inventory" and the test administration was carried out as nearly in the same manner as had been followed the previous year. By keeping the program as nearly as possible like it had been the previous year it was hoped to remove as many variables as possible from the study. An examination of the individuals in the two groups indicates that they are as nearly alike as any two groups of this size
could be. They have similar high school backgrounds, home environment, and vocational objectives. There were 674 individuals in the group used for the validation studies on the class of 1956. The group used for the studies made on the class of 1955 included 645 individuals. The difference in size of these two groups is due to the fact that in 1955 both fall and spring entrants were included whereas in 1956 only fall semester entrants were involved in the study.

I. COMPARISON OF INVENTORY SCORES OF STUDENTS WHO COMPLETED FIRST SEMESTER WITH THOSE WHO DID NOT COMPLETE

In addition to the 674 students who completed the first semester and were included in the complete validation study there were 126 students who dropped out of college during the first semester after they had taken the "Academic Motivation Inventory" but before completing any course work on which grades could be assigned. The attitudes which led to early drop-out might have been reflected in the scores on their motivation inventory.

The drop-outs had a mean raw score on the motivation inventory of 28.55, with a standard deviation of 15.65. The students who completed the semester had a mean raw score of 33.06 with a standard deviation of 14.05. The difference
between the means of 4.51 produced a "t" score value of 3.036. Because a "t" score value of 2.57 would be significant at the 1 per cent level with 800 degrees of freedom, it would appear that the mean scores of these two groups of students show a real difference and not a mere chance relationship.

An examination of individual scores showed that there were individuals among the group of drop-outs who made relatively high scores on the motivation inventory, but as a group they tended to have lower inventory scores than did the students who continued in college.

II. CORRELATION STUDIES

There were 674 individuals in the entering class of 1956 for whom correlation studies between the grade-point average (hereafter designated as GPA) and "Academic Motivation Inventory" were made. The Pearson r was found to be .46 with a standard error of .0303 when the total score on the inventory was compared with the GPA as shown in Table V. Correlation coefficients were not computed for the GPA and Part I and Part II of the motivation inventory as separate scores because the studies made with the class of 1955 had demonstrated that the total score on the inventory had a higher correlation with the GPA than did either of the separate parts.
TABLE V

VALIDATION STUDIES WITH CLASS OF 1956 AS COMPARED WITH CLASS OF 1955

<table>
<thead>
<tr>
<th>Instruments Which Were Compared</th>
<th>Class 1955</th>
<th>Class 1956</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>S.E.</td>
</tr>
<tr>
<td>GPA with ACE</td>
<td>.41</td>
<td>.0286</td>
</tr>
<tr>
<td>GPA with Motivation Inventory</td>
<td>.52</td>
<td>.0251</td>
</tr>
<tr>
<td>ACE with Motivation Inventory</td>
<td>.24</td>
<td>.0324</td>
</tr>
<tr>
<td>Multiple Correlation GPA with ACE and Motivation Inventory</td>
<td>.59</td>
<td>.0141</td>
</tr>
</tbody>
</table>

N = 845 674
Because scores on the American Council on Education Psychological Examination (hereafter designated as ACE), were not available for a few of the students in the class of 1956, there were only 659 cases in the validation studies involving the ACE. When the GPA was compared with the ACE for this group the Pearson r was found to be .40, with a standard error of .0327. The correlation between the total scores on the "Academic Motivation Inventory" and the ACE, for the 659 cases, was .30 with a standard error of .0354.

When a multiple correlation was computed between the total scores on the "Academic Motivation Inventory," the GPA, and the ACE the coefficient was found to be .53, with a standard error of .0183.

III. COMPARISON OF FINDINGS

It had been assumed that the coefficient of correlation between the GPA and the "Academic Motivation Inventory" would not be as high with the class of 1956 as it had been with the class of 1955 and this assumption was borne out by the results of the validation study. Where the comparison between motivation inventory total scores and GPA had shown a Pearson r for the class of 1955 of .52 the class of 1956 had an r of .46.

The comparison of the GPA and the ACE for the class of 1955 produced an r of .41 while with the class of 1956
the \( r \) was \( .40 \). When the ACE was compared with the total score on the "Academic Motivation Inventory" for the class of 1955 the \( r \) was \( .24 \) and with the class of 1956 the \( r \) was \( .30 \).

