

A STUDY OF THE RELATIONSHIP OF
SELECTED SOCIO-ECONOMIC FACTORS
TO OUTCOMES OF THE PROGRAM
OF GENERAL EDUCATION AT
MICHIGAN STATE COLLEGE

Thesis for the Degree of Ed. D.

MICHIGAN STATE COLLEGE

Carroll Milton Pike, Jr.

1953

This is to certify that the

thesis entitled

A STUDY OF THE RELATIONSHIP OF SELECTED
SOCIO-ECONOMIC FACTORS TO OUTCOMES OF
THE PROGRAM OF GENERAL EDUCATION AT
MICHIGAN STATE COLLEGE

presented by

Carroll Milton Pike, Jr.

has been accepted towards fulfillment
of the requirements for

Ed. D. degree in Education

Walter F. Johnson
Major professor

Date November 24, 1953

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THE PROGRAM OF GENERAL EDUCATION AT
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By

Carroll Milton Pike, Jr.

AN ABSTRACT

Submitted to the School of Graduate Studies of Michigan
State College of Agriculture and Applied Science
in partial fulfillment of the requirements
for the degree of

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Walter F. Johnson

THESIS



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ABSTRACT

This study is concerned with the evaluation of certain outcomes of the general education program at Michigan State College with particular attention being given to the effect of selected socio-economic factors upon those outcomes. Three newly developed objective-type evaluation instruments of the Cooperative Study of Evaluation in General Education, the Test of Critical Thinking-Form "A," the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing, have been utilized in the study for the specific purposes of determining whether differences exist (1) between groups of entering freshmen, and (2) in the amount of change or gain during one academic year, when freshmen are classified according to (a) size of high school, (b) size of home community, (c) fathers' occupations, and (d) sex.

A sample of five hundred and ninety-six Michigan State College freshmen, tested for their representativeness of the total freshman class by means of the distribution of earned scores on the American Council on Education Psychological Examination, were used in the study. They were examined on the three evaluation instruments at the beginning and end of the academic year, 1951-1952.

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Data analyzed consisted of pretest and posttest scores on the three evaluation instruments, selected biographical information, and A. C. E. scores, the data being collected, coded, and placed upon IBM punch cards for statistical analysis.

Gains in scores on each instrument made by the total sample of students during the academic year were studied by means of the "t" test of significance between correlated means. Differences in pretest or entrance scores for the various groups of students were tested by the analysis of variance technique. Differential gains among the various student groups for the academic year were analyzed by the analysis of variance, covariance adjustment technique.

For each of the three evaluation instruments statistically significant gains were found for the total sample of students during the course of the freshman academic year.

No significant differences were found among pretest or entrance mean scores for groupings of students within the high school, community, occupational, and sex categories as measured by the Test of Critical Thinking-Form "A," the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing.

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ABSTRACT

The study of differential gains for the academic year indicated a possible difference--significant at the 5-percent level of confidence--between men and women for scores on the Test of Critical Analysis in Reading and Writing with differences in pre-test and A. C. E. scores controlled. However, this difference in favor of the women does not reach this level of significance if no correction is made for initial differences. No significant differences were found among mean gains made by groups within the other socio-economic categories for the Test of Critical Analysis in Reading and Writing, and no significant differences were found among gains within the high school, community, occupational, and sex categories for either of the other two evaluation instruments.

The results of this study lead to the conclusion that the socio-economic factors examined apparently have no measurable effect upon the extent or degree to which students benefit from emphases in the general education objectives of critical thinking, maturity of beliefs and attitudes, and reading and writing abilities.

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1953

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candidate for the degree of

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Final Examination, November 24, 1953, 8:00 a.m., Department of
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TABLE OF CONTENTS

CHAPTER	Page
I. INTRODUCTION	1
Statement of the Problem	2
Definition of Terms	3
The Cooperative Study	3
The Horowitz Study	4
American Council on Education Psychological Examination	4
The Test of Critical Thinking- Form "A"	5
The Inventory of Beliefs	6
The Test of Critical Analysis in Reading and Writing	6
The Basic College	7
Background of the Study	7
Relationship of the Cooperative Study	7
Relationship of the Horowitz Study	9
Limitations of the Study	10
Organization of the Dissertation	15
II. METHODOLOGY AND PROCEDURE	17
Introduction	17
The Test Instruments	18
The Development of the Cooperative Test Instruments	18
The Test of Critical Thinking	26
Description of the test	26
Test validity	27
Test reliability	29
Uses of the test	30
The Inventory of Beliefs	32
Description of the test	32
Test reliability	33

CHAPTER	Page
Test validity	34
Uses of the test	35
The Test of Critical Analysis in	
Reading and Writing	37
Description of the test	37
Test reliability	38
Test validity	39
Uses of the test	40
Administration and scoring	40
Selection of the Sample	41
Collection and Coding of the Data	49
Sources of Data	49
The pretest program	50
The posttest administration	51
The individual data sheet	53
The IBM data card	54
Analysis of the Data	55
 III. ANALYSIS OF THE DATA FOR THE TEST OF CRITICAL THINKING	 61
Introduction	61
Presentation of Raw Scores, Gains, and Adjusted Posttest Scores for the Test of Critical Thinking- Form "A"	63
Analysis of the Significance of Differences Between Total Sample Pretest and Posttest Means for the Test of Critical Thinking-Form "A"	68
Analysis of Pretest Differences Within the Socio-Economic Categories for the Test of Critical Thinking-Form "A"	70
Analysis of Differential Gains Within the Socio-Economic Categories for the Test of Critical Thinking-Form "A"	72
Summary	77

CHAPTER		Page
IV.	ANALYSIS OF THE DATA FOR THE INVENTORY OF BELIEFS	79
	Introduction	79
	Presentation of Raw Scores, Gains, and Adjusted Posttest Scores for the Inventory of Beliefs	80
	Analysis of the Significance of Differences Between Total Sample Pretest and Posttest Means for the Inventory of Beliefs	82
	Analysis of Pretest Differences Within the Socio-Economic Categories for the Inventory of Beliefs	84
	Analysis of Differential Gains Within the Socio-Economic Categories for the Inventory of Beliefs	86
	Summary	87
V.	ANALYSIS OF THE DATA FOR THE TEST OF CRITICAL ANALYSIS IN READING AND WRITING	93
	Introduction	93
	Presentation of Raw Scores, Gains, and Adjusted Posttest Scores for the Test of Critical Analysis in Reading and Writing	94
	Analysis of the Significance of Differences Between Total Sample Pretest and Posttest Means for the Test of Critical Analysis in Reading and Writing	94
	Analysis of Pretest Differences Within the Socio-Economic Categories for the Test of Critical Analysis in Reading and Writing	97

CHAPTER	Page
Analysis of Differential Gains Within the Socio-Economic Categories for the Test of Critical Analysis in Reading and Writing	99
Summary	100
VI. SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR FURTHER RESEARCH	108
The Purpose of the Study	108
Methodology	110
Findings	111
Conclusions and Implications for Further Research	115
BIBLIOGRAPHY	122
APPENDIX	130

LIST OF TABLES

TABLE		Page
1.	Coefficients of Reliability for the Test of Critical Thinking-Form "A"	30
2.	Distribution of Cases	44
3.	Derived Scores, "Total" Raw Scores, and Percentages of Cases for A. C. E. Psychological Examination	46
4.	Summary Table of χ^2 Values for Representativeness	47
5.	Raw Scores, Gains, and Adjusted Posttest Means for High School Groups, the Test of Critical Thinking-Form "A"	64
6.	Calculation of Adjusted Posttest Means for High School Groups, the Test of Critical Thinking-Form "A"	66
7.	Summary Table of Analysis of Variance Values for Pretest Means on the Test of Critical Thinking-Form "A"	71
8.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Thinking- Form "A," High School Categories	73
9.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Thinking- Form "A," Community Categories	74
10.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Thinking- Form "A," Occupational Categories	75