A multiple correlation between the GPA, "Academic Motivation Inventory," and ACE for the class of 1955 gave a coefficient of \( .59 \) while a similar multiple correlation for the class of 1956 gave a coefficient of \( .53 \).

IV. SUMMARY

The validation studies made with the class of 1956 were carried out as a check on the validity of the results of the studies with the class of 1955. An assumption had been made that the coefficient of correlation between the first semester grades and the score on the "Academic Motivation Inventory" would be higher for the class of 1955 than for the class of 1956 because the scoring key was based on the records of the 1955 group.

A comparison of the two groups has shown that while there is a difference in the correlation coefficients of the instruments tested, the difference is not so great as to invalidate the results obtained with the class of 1955. In both the original study with the 1955 group, and the validation study with the 1956 group, the "Academic
Motivation Inventory had a slightly better predictive value in regard to first semester grades than did the ACE. Using both instruments increased the predictive value over that of either instrument used separately.
CHAPTER VI

SUMMARY AND CONCLUSIONS

This study was undertaken to determine whether or not students will give an indication of the strength of their academic motivation through the opinions and attitudes they express and to determine whether it is possible to construct a paper-and-pencil test or measuring instrument to measure these attitudes.

I. REVIEW OF THE STUDY

The hypothesis on which this study was based was the null hypothesis that the coefficient of correlation between academic achievement and the score made on an inventory of academic motivation will be no higher than could be expected according to chance.

To support the hypothesis it was necessary to construct such an instrument which could be used with the entering freshmen at the Modesto Junior College to measure the level of their academic motivation. The first step in the construction of the instrument, which has been referred to as the "Academic Motivation Inventory," was to select a group of questions which would reflect the attitude of typical students. Teachers, counselors, and students were
asked to describe the attitudes which in their opinion seemed to differentiate between the students who made good academic progress and those who did not achieve. From this group of responses a number of ideas, which had been mentioned by several people, were incorporated into two sets of questions to make up the "Academic Motivation Inventory." The inventory was administered on a trial basis to test the suitability of vocabulary and to determine if the questions would be clear to students taking the test.

The revised instrument was first administered to the entering freshmen at the Modesto Junior College during the school year 1955-1956 and a scoring key was developed by an item analysis of the pattern of responses made by three comparisons of students selected as achievers and under-achievers on the basis of their aptitude tests and first semester grade-point average.

Correlation studies were made between the motivation inventory scores and grade-point averages, between grades and aptitude scores, and between aptitude scores and scores on the motivation inventory. Multiple correlations were computed using the American Council on Education Psychological Examination (hereafter designated as ACE), grade-point average (hereafter designated as GFA), and the "Academic Motivation Inventory." The results of these correlation studies have been shown in Table IV, page 46.
Validation studies were carried out the following year with the freshman class entering Modesto Junior College in the fall of 1956. These validation studies were made to determine whether the results obtained with the class of 1955 were the result of having used the class of 1955 to construct the scoring key for the "Academic Motivation Inventory" or if there was any real validity in the use of the inventory.

In the validation studies coefficients of correlation were computed to measure the relationships between the first semester grade averages, and the scores on the motivation inventory. Studies were made to measure the relationship between the ACE and the inventory. Multiple correlations were computed using the GPA, the ACE, and the "Academic Motivation Inventory." The results of the validation studies and the comparisons with the results of the statistical studies made with the first group are shown in Table V, page 56.

II. CONCLUSIONS

A coefficient of correlation for two variables with 500 degrees of freedom would be significant at the 1 per cent level of confidence if it exceeded an "r" of .115. The coefficient of correlation between the "Academic Motivation Inventory" and first semester grades was found to be .52
for the class of 1955 and .46 for the class of 1956.

From the evidence obtained it can be concluded that the null hypothesis has been disproved. The correlation between academic achievement and scores on the "Academic Motivation Inventory" is higher than could be expected by chance and, therefore, it is possible to construct a paper-and-pencil measure of academic motivation based on the attitudes and opinions of students.