TABLE

Page

11.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Thinking- Form "A," the Sexes	76
12.	Raw Scores, Gains, and Adjusted Posttest Scores for the Inventory of Beliefs	81
13.	Summary Table of Analysis of Variance Values for Pretest Means on the Inventory of Beliefs	85
14.	Analysis of Covariance of Gains and Errors of Estimate, the Inventory of Beliefs, High School Categories	88
15.	Analysis of Covariance of Gains and Errors of Estimate, the Inventory of Beliefs, Community Categories	89
16.	Analysis of Covariance of Gains and Errors of Estimate, the Inventory of Beliefs, Occupational Categories	90
17.	Analysis of Covariance of Gains and Errors of Estimate, the Inventory of Beliefs, the Sexes	91
18.	Raw Scores, Gains, and Adjusted Posttest Scores for the Test of Critical Analysis in Reading and Writing	95
19.	Summary Table of Analysis of Variance Values for Pretest Means on the Test of Critical Analysis in Reading and Writing	99
20.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Analysis in Reading and Writing, High School Categories	101

TABLE

Page

21.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Analysis in Reading and Writing, Community Categories	102
22.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Analysis in Reading and Writing, Occupational Categories	103
23.	Analysis of Covariance of Gains and Errors of Estimate, the Test of Critical Analysis in Reading and Writing, the Sexes	104

CHAPTER I

INTRODUCTION

With the expanding emphasis being placed upon general education in our schools and colleges today, it becomes increasingly important that the evaluation procedures for the many different schools of thought in this area be improved and refined. That this is the concern of numerous educators can be seen in the efforts of the many institutional and interinstitutional research programs in general education in progress at the present time. Emphasizing the ever growing need for scientific evaluation and experimentation in general education, McGrath expressed a plea for a clarification of objectives and evidence or proof of the values to be obtained from varying theories and practices. At the "Minnesota Conference on Building a Program of General Education" in the spring of 1949, McGrath said (50:17),

. . . . To a very large degree these developments known as general education have proceeded on the basis of a priori reasoning with little more than opinion to back up the assumptions on which they rest. With a few striking exceptions little attempt has been made to determine experimentally whether one arrangement of subject matter, or one method of teaching, is better than another, or better than more conventional forms or practices.

Statement of the Problem

This study is concerned with the evaluation of certain outcomes of the general education program in The Basic College at Michigan State College as studied during the academic year 1951-1952. Particular attention has been given to the effect of selected socio-economic factors upon those outcomes. Three objective-type test instruments, the Test of Critical Thinking-Form "A," the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing, have been used in the study for the specific purposes of determining whether differences exist (1) among groups of entering freshmen and (2) in the amount of change or gain during one academic year, when freshmen are classified according to (a) size of high schools from which they come, (b) size of home communities, (c) fathers' occupations, and (d) sex.

Stated in more general terms, the investigation concerns certain preconceived educational objectives with which students enter college, and the determination of change or gain which occurs during that experience. The study has sought purposefully to avoid the use of subjective evaluative techniques or the utilization of final status as an indication of change. Rather, the attempt is made to evaluate differential gains of generally accepted objectives

of general education as the students progress through a portion of their educational experience. The tests used for the purposes are newly developed evaluation instruments of the Cooperative Study of Evaluation in General Education of the American Council on Education.

Definition of Terms

The Cooperative Study

The Cooperative Study of Evaluation in General Education was undertaken in the spring of 1950 under the sponsorship of the American Council on Education for the following stated purposes (25:61):

1. A focusing of attention on the need for research and evaluative activities in general education and, associated with this an arousal of interest on the part of general education staff in initiating such activity.
2. The development of improved evaluation procedures and the collection of actual evidence on changes made by students in regard to general education objectives.
3. One or more publications which, by presenting new developments in evaluation and some evidence on the outcomes of general education, might point the way to even more definite research, and challenge others to undertake it.

The Cooperative Study was responsible for the development of the three test instruments which are utilized in this dissertation. These instruments are the Test of Critical Thinking, the Inventory of

Beliefs, and the Test of Critical Analysis in Reading and Writing.

The relationship of this dissertation to The Cooperative Study is discussed further in that section of Chapter I entitled Background of the Study.

The Horowitz Study

The Horowitz Study refers to a concurrent study closely related to the present thesis, which is being carried out by Victor Horowitz, an advanced graduate student in the Department of Guidance and Counselor Training, Michigan State College. The relationship which the Horowitz Study shares with the current study is discussed in that section of Chapter I entitled Background of the Study.

American Council on Education Psychological Examination

Scores on the American Council on Education Psychological Examination are referred to as A. C. E. Scores. Whereas "L," or linguistic scores, and "Q," or quantitative scores, were obtained and coded for each of the cases, the scores utilized in the present study refer to "T" or total scores unless otherwise indicated.

The A. C. E. Total Scores are a combination of the "L" and "Q" scores and are considered a measure of general academic aptitude.

The Test of Critical Thinking-Form "A"

The Test of Critical Thinking-Form "A" is an evaluation instrument developed by the Cooperative Study of Evaluation in General Education. It consists of fifty-seven objective-type test items designed to measure the ability of college students to demonstrate certain skills in critical thinking processes. The critical thinking area was looked upon by The Cooperative Study as one of the important objectives of programs of general education. The Cooperative Study recognized that the ability to demonstrate skills in critical thinking is not a single ability or variable; therefore, this test was designed to measure the following major components of the critical thinking or problem solving process (4:4-5):

1. Ability to define problems.
2. Ability to select pertinent information.
3. Ability to recognize unstated assumptions.
4. Ability to invent and evaluate hypotheses.
5. Ability to make valid inferences and to judge the validity of inferences.

The Inventory of Beliefs

The Inventory of Beliefs was developed by the Inter-College Committee on Attitudes, Values and Personal Adjustment of the Cooperative Study of Evaluation in General Education. The inventory consists of 120 items or statements with which students are requested to register agreement or disagreement. The total score is taken as an index of psychological maturity and personality structure. The following descriptive paragraph is found in the Instructor's Manual (2:4).

The fundamental assumption underlying the Inventory of Beliefs is that the objectives of general education can serve as a base from which may be inferred the model organization characterizing the personalities of those most adaptable to the purposes of general education. Our attempt has been to explore the manifestations of these personality dimensions as relevant to the problems of general education in terms of the individual's relations to (1) ideas and intellectual abstractions, (2) social groups and identifications, (3) interpersonal relations, and (4) the self.

The Test of Critical Analysis in Reading and Writing

The Test of Critical Analysis in Reading and Writing is a forty-item objective-type test developed by the Inter-College Committee on Communications of The Cooperative Study of Evaluation in General Education. The purpose of the test is to assess students'

ability to read thoughtfully and analytically and to write clearly and effectively. For the purpose of appraising achievement in communications courses at the freshman and sophomore level, the test as originally developed makes use of passages from Thoreau's Walden, the Rubaiyat of Omar Khayyam, the "Sermon on the Mount," and a reproduction of a student theme comparing these passages.

The Basic College

The Basic College of Michigan State College is an instructional and administrative division or college which provides a program of general education through the following courses which are required of all students: Communications Skills, Natural Science, Social Science and Humanities. The Basic College student carries approximately one-half of his academic load in the courses of The Basic College and one-half in courses of his indicated major school or department during his freshman and sophomore years.

Background of the Study

Relationship to the Cooperative Study

This study had its inception as a direct outgrowth of The Cooperative Study of Evaluation in General Education of the American

Council on Education. The Cooperative Study made available certain of its newly developed test instruments and data for this study.

The Cooperative Study, unique in its purpose and design, was interested in gaining supporting evidence in the task it had undertaken--that of focusing attention upon the need for research and evaluative activities in general education. Publication of the purposes, design, and findings of The Cooperative Study, while not extensive, is sufficient to make unnecessary the inclusion of comprehensive details in this report. Basically, however, The Cooperative Study has attempted to utilize the combined talents and interests of many outstanding educators from cooperating colleges and universities for the purpose of developing more adequate evaluation objectives and techniques, to promote better evaluative methods on their respective campuses. Furthermore, The Cooperative Study was seeking evidence for the validation of the newly developed evaluation instruments in a large variety of general education programs. As a step toward obtaining additional evidence for the purposes for which these instruments could be used, the central office of The Cooperative Study made data, materials, and personal assistance available for this study. Therefore, to a large degree this study becomes an additional

validation study for the tests by the further application of the nationally developed tests at the local level.

The reader is directed to articles by Dressel and Mayhew (24, 25, 56, 57) and to the final report of findings to be issued shortly in book form for a comprehensive explanation of the objectives, procedures, and findings of The Cooperative Study of Evaluation in General Education.

Relationship to The Horowitz Study

Simultaneous with the planning and execution of this study, Victor Horowitz, an advanced graduate student in the Department of Guidance and Counselor Training, Michigan State College, was designing and carrying out research closely related to that which is reported in the present study. Since advantages could be gained from related findings and coordinated research, plans were made to bring about the coordination of the two studies wherever possible. The test instruments, the statistical procedures, and a part of the raw data are common to both studies.

Using the same sampling of students, The Horowitz Study sets forth the following as the stated objectives to be accomplished (39):

By means of the Test of Critical Thinking, the Test of Critical Analysis in Reading and Writing, and the Inventory of Beliefs:

- (1) To attempt to determine whether, over a period of one academic year, and within the areas of Critical Thinking, Ability to do Critical Analysis in Reading and Writing, and level of Maturity of Beliefs and Reactions, change or gain can be discovered in Freshmen students.
- (2) To attempt to determine whether, within the areas of Critical Thinking, Ability to do Critical Analysis in Reading and Writing, and Level of Maturity of Beliefs and Reactions, differences can be distinguished between the change or gain of Freshmen students the various interest categories, or major areas of study.

The Horowitz Study, in effect, analyzes data pertaining to the same evaluation instruments as those of the present study for differences among preference categories or chosen major areas of study, whereas the present study is concerned with differences exhibited among groupings of students classified within four different socio-economic categories.

Limitations of the Study

Certain limitations usually accompany a research design which restrict the scope of the findings and the extent to which generalizations may be drawn from them. The factors which place limits upon the present study are discussed in the paragraphs which follow.

The basic design and scope of this study was shaped in part by the relationship which it shared with The Cooperative Study of

Evaluation in General Education. The study was undertaken in a sense as a partial further validation of the test instruments. The Test of Critical Thinking, Form "A," the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing were selected initially from among approximately twelve evaluation instruments of The Cooperative Study on the basis of incomplete validation data. These three tests were selected because they appeared at the outset to hold the most promise for the purposes of the study. Since the time the investigation was undertaken, the faith placed in these tests has been substantiated, for the most part, by adequate validation data referred to in Chapter II.

As pointed out in Chapter II, two forms of the Test of Critical Thinking, Form "A" and Form "B" were used in the preliminary phases of the study. The decision to discard the results of Form "B," based partially upon early results obtained in the current study and The Horowitz Study, in effect cut by about half the number of cases which could be analyzed in this area. Even though the sample group to which Form "A" was administered was proven to be the equivalent to that form "B" was given, the size of the sample became a limiting factor.

The question of whether or not adequate motivational factors were present in all phases of the testing situation received careful evaluation. During the pretest program conditions for maximum motivation may be considered to have been present, since the tests were administered as part of the entrance testing battery given to all freshmen during their Orientation Week program. On the other hand the posttest program was administered in two different testing situations. The Test of Critical Analysis in Reading and Writing was administered to all freshmen taking the third term comprehensive examination in Communications Skills at the end of the academic year. The Test of Critical Thinking and the Inventory of Beliefs were administered during time released by the Department of Communication Skills. Although, upon the request of the department, students were told that the tests were of an experimental nature and that the results therefrom would have no bearing upon their grades in the course, the testing conditions and motivational factors were so controlled that the results compare favorably with those of other Cooperative Study research designs administered in the most rigidly controlled conditions.

Because a number of pretest cases was unavailable for the posttest program, the size of the final working sample was reduced.

This fact may be considered a further limitation. One hundred and eighteen students of the original sample of 896 were no longer in college by the end of the academic year, and 182 others were unavailable for one or more phases of the posttest program for various reasons. A number of the latter were Special Permission students who were not enrolled in the third term of Communication Skills because they had completed the requirements for the course by special comprehensive examination. Because of the proximity of the posttest administration to the end of the academic year, the possibility of testing these students individually and voluntarily was ruled out as impractical. Although those cases not retested were proven to vary somewhat from the final working sample, the posttest sample remained statistically representative of the population in study.

It is recognized that the problem of time lapse in a study of gains or change is a particularly difficult one to resolve, and especially so when studying factors such as the outcomes and objectives of general education. The unresolved question is whether gains in objectives of general education should be measured over the relatively short period of one academic year, or whether more permanent outcomes should be explored at the completion of a

student's college experience. Two major factors legislate in favor of electing the former. The first of these is the questionable practicality of the contribution of an experimental research design for a period longer than one academic year. Secondly, on the average, at least one-half of all general education course requirements are completed in The Basic College by the end of the student's first year. Furthermore, it can be argued that the first year's experiences may be relatively more important and that from an evaluation of the one year of general education, adjustments and refinements may be made in the program which may have a bearing upon the remainder of the student's college work. It is recognized that the ultimate expansion of the present design to include periodic evaluations over the entire college experience would be desirable. An additional factor which helped resolve this question lay in the nature of the relationship which this study bears to The Cooperative Study. It was deemed desirable to restrict the scope of the inquiry to a one-year program, thus supplementing as closely as possible findings of The Cooperative Study over the same period of time.

A final limitation arises out of the assumption that all of the students concerned enjoyed equal, if not similar, general educational experiences during their freshman year. While all students were not

enrolled in identical courses, the effect of the training for the year is assumed to be equal, since the total college experience, rather than the specific course pattern, is expected to furnish the desired results. All students had had at least the one common experience, Communication Skills, while the pattern of other general education courses was spread among the other Basic College courses.

Organization of the Dissertation

For the purposes of convenient and systematic consideration of the study at hand this report is presented in a series of divisions or chapters.

Chapter I has presented a brief introduction of the study, and certain limitations which were inherent in the design and development of the problem. Basically, Chapter I introduces the problem.

Chapter II encompasses a description of the test instruments utilized, the selection of the sample, the collection and coding of data, and the statistical procedures used in the analysis of the data.

Chapters III, IV, and V are "findings" chapters. A chapter is devoted to the discussion of the findings of each of the three test

instruments--the Test of Critical Thinking, the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing.

Chapter VI is a summary chapter comprising a discussion of results and implications arising from these results.