An analysis of the results obtained from the statistical studies and validation studies as shown in Table IV, page 46, and Table V, page 56, will demonstrate that the "Academic Motivation Inventory," as developed in this study, has a better predictive value in terms of first semester grades than does the ACE, which has long been used as one of the best indications of probable academic success of the students entering college. The relatively low correlation between the scores on the "Academic Motivation Inventory" and the ACE seems to indicate that the inventory measures some of the non-intellectual factors which influence academic motivation and achievement.

When the scores on the ACE and the motivation inventory are combined with first semester grades for a multiple correlation coefficient, it will be seen that the use of the two instruments increases the predictive value and gives a better measure than either instrument used alone.
Therefore, it can be concluded that it is possible to construct a paper-and-pencil instrument to measure the drive or motivation toward academic achievement through the utilization of opinions and attitudes which students express. The use of such an instrument will add to the total evaluation of the student and will provide an additional tool for the counselor to use in helping the student make the best possible adjustment to college. The "Academic Motivation Inventory" cannot be used by itself since the non-intellectual factors which influence achievement do not stand alone. The aptitude or intellectual capacity which the student possesses will always be the most important consideration in academic achievement, but the use of the motivation inventory would give the counselor a clue to some of the non-intellectual factors which may prevent the student from making full use of the aptitude and ability which he has.

Experience with the "Academic Motivation Inventory" at the Modesto Junior College during the past three years has indicated that it can make a significant contribution to the counseling program, and with additional experience it promises to be of continued use in the future.
III. RECOMMENDATIONS

A review of the literature dealing with the non-intellectual factors influencing academic achievement in college has shown that numerous attempts have been made in the past to develop an instrument to measure these factors. While the instrument described in this study appears to have validity when used with the students in a public junior college, it would seem reasonable to expect that it might not have the same value if it were to be used with the student population of a college which had more restrictive admission policies.

Therefore, it is recommended that research is needed to refine the available measures of the non-intellectual factors which influence academic achievement. It may be necessary for each type of collegiate institution to develop its own instrument or scoring key based upon research with its own student population.
BIBLIOGRAPHY


Tsao, Fei. "Is A.Q. or F score the Last Word in Determining Effort?". Journal of Educational Psychology, 34:515-25, December, 1943.

THE ACADEMIC MOTIVATION INVENTORY

To the Student:

You are asked to complete this inventory as an aid to your counselor who will use it to help you gain a better understanding of yourself and how to improve your chances for making better grades in school.

This inventory will be of value to you alone, and it is to your advantage to be completely honest with yourself in answering the questions.

You will mark your answers on the I.B.M. answer sheet with special pencil. Make no marks on this booklet.

The questions are divided into three parts:

Part I asks you to give your reaction to a group of statements about students in general without specific reference to yourself.

Part II asks your reaction to a group of questions about yourself in which you are asked to indicate how often the question applies to you.

Part III consists of a group of questions on which you are asked to express your own opinion on the back of the answer sheet.

Keep in mind that you are to give the answers according to how you actually feel about the question and not how you think you should answer.

This is not an attempt to test you in any way so there are no RIGHT or WRONG answers. Every answer you give is the RIGHT answer if it accurately describes the way you feel about the question.
You are asked to give your reaction to the following statements about students in general without specific reference to yourself. The following questions are in the form of statements with which you may agree or disagree. If you agree with the statement, place a mark with the graphite pencil in the space under "1" opposite question 1 on the answer sheet. If you disagree with the statement, place your mark under "2" opposite the question number. If you have no opinion or feel you cannot answer the question, place your mark under "3" opposite the number of the question.

Be sure to blacken the space between the dotted lines, and if you make a mistake or change your mind, be sure to erase the mark completely.

REMEMBER: No marks on the booklet. All questions are to be answered on the special blank provided.

1. There is no use for a high school boy to think of college until after he has completed his time in the Armed Forces.

2. Parents who indulge their children with too much money should be held responsible if the children do not make good in school.

3. Girls go to college to find husbands.

4. One of the most important reasons for going to college is to make the social contacts which will help in later life.

5. High school students have a real understanding of what they are preparing for in school.

6. The school should put more emphasis on how to read and how to study so that students would know better ways of preparing their lessons.

7. There is too much smoking and drinking by high school students.

8. Students who have cars and plenty of money find it easy to be popular in school.
9. Most students who do not do well in school have never known the satisfaction of achievement in any type of school activity.