No specific mention is made of a comprehensive review of the literature. Because of the unique nature of the subject of this study and the close relationship which exists between it and The Cooperative Study, the investigator has chosen not to include such a unit. Rather than duplicate the efforts expended in this related research design, a bibliography carefully selected for its relevance to the present study has been included.

CHAPTER II

METHODOLOGY AND PROCEDURE

Introduction

Chapter I has been devoted to sections covering the purposes or the statement of the problem, the background of the study, and the limitations which accompany the research design. In the present chapter, the emphasis is upon the development and description of the test instruments and the statistical design of the study.

This study is primarily concerned with the measurement of gain or advancement toward certain educational objectives in programs of general education. As indicated in Chapter I, it is not the purpose of this study to pass judgment upon variously stated objectives of general education, but rather to study the effect of certain socio-economic factors upon the gain of selected results of general education programs. In so doing, this study demonstrates the use of certain evaluative methods and specific objective test instruments which it is hoped may be utilized to evaluate more adequately various aspects of programs of general education.

Therefore, the application of the statistical design of this study may be considered as one of the contributions of this research.

Furthermore, this study is in part an attempt to validate further newly developed test instruments of The Cooperative Study of Evaluation in General Education. The underlying assumption is that the objective test instruments selected for this study have been so designed that the relationships and contributions of specified socio-economic factors to commonly recognized outcomes and objectives of general educational programs may be analyzed. Since the tests are relatively new and the opportunity to become familiar with them through the literature or by actual use has been limited, a rather detailed description of their nature and development will be presented in the present chapter.

The Test Instruments

The Development of the Cooperative Test Instruments¹

The Cooperative Study of Evaluation in General Education was designed for three major purposes. The first of these was

¹ The information for this description of the development of the test instruments was taken in part from a tape recorded interview with the Assistant Director of The Cooperative Study of Evaluation of Evaluation in General Education and in part from information and records on file with the central office of that Study.

the focusing of attention upon the need for research and evaluative activities in general education. The second was the development of improved evaluation procedures and the collection of actual evidence concerning changes made by students in regard to general education objectives. The third was the hope that through publication of significant results other definitive research in general education would be encouraged (25:61).

With the organization of The Cooperative Study in December of 1949, the cooperation of twenty different colleges and universities, each with unique general education programs, was secured for work in six different problem areas. These areas were to become the fields of emphasis around which The Cooperative Study was to be designed. Three of these areas were the humanities, the sciences and the social sciences, and are sometimes referred to as divisions of human knowledge. Two were organized around the skills of communication and critical thinking, while the sixth and final area was that of values, attitudes, and personal adjustment. Six intercollege committees were selected by The Cooperative Study to explore these areas, with faculty representatives of each participating college choosing at least four of the areas in which to be represented. Members of the various intercollege committees in turn activated

local committees on the campuses of their particular college or university.

During the initial meeting in 1949, each of the intercollege committees drew up a set of objectives upon which to base their work. They then discussed possible ways in which the study should proceed. It was agreed by the representatives that new evaluation instruments should be designed by the cooperative efforts of the various schools, rather than by a committee of evaluation experts as such. In other words, the members of The Cooperative Study assumed that the process of cooperative enterprise on the part of educators representing different general education programs would not only develop tests more closely allied to the needs and objectives of differing programs of general education but that the efforts and interests of the group involved would lead to the demonstration of the values to be gained by more effective evaluation methods on local campuses. The Cooperative Study reports satisfaction with the results obtained (24).

The test instruments chosen for use and study in this dissertation comprise a portion of the resulting efforts of the committees representing the skills of critical thinking and communication, and one of the instruments of the Attitudes and Values Committee.

Since the development of these test instruments proceeded in a similar manner for each of the tests, discussion will center here upon the development of only one of them, the Test of Critical Thinking, as representative of all three.

Following a tour by the director of The Cooperative Study to see to what extent each institution was prepared to participate in the Study, meetings of the various committees were held during March and April of 1950 as an initiation of their work. The Inter-College Committee on Critical Thinking, for example, assumed the task of reviewing and revising the previously stated over-all objectives of the area, and of discussing what those objectives meant in terms of specific action. They then made an appraisal of what was being done on each of the campuses to teach for critical thinking and to evaluate the results of efforts in that direction. There were a few courses at various cooperating schools which attempted to teach for these or similar objectives. However, for the most part, neither the objectives nor the methods of teaching or evaluation seemed adequate in the eyes of the Committee.

The Committee then undertook a discussion of the definition of critical thinking in terms of specific behaviors and outcomes

which it felt should be sought. The process of limiting the field also took place. For instance, the Committee drew a differentiation between critical thinking and creative thinking. Further, the Committee outlined its assumption that critical thinking is something more than intelligence plus knowledge, hence the need for a more adequate evaluation instrument which would measure that total of essential elements which appear to make up the ability to think critically.

So that the Committee would be able to become more conversant with what had already been done in the field to evaluate for the behaviors which characterize critical thinking, the members of the Committee investigated, during the spring of 1950, various tests and procedures such as the tests of the Eight Year Study, the Watson Glaser Test, parts of the Yale Aptitude Battery and the American Council on Education Psychological Tests, the Ohio State Psychological Tests, and other instruments developed on various local campuses. In addition to the examination of methods by which these and other tests attempt to appraise traits attributed to critical thinking, individual Committee members were asked to observe, and to have colleagues observe, situations in which people demonstrate effective or ineffective critical thinking. This helped to clarify the

collective mind of the Committee as to what it meant by critical thinking as well as to begin to provide the mass of material out of which, eventually, would be constructed various test exercises.

During a summer workshop session, the Inter-College Committee reviewed the efforts of the individual members in the direction of the appraisal of existing commercial tests. It was the decision that since no existing test hit precisely the needs and objectives sought by the group that the Committee would attempt the development of an instrument for this purpose. Before the task could be undertaken certain additional details had to be established. For example, it was decided that the test should be an objective-type test. The vocabulary level, it was agreed, should be at about the eleventh grade. The question arose of whether or not the test should include or exclude the knowledge of subject-matter content of specific courses. It was felt that this was an area which should determine outgrowths of a total general educational experience rather than the reflection of specific courses. The test was constructed accordingly.

The efforts of the Committee for the following school year were directed to an accumulation of situations which elicit critical thinking, to try various test items with students, and to seek further

information and expression of what colleagues would contribute to the definition of the term. As an aid in the direction of local staff involvement and enthusiasm, visits to campuses were made by representatives of the central committee staff.

In January of 1951, the Committee met again, at which time members reviewed the collections of evidence brought in from the local committees. At this point, for the first time, a blueprint for the test was undertaken. The Committee constructed a chart listing on one axis the aspects of critical thinking which it wished to measure, and on the other axis a list of those areas of human activity in which it felt these traits of critical thinking should be developed. By means of this two-way chart, which resulted in a series of cells, individual objectives were defined and assigned to various Committee members or institutions for the development of test items. Thus, some Committee members, with the help of their local committee, undertook to develop items which would measure the ability to define a problem, while others undertook the measurement of the formulation of hypotheses, et cetera.

Once developed, these individual test items were submitted to groups of students on local campuses for the purpose of accumulating normative data for the items. The items and resulting

data were then sent to the central office before the summer meeting which was held for the purpose of constructing the preliminary forms of the test instruments. The central office undertook to design four tests which were sent out to representative schools for trial with various groups of students. The results were collected and item-analyzed and items were selected from these for inclusion in the initial forms of the test.

The summer meetings resulted in the completion of two preliminary forms of the test, Form "A" and Form "B" of the Test of Critical Thinking. These were printed and distributed to the cooperating colleges for use during the entrance or fall testing programs. This 1951 Freshman Fall Testing Program at Michigan State College furnished the pretest data utilized by this study.

This description of the development of the Test of Critical Thinking serves as an example of the kinds of activity which were pursued by committee members working in the development of the Inventory of Beliefs and the Test of Critical Analysis in Reading and Writing and the other instruments of The Cooperative Study. Similarly, the other five committees had brought the development of test instruments to the point of printing for inclusion in the fall testing programs of the participating institutions. It was then

possible to begin the collection of data on a mass scale and to assess the relationships between the instruments and tests already on the market in the various areas. The purpose of the test program during the 1951-1952 academic year was to determine the extent to which these instruments could be utilized for the purposes outlined. This study thereby becomes an additional attempt in that direction.

The Test of Critical Thinking

Description of the test. The Test of Critical Thinking, as developed by the Inter-College Committee on Critical Thinking of The Cooperative Study is designed to measure the ability of college students to demonstrate skills considered to be essential aspects of critical thinking or problem solving. The test consists of fifty-two objective-type questions stated as problems which elicit various kinds of mental activity for their solution. The test is concerned with the processes of thought which are seen as the outcome of all general education. The aspects of critical thinking which the committee attempted to build into this test include such traits as (1) the ability to define a problem, (2) to select information pertinent to its solution, (3) to recognize assumptions, (4) to make

hypotheses and to draw conclusions from assumptions, hypotheses, and pertinent information, and (5) to judge the validity of the conclusions and to evaluate conclusions in life situations. These objectives are discussed in further detail in the Instructor's Manual (4:4-5).

Test validity. The experimenter is always on uncharted ground with a new test instrument with respect to the question of validity. This fact has not been ignored in the present study. Despite its acceptance as a limitation of the study, it was decided to proceed with the plans for the use of the Test of Critical Thinking and thereby help to establish additional uses and purposes for which it could be considered valid. This study, by exploring differential gains among freshmen with respect to selected socio-economic factors, has explored the possible utilization of three new test instruments for new or additional purposes. A comparison of the results obtained by this study with other studies of the tests has then in effect helped to establish the extent to which the assumptions of validity for these instruments can be accepted.

An issue which arises in the establishment of validity for the Test of Critical Thinking comes from the manner in which the test was constructed. The Inter-College Committee utilized

classroom instructors as well as test experts during the early development of the test. The Committee worked on the assumption that the opinions of a vast number of colleagues who were concerned with critical thinking in its many expressions would collectively point the way to the issues involved in its definition. From that effort the evaluation experts then aided in the design of test items, which in turn were subjected to item analysis. Using the total test as a criterion, items with a satisfactory discrimination index have been retained in the preliminary forms of the test.

An index of validity largely subjective in nature has been sought by the Committee. Judges were asked to identify groups of people who did and did not seem to possess the ability to think critically. The result was the identification of a significant group of people who were judged to possess the ability to think critically who also scored high on the test.

Validity is not a concept which can be measured in such specific terms as a percentage of perfection, such as "90% validity." Rather, it is the constant accumulation of facts which either support the assumption that the test measures that which it set out to measure, or that it does not. A point in illustration is the fact that Form "B" of the Test of Critical Thinking was discarded

because it lacked validity and was found not to be equivalent to Form "A." The reason was that the Form "B" had been constructed in part from items untried, but similar to those of Form "A." In other words, the Committee selected part of the items for the Form "B" at face validity, hoping to establish an equivalent form but were unsuccessful in the attempt. Because it is constructed of "second best" and untried items it has proven to be less satisfactory than Form "A." It is less reliable, the indices of discrimination have proven to be less high, it correlates in a more fluctuating manner with other measures, and therefore is considered less valid. For this reason, data pertaining to Form "B" of the Test of Critical Thinking has not been included in the report of this study. On the other hand, all studies have supported the assumption of validity for Form "A." Conclusions and discussions in this study concerning critical thinking have been based upon Form "A" of the Test of Critical Thinking, the form for which validity measures have been proven to be satisfactory.

Test reliability. The Test of Critical Thinking--Form "A" has been proven to be sufficiently stable for group measurement. The following table is taken from the Instructor's Manual (4:6).

1

TABLE 1
COEFFICIENTS OF RELIABILITY FOR THE TEST OF
CRITICAL THINKING--FORM "A"

Test Form	Method	Group	N	r
"A"	Kuder-Richardson	Freshmen	600	0.84
"A"	Kuder-Richardson	Freshmen	101	0.71
"A"	Kuder-Richardson	Freshmen	135	0.75
"A"	Kuder-Richardson	Freshmen	147	0.73

Uses of the test. For the purpose of this study the consideration of gains between pretest scores and posttest scores is considered foremost. In other words, it is assumed that this test can measure gains in the ability to do critical thinking which have occurred as a result of a general education experience whether they be the result of formal or informal experiences at the high school or college level. The Cooperative Study has made extensive analyses of the gains achieved at various colleges participating in the Study and has demonstrated that in varying programs and educational experiences, the test measured mean gains in each instance, ranging from 2.33 to 6.24 raw score points. There is supporting



evidence that greater gains occurred where specific efforts were made to teach for logical or correct thinking.²

Since the Test of Critical Thinking and the other tests with which this study is concerned are evaluation instruments designed to measure the effectiveness of programs of general education certain uses and applications are evident. The Test of Critical Thinking was designed to evaluate the effectiveness of an entire program and may be considered a test of developed skill rather than accumulated knowledge. It may be used to measure entry status, final status, or gains.

In this study the Test of Critical Thinking has been used as an instrument to determine the extent to which various socioeconomic groupings of students benefit from a program of general education. Many other applications may be hypothesized for this test, such as its use as a partial determinant of grades in courses specifically designed to teach methods of critical thinking, or in some conditions it may prove to be a possible predictor of college grades. The utility of these applications, of course, will need to be established.

² Taken from data on file with The Cooperative Study.

The Inventory of Beliefs

Description of the test. The Inventory of Beliefs is an instrument of the Inter-College Committee on Attitudes, Values, and Personal Adjustment, of the Cooperative Study of Evaluation in General Education. This committee, like the Inter-College Committee on Critical Thinking, was formed for the purpose of developing a test instrument which could be used to measure attitudes which were conceived as being a part of the desired outcomes of a total general education rather than the result of a specific course. Increasingly, in recent years, educators have become concerned with the study of opinions as a reflection of attitudes, values, and adjustment. Similarly, psychologists have demonstrated that basic personality structure may be reflected in personal opinions. Hence it has been the attempt of The Cooperative Study through the Attitudes Committee to coordinate the recent research of these two disciplines and to explore the common ground of personality patterns and behavioral expressions which are sought as ideal expressions of general education. The following statement describing the test instrument is taken from the Preliminary Manual for the Inventory of Beliefs (5:1):

. . . The instrument described here is an attempt to express the relationship between these psychological and educational interests. It is concerned with the differentiation between the mature, independent, reality-minded, flexible, adaptive, secure and comfortable individual who is seen as the potential base and anticipated outcome of a general education program of general education in a free society, and the childish, selfish, self-centered, threatened, aggressive, rigid, compulsive insecure and uncomfortable individual whose concomitant attitudes and values are seen as essentially anti-democratic and in opposition to the objectives of general education. . . .