10. Getting in with the right crowd in school is the most important step toward academic and social success.

11. It is more important to have friends in school than to make good grades in class.

12. The enthusiasm of the teacher in a particular subject will determine the enthusiasm of the students in that class.

13. The student who does not have good clothes and spending money cannot achieve social success in school.

14. Lack of interest in school is the natural result of lack of love and understanding on the part of the parents.

15. The student who takes a college prep program in high school and then does not go to college has wasted his time.

16. It is fair for parents to compare one child with another and use the example of the better student to prod the poor student.

17. Some high school boys seek to gain recognition by being known as a "problem case" in school.

18. It is no use for a student to take a college prep program in high school if his parents do not have the money to send him to college.

19. It is not wise to make high grades if you want to be popular with other students.

20. If a student does not do as well in school as his intelligence tests indicate he should, it is usually the fault of the teacher.

21. Students in vocational courses do better work because they can see that what they are learning will help them to get a good job.

22. If the parents insist that a student follow a vocational objective in which he has no real interest, the usual result is a poor school record.
1 - Agree  2 - Disagree  3 - No opinion  74

23. Much of the work in high school consists of going through the motions of meeting requirements.

24. The way in which parents react to grades on a student's report card will often determine how hard he tries.

25. Some parents expect too much from their children and cause them to be discouraged and unhappy.

26. The student who makes the best grades are less popular than those who make average grades.

27. If the teacher is friendly and helpful in class the students will do better and make higher grades.

28. If a student fails a subject it should be regarded as a failure of the teacher as much as a failure of the student.

29. It is not important who you are as long as you are able to achieve recognition by your own efforts.

30. Competition between students in a class will create more interest and result in better grades.

31. Students worry about minor or unimportant things outside of school.

32. Preparation for college can be a good enough reason for going to high school.

33. If the required courses in English and History were removed, students would have a better attitude toward high school.

34. Girls do not want to be known as "brains" because it would hinder their chances for dates.

35. Much of what is taught in high school is of no real value in the earning of a living after graduation.

36. Boys who are not able to make good grades in school sometimes gain recognition by having a police record.

37. Students who do not want to go to school would be better off if they were permitted to quit school and get a job.
1 - Agree  2 - Disagree  3 - No Opinion

38. Teenagers care more about what their friends think of them than what adults think.

39. The students who make poor grades usually do not care and make little effort to improve.

40. School grades are not important as long as you understand the material covered in the course.

41. Learning to get along with other people is more important in school than learning the subject matter.

42. Students do not try to do their best work in school because they do not feel that the subjects they must take will do them any good after they graduate.

43. Students who make poor grades have no definite aim in life and are uncertain as to the kind of job they are preparing for.

44. School romances are one of the most frequent reasons for poor grades.

45. Students who make poor grades often spend too much time just fooling around when they could be studying.

46. Girls will not date a boy who does not have a car.

47. High school students are too easily led by the other members of the group or "gang."

48. The good athlete does not have to worry about grades since the coaches will see to it that he is kept eligible.

49. Good grades in high school are their own reward for the student who plans to go on to college.

50. Some students take a negative attitude toward school because they have trouble at home.
1 - Always  2 - Generally  3 - Frequently  4 - Sometimes  5 - Never

PART II

Part II asks your reaction to a group of questions about yourself in which you are asked to indicate how often the question applies to you.

The questions in this group are worded in such a way that you can give your answer by indicating one of the following responses:

1 - if always true
2 - if generally true
3 - if frequently true
4 - if sometimes true
5 - if never true

Using your special pencil as in the first section you will mark your response under the appropriate number of the five possible chances for each question.

Be sure to mark the proper question number on the answer sheet. NOTE THAT PART II BEGINS WITH QUESTION NO. 61.

61. Do you have periods of feeling "blue" or sorry for yourself?

62. Do you miss more than five days of school each year because of illness or other reasons?

63. Do you have the use of a car for your social and recreational activities after school hours?

64. Is it difficult for you to concentrate on your homework when you are given time to do it in school?

65. Do you feel that you are not as strong and healthy as other people of your age?

66. If a particular subject, which you are required to take, does not interest you, do you pay attention and try to do your best.