The fundamental assumption underlying the scale is that the objectives of general education can serve as a base from which may be inferred the model organization characterizing the personalities of those most adaptable to the purposes of general education. Our attempt has been to explore the manifestations of the antidemocratic continuum as relevant to the problems of general education in terms of the individual's relations to (1) ideas and intellectual abstractions, (2) social groups and identifications, (3) interpersonal relations, and (4) the self.

These four levels of personal involvements, seen as indices of psychological maturity, are described in detail in the Instructor's Manual (2).

Test reliability. The Instructor's Manual for the Inventory of Beliefs discusses the reliability of this instrument as follows

(2:5):

All studies of the reliability of the Inventory of Beliefs tend to indicate that the instrument is sufficiently stable to warrant use for the purpose of either group or individual measurement. It does not seem to matter whether the coefficients of correlation are computed by means of Kuder-Richardson, test-retest,

split-half, or parallel forms method. In each case, the correlations obtained are high enough to lend support to the idea that the Inventory of Beliefs yields a reasonably consistent result. The 30 reliability studies detailed in Table I yield coefficients ranging from .68 to .95 with a median r of .86. With the exception of one investigation involving senior students, these studies were made on groups of freshman students at colleges having programs in general education. The size of the study groups ranged from 18 students to 370 students with the great majority of studies involving groups of more than 100 students.

Test validity. The determination of validity of the Inventory of Beliefs must stem from one or both of the two major purposes for which it was designed. On one count there can be some degree of agreement for the test does contain statements of educational objectives, in terms of beliefs, which educators feel should be influenced and developed as a result of a general education. Studies have supported the expectation that changes or gain should occur in these expressions as a result of a specified educational experience.

It is more difficult to determine whether the other dimension has been equally successful. The structure of basic personality needs much more investigation before factors which have been influenced by an educational experience and measured by the test instrument can be determined. One manner in which this kind of evidence may be collected is a systematic and careful study of the

conditions and types of situations in which this test has differentiated between various groups or predicted the results of an educational experience with groups. Evidence in this direction continues to mount in the files of The Cooperative Study. For example, considerable agreement between subjective judgment and the test results has been obtained in the comparison of performance by students of the various colleges cooperating in the study. The Inventory has been used successfully to identify homogeneous groupings of students by one test instrument that formerly required several indices. The possibility that the instrument may differentiate between various academic preferences and that in some cases it may be used to identify potential drop-outs has been reported. The low correlations between this and other standardized test instruments have been particularly reassuring that the Inventory of Beliefs is unique in its function. Item analyses have been satisfactory, with the coefficients therefrom, for the most part, falling well above the necessary levels for retention of items within the test. Reference to each of the above validity measures is given in the Instructor's Manual.

Uses of the test. The Inventory of Beliefs can be used to show changes in the attitudes, values and beliefs, insofar as these

traits are measured by the test, for students over an academic year or portion of a college experience. The test purportedly measures traits which are seen as desirable outcomes of a general education and indices of the mature individual in our society. By utilizing pretest and posttest scores, differing methods of instruction or varying college experiences may be analyzed in the light of major changes in students' responses.

The comparison of student groups by means of the Inventory of Beliefs may have some value in the direction of accounting for certain observed differences in behavioral characteristics or backgrounds. Normative data in the direction of prediction studies will undoubtedly lead to suggested uses for varied purposes. The Cooperative Study reports, by way of example, that low scorers on the Inventory tend to do less well in courses in the humanities, the social sciences, and literature. The implication follows that special instruction for, or a better understanding of, individuals so identified by this instrument might be in order. The use of this Inventory as an individual counseling aid can be hypothesized if care be taken to limit the extent to which it is used as a diagnostic tool until such time as these implications have been further demonstrated. The purposes of The Cooperative Study

validation studies have been limited to their general education implications. Therefore, no attempt has been made to study this latter possibility.

The Test of Critical Analysis in Reading and Writing

Description of the test. The Test of Critical Analysis in Reading and Writing was developed by the Inter-College Committee on Communications of the Cooperative Study of Evaluation in General Education. The Committee's purpose was to develop an objective-type test designed to assess the student's ability to read analytically and to write clearly. These objectives are seen as desirable outcomes of communications courses taught at the freshman and sophomore level. The test as developed has not only been proven appropriate for these purposes, but for college students at all grade levels from the freshman through the senior year.

The test consists of three short passages each dealing with the subject of the good life. The student is asked to react in twenty multiple-choice items to similarities expressed in the passages taken from Thoreau's Walden, the Rubaiyat of Omar Khayyam, and the "Sermon on the Mount." The test also contains a reproduction of a student theme written about the three passages. In

twenty additional objective-type items the test solicits the student's perception of formal elements of writing and appropriateness of expression.

The Critical Analysis Test in Reading and Writing utilized in this study as developed by the Inter-College Committee on Communications is based upon earlier work done by Paul Diedrich of the Educational Testing Service in connection with the United States Armed Forces Institute in the early 1940's. It may be considered a developmental form of the test. Results from extensive pretest and posttest administrations in the fall of 1951 and the spring of 1952, of which The Horowitz Study and the present study form a part, led to a final revision of the test.³ This revision was undertaken to adapt the scope and success of the developmental form of the test to be more applicable to all levels of the college population. The rationale of the two forms is the same and a majority of the items is common to both forms.

Test reliability. Estimates of reliability for the initial form of the test used in the present study proved to be somewhat

³ Currently available from the Educational Testing Service, Princeton, New Jersey.

lower than desired. The Instructor's Manual reports estimates based upon the Kuder-Richardson technique involving internal consistency ranging from 0.62 to 0.67. These low coefficients are seen as the result of test length and item difficulty which prevent numbers of students from finishing the complete test. These difficulties have been modified in the revised version of the instrument (3:5).

Test validity. Evidences of test validity consist of data which support or reject the presumption of validity. The Instructor's Manual suggests the presence of "logical validity" based upon the fact that the instrument was designed by college teachers of communications courses in general education and by persons experienced in the techniques of evaluation. The relationships between the Test of Critical Analysis in Reading and Writing and other standardized tests has been reassuring. The expected positive relationships between the test and certain linguistic expressions of academic aptitude have been demonstrated to exist within expectations. Correlations with nonlinguistic factors correspondingly have not been found to be as high. Studies of gains among groups of freshmen over the academic year and between freshmen and seniors support assumptions



made for the test. Specific reference to these and other validity measures is contained in the Instructor's Manual (3:5-6).

Uses of the test. The nature of the present study suggests one of the more obvious uses of the test instrument, the measurement of the extent of gain in the traits measured by the instrument between initial and posttest administrations. The effectiveness of differing methods of instruction might be ascertained by this means. An exploration and examination of the items of the test may be used effectively with a class as a teaching device for these principles. This procedure has been proven to be extremely thought-provoking with students with whom it has been used for this purpose. Post-test scores or indices of gains have also been utilized as a partial determinant of final grades in a communications course.

Administration and scoring. The Test of Critical Analysis in Reading and Writing is composed of forty multiple-choice items and is designed to be administered in a fifty-minute period. Preliminary instructions should be carefully presented with emphasis given to the fact that each question is designed to have one best answer. Since no correction is made for guessing, students should be encouraged to make the best possible use of prudent guesses.

The use of either machine-scored or hand-scored answer sheets is appropriate. A scoring key is included in the Instructor's Manual.

Selection of the Sample

The design of the present study was approved by the guidance committee shortly after the beginning of the 1951-1952 academic year at Michigan State College. The proposed relationship with The Cooperative Study was such that it was deemed desirable to utilize data and materials which were available during the current academic year. Furthermore, the findings of this study were sought as a further validation for the test instruments under study by The Cooperative Study for the 1951-1952 academic year. To meet these conditions it was necessary to utilize pretest data and biographical data already on file with The Cooperative Study and A.C.E. Scores from the lists of the Board of Examiners of The Basic College.

The Basic College, Michigan State College, had cooperated with The Cooperative Study to the extent of participating in several of the different research designs of the Study. For this purpose, all entering freshmen were assigned to one or more of the various research programs of The Cooperative Study. During the fall

entrance testing program of The Basic College, each freshman was administered various tests of The Cooperative Study as a part of the entrance battery. The assignment of the subjects to the various research designs was made on the basis of the time at which different groups appeared for testing rather than by randomly selected or controlled procedures. Previous experience by The Cooperative Study had proven this to be an adequate procedure with the use of samples of the magnitude with which they were working.

It was felt desirable that since the current study was to utilize borrowed data, representativeness be studied and established for the samples in question. The parent population consisted of 1,942 freshmen starting their work with the fall term of 1951. Of this number The Cooperative Study research designs included 896 students to whom had been administered each of the three test instruments with which this study is concerned. These 896 cases constitute the pretest or initial working sample for this study.

Of the initial pretest sample of 896 cases, 300 were no longer available for study by the completion of the spring or post-test program. Of the original sample 118 students were no longer in attendance in college at the time of the spring testing. Another 182 students were unavailable for the posttest program for various

reasons. Table 2 presents the distribution and disposition of all cases with which the study is concerned.

The determination or establishment of representativeness of the sample was studied by means of the test of homogeneity, Chi-Square (χ^2), as presented in Lindquist (47:43-45) and Johnson (43:33-37), utilizing scores obtained by each student on The American Council on Education Psychological Examination. The scores used were derived from the "Total" score on the A.C.E. Psychological Examination administered as a part of the entrance battery of tests of The Basic College. The raw scores were secured from the official listings of the Michigan State College Board of Examiners. These raw scores were in turn converted into derived scores based upon Michigan State College norms for the 1949 edition of the A.C.E. Psychological Examination.

The derived scores which were used are similar in make-up to decile scores insofar as there are ten breakdowns or groups. In other words, decile groupings are replaced by a standard ten-point scale ranging from 1 (low) to 10 (high). The effect of this derived scale is to reduce the percent of students in the extremes and to increase it in the middle of the scale to approach a more normal distribution. Under this system, extreme scores become much more

TABLE 2
DISTRIBUTION OF CASES

Total Parent Population (Michigan State College Freshmen entering Fall Term 1951)	1,942
Initial Pretest Sample	
"A" Group (Administered The Test of Critical Thinking, Form "A")	448
"B" Group (Administered The Test of Critical Thinking, Form "B")	448
Total	896
Final Working Sample	
"A" Group	302
"B" Group	294
Total	596
Cases Not Used	
Drop-outs	118
Special Permission Students	56
Incomplete Posttest Data	126
Total	300

significant in indicating superior or inferior ability. Table 3 presents the derived scores, the corresponding raw scores for the Michigan State College population of entering freshmen, and the approximate percentage of cases in each category.

The analysis of the data by the Chi Square method, determination of goodness of fit, for the relationship between the total working posttest sample ($n = 596$) and the total parent population (1,942 entering freshmen) is presented in Table 4. From the above statistical test of homogeneity it was found that the final working sample could be considered to be representative of all entering Michigan State College freshmen. The obtained value of Chi Square (14.126) is not sufficient to reject the hypothesis of representativeness and it can therefore be assumed that the differences which exist between these two groups may be attributed to chance.

In like manner, the relationship between the initial pretest sample of 896 cases for whom complete pretest data were available, and the final working sample of 596 cases was tested. Again, it may be seen from an inspection of the summary table of obtained χ^2 values that these two groups or samples may be considered equivalent groups with respect to the distribution of their A. C. E. Scores.

TABLE 3

DERIVED SCORES, "TOTAL" RAW SCORES, AND PERCENTAGES
OF CASES FOR A. C. E. PSYCHOLOGICAL EXAMINATION

Derived Score	"Total" Raw Score	Percentage of Cases
1	0-54	1
2	55-69	3
3	70-82	8
4	83-94	16
5	95-105	22
6	106-119	22
7	120-132	16
8	133-144	8
9	145-159	3
10	160-up	1

TABLE 4

SUMMARY TABLE OF χ^2 VALUES FOR REPRESENTATIVENESS

Sample Distributions Tested For Representativeness	N	Obtained χ^2 Value
Final Working Sample with All Michigan State College Freshmen	596 1,942	14.126*
Pretest Sample with Final Working Sample	896 496	12.748*
Pretest Sample with All Other Michigan State College Freshmen	896 1,046	16.754*
Final Working Sample, Group A with Final Working Sample, Group B	302 294	6.942*
Final Working Sample with Cases Dropped from Pretest Sample	596 300	66.676**
All Michigan State College Freshmen with Cases Dropped from Pretest Sample	1,942 300	30.805**

* Indicates hypothesis of representativeness accepted.

** Indicates hypothesis of representativeness rejected.

Before the final working sample had been defined it was important that the initial pretest sample reflect the trend of representativeness. One relationship which was studied was that of the pretest sample ($n = 896$) and the remainder of freshmen who entered college in the fall of 1951 ($n = 1,046$). The resulting χ^2 value indicated that the two groups could be considered as having come from the same population (Table 4). The establishment of this relationship along with several other preliminary tests of representativeness provided assurance that representativeness had been established for the pretest samples.

The relationship between two subsamples of the final working sample was also studied. This was deemed desirable since the pretest program by The Cooperative Study had included two forms of the Test of Critical Thinking: Form "A" comprising proven test items, and Form "B" made up of similar, but, for the most part, untried items. As it became apparent that conclusions in the current study for the critical thinking area would need to be based upon the results of Form "A" to the exclusion of Form "B," the test of χ^2 was administered to these two groups. The resulting χ^2 value (Table 4) indicated that these two subsamples of the final

working sample can be considered to be equivalent groups with respect to their A. C. E. Score distributions.

As indicated in Chapter I, the cases which were dropped between the time of the fall testing program and the retests made at the end of the academic year were determined to be dissimilar to the final working sample with respect to their A. C. E. Scores. From an inspection of Table 4, it is evident that real differences existed between the make-up of these cases and that of the final sample. This also proved to be the case for the relationship of the cases dropped during the study and the total population of freshmen ($n = 1,942$). However, the loss of this atypical group did not prevent the final working sample from being representative of the total population of freshmen entering Michigan State College during the fall term of 1951.

Collection and Coding of the Data

Sources of Data

The data upon which this study is based come from two main sources: the pretesting program administered to entering freshmen at Michigan State College in cooperation with The Co-operative Study, and the posttesting program, administered jointly

with The Cooperative Study. The 1951 fall pretesting program produced two general kinds of data--test scores, and biographical data. The posttest program was concerned primarily with retest scores on the test instruments.

The pretest program. Pretest scores for the Test of Critical Thinking, the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing were obtained directly from the individual scored answer-sheets on file with The Cooperative Study. The scores on the American Council on Education Psychological Examination were obtained from the official listing of the Michigan State College Board of Examiners.

Items of biographical data were obtained largely from the Individual Biographical Data Sheet,⁴ administered by The Cooperative Study during the pretesting program. All cases are identified by the name of the student as well as case number assigned by The Cooperative Study and retained by the present study. Student numbers assigned by the college and listed on the Biographical Data Sheet Proved helpful for the purpose of cross-validation and the

⁴ A copy of the Biographical Data Sheet may be found in the Appendix.

completion of incomplete biographical data which were obtained from admissions applications on file in the Office of the Registrar. A Supplementary Biographical Questionnaire,⁵ administered at the time of the posttest administration provided data relative to the size of the high school which each student had attended.