67. Do you feel that you lack the ability to learn in a particular subject?

-5-

68. Do you wish you could change your personality?
69. Do you feel tired or "run down"?
70. Do you feel ill at ease with other people at a party or other social event?
71. Do you feel restless because of the delay in starting your life work?
72. Do you feel that you are not getting enough sleep?
73. Do you find that you are thinking about the problems of marriage and family relations?
74. Do you try to make the best possible grade in every class?
75. Do you feel that you have a poor background for the subjects you are taking in school?
76. Are you glad to return to school in the fall after summer vacation?
77. Do you feel that you have close friends in school?
78. Are you or have you ever been the top student in a particular class of subject?
79. Do you hesitate to speak to students you do not know when you meet them on campus?
80. Do you start out well at the beginning of the semester and then fall behind by the end of the semester?
81. Do you feel that you do not have enough money for clothes?
82. Do your best friends make better grades in school than you do?
83. Do you plan a definite study time for each class assignment?
84. Do your parents become upset if you bring home a poor mark on your report card.
1-Always  2-Generally  3-Frequently  4-Sometimes  5-Never

85. Do you find that taking as much time as you should for your school work would interfere with your social activities?

86. Do you find that you are able to complete written tests or classroom assignments within the time limits set by the teacher?

87. If you get behind in a particular subject do you tend to "give up" and quit trying to make up your work?

88. Have your parents attempted to help you select a vocation or profession?

89. Do you see a definite relationship between the courses you study and your vocational objective?

90. Does your family expect you to make good grades in all subjects?

91. Do you belong to and participate in one or more extra-curricular activities during the school term (in addition to going to athletic events)?

92. Do you feel that teachers depend too much on their personal likes and dislikes when grading students?

93. Do you feel left out of activities and social events?

94. Are you confused or uncertain about what to select as a vocation or profession?

95. Do you feel that your teachers understand your problems?

96. Do you find your grades on written work lowered because of careless mistakes?

97. Do you seem to put off written assignments as long as possible so that you have to do them in a hurry at the last minute?

98. Do you find it difficult to concentrate on your reading when you are doing a school assignment?

99. Do you feel that your parents really understand your problems?

100. Do you feel that too much school work is required of you by your teachers?

101. Are you able to complete your homework assignments and turn them in on time?

102. Do you find that your study time is distributed so that you spend unequal time on your classes?

103. Are you late to school or late reporting to a particular class?

104. Did you like school when you were in the elementary grades?

105. Do you feel that you are under a handicap in school because you read slowly?

106. Do your parents permit you to make important decisions for yourself?

107. Do you feel that your teachers are really interested in you as an individual?

108. Do your parents visit your school during Public School Week?

109. Do you have a part-time job after school and on Saturday to earn spending money?

110. Have you had teachers in the past for whom you had a high degree of respect and admiration?

111. Do you drive a car to school?

112. Have you had a strong dislike for a teacher in the past?

113. Do you find that you lack self-confidence when an important decision must be reached?

114. Do your friends seem to think more highly of you when you make better grades than they do?

115. Do you dread the opening of school in September and wish you did not have to go back?

116. Do you feel that you spend too much time on TV, shows, and other recreational activities for the good of your school work?
117. Do your parents and friends discuss your vocational and educational plans with you?

118. Do you become frightened or nervous when the teacher calls on you in class?

119. Do your parents think you go out more than you should at night?

120. Are you bothered by problems outside of school so that you cannot do your best in class?

121. Do you find that you become nervous and confused during written tests?

122. When you are reading an assignment do you stop from time to time and mentally review what you have read?

123. Do you find yourself daydreaming in class?

124. Do you oversleep so that it is difficult to get to school on time?

125. When you have finished studying an assignment do you have the feeling that you have accomplished very little?

126. Do you find that when you are reading you may reach the bottom of the page and realize that you have no idea what you have been reading?
PART III

The following questions are intended to give you an opportunity to express your own opinions. Please turn your answer sheet over and write on the back of the answer sheet.

1. How would you rate your own will to success or your ambition in school as compared with the other students in your class?

2. Can you think of any reasons why your attitude toward school should be as it is?

3. Do you feel that it will be of any help to you to know the results of this inventory? What are your reasons for this opinion?

4. Can you suggest ways in which your counselor could be of help to you?

5. Please make any general comments which have come to your mind while completing this inventory.