The posttest administration. The posttesting program constituted one of the major administrative undertakings of the study. It proved to be necessary to plan very carefully for an adequate and representative posttest sample. While it was not expected to include one hundred percent of the pretest cases in the posttest sample, the design of the study, being a study of gains, demanded that every available case within reason be retained in the posttest administration. This proved to be a difficult problem and one that random sampling with three separate tests would not solve. In checking the plans of The Cooperative Study, it became apparent that special posttesting plans needed to be developed beyond those proposed by The Cooperative Study. It was decided to seek the cooperation of

⁵ A copy of the Supplementary Questionnaire may be found in the Appendix.

The Basic College in the administration of a posttest program more adequate for the purposes of this study.

The Basic College had made arrangements to administer the Test of Critical Analysis in Reading and Writing as a portion of the final Comprehensive Examination to all freshmen completing the third term of Communications Skills, the basic communications course required of all freshmen at Michigan State College. Thus, it was possible to secure the test scores on the Test of Critical Analysis in Reading and Writing from the individual answer sheets as filed with The Cooperative Study. Because the Department of Communication Skills enrolled a greater proportion of the freshmen during the spring term than any other department of The Basic College, this department was requested to make available to the posttest program, one two-hour laboratory or recitation meeting for each of the seventy-two sections of Communication Skills 113, the third term of the basic communications course. During this two-hour period, the two remaining tests, the Test of Critical Thinking and the Inventory of Beliefs, were administered along with the supplementary questionnaire.

Prior to the posttest administration late in the month of May, the revised class lists for each of the seventy-two class

sections were checked for the members of the pretest sample who were included in each section. Provisions were made to designate the form of the Test of Critical Thinking, Form "A" or Form "B," which was to be administered, each student in the sample being given the same form of the test he had taken in the fall. A preliminary meeting was held with staff of the Department of Communication Skills to give the background of the study, to impress upon each instructor the need for uniform test administration procedures, and to answer any questions about the test administration. A complete list of written instructions and a copy of each class roll designating the form of the Test of Critical Thinking to be administered to each student accompanied the kit of test materials. Testing procedures were reviewed carefully with each instructor prior to the start of each test administration. The excellent cooperation of the staff of the Department of Communication Skills aided in producing testing conditions of maximum motivational control.

The individual data sheet. In a statistical study utilizing numerous items of data for each of several hundred cases, provision must be made for the systematic collection, recording, and possible coding of such data. For this reason, an individual data

sheet was designed for the present study which provided for the recording and coding of all necessary data for each individual case or student in the study. Thus one data sheet, identifiable by name and case number, contains the complete raw data and the codes assigned for each item for each individual case in the study. In planning the Individual Data Sheet, provisions were made to include data pertinent not only to the present study, but to The Horowitz Study as well. A few items were also included which it was felt might become useful for follow-up studies resulting from conclusions and implications for further study, thus the data sheet contains data for each case which was not necessarily utilized or reported in the present study. Items which pertain directly to the present study have been marked by an asterisk (*) in the sample data sheet in the Appendix.

The IBM data card. The provision for the coding of data which was made on the Individual Data Sheet was for the purpose of transferring all data to IBM punch cards. Thus the Individual Data Sheet for each case was merely used as a means of systematic collection, checking, and coding of data prior to their transfer to individual IBM cards. The coding of data on the IBM cards made it possible to run much of the statistical work on various

IBM machines. The utilization of IBM procedures and equipment made it possible to increase greatly the number of statistical relationships and calculations studied, as well as the expansion of the number of cases which could be analyzed.

Analysis of the Data

A basic assumption of any educational system, program, or course is that of gain or change. Gain as defined by Webster, implies an increase. Change implies an alteration or variation. Thus the evaluation of progress or change implies the determination of initial status in order that the extent of change can be determined. Too often in the field of education one finds that only final status or an achieved level of accomplishment has been ascertained rather than the measurement or evaluation of actual change. Thus, without an inventory of the initial level of accomplishment of the individual student as he enters the classroom, school, or college, it is impossible to determine to what extent a final score or evaluation is a reflection of change during a particular educational experience.

This study, therefore, makes use of objective-type test instruments in before and after testing situations to measure selected outcomes of one academic year of college experience. These results are studied in relation to various socio-economic groupings of students. For example, do students from large high schools gain more in their ability to think critically during their freshman year in college than do students from small high schools? When gain or change is the criterion it becomes obvious that pretest information or initial status is of importance equal to that of final status if one is to arrive at valid answers.

The statistical treatment of gains is complicated, unfortunately, by the fact that there is no clear-cut method for the analysis of data utilizing pretest and posttest results. When this problem is analyzed carefully, it appears that there are two best possible approaches: (a) the so-called classical method in which the differences in gains for various groups are tested each against the other by use of their standard error of difference, and (b) the analysis of variance, covariance adjustment technique. In both instances the intention is to ferret out, insofar as is possible, initial differences, so that final differences or variances will reflect change resulting from the educational experience in which we are interested rather than

differences which existed in initial status. We wish the index of change to reflect the final difference between groups corrected for their initial difference. Each of the above methods makes certain assumptions but the two methods do not necessarily yield similar results. McNemar (53:343) makes the following observations concerning these methods.

The covariance adjustment technique is based upon predictions by means of regression equations, and accordingly it provides a way of correcting final means for initial differences, with due allowance for the "degree" of correlation between initial and final scores. Now the ordinary (classical) and the covariance methods of testing the significance of gains differ not only in the correction or adjustment to final means, but also in the resultant sampling error. The ordinary technique uses a standard error which definitely includes, either explicitly or implicitly, the variance for both initial and final scores and the correction of initial with final, whereas the error term used in the covariance method is a direct function of the degree of correlation and of the variance of the final scores only. In other words, the net differences being tested are not the same, and neither are the error terms the same. In general the two methods will not lead to the same level of significance for a given comparison.

Which method is preferable? The student who is interested in an answer will wish to read Chapter IX of R. A. Fisher's Design of Experiments. Suffice it to say here that Professor Fisher discusses different types of corrections and then proceeds to use the covariance technique.

Actually, the situation which pertains here is one in which allowance needs to be made for the correction of uncontrollable variables. While it is preferable to design an experiment in such a manner that experimental and control groups are equivalent

prior to a certain controlled experience, oftentimes this becomes impractical, if not impossible. Therefore, as in the present case, statistical allowance needs to be made which will in turn allow valid inferences.

By way of example, one may assume that an individual subjected to one year of study in the Basic College at Michigan State College would exhibit gains in his ability to read, write, and communicate. Furthermore, it could be hypothesised that because of a more enriched background, students from a large high school would show greater gains in these areas during their freshman year in college than would students from a small high school. However, in order that this might be studied, one must know the entry or pretest level of students in these two groups, for they might be expected to differ at the time they entered college. In other words, a group test at the end of the one-year experience would measure not only gains, but gains plus initial differences or status. Thus, a pretest of reading and writing abilities would provide a measure of initial differences by which final differences might be adjusted to reflect gains over the period in question.

A complete discussion of analysis of variance by the covariance adjustment technique is presented in Chapter XV of

McNemar's Psychological Statistics and in Chapters 12 and 13 of Snedecor's Statistical Methods. These two references furnish the reader with the methodology employed in the present study.

Two additional statistical procedures have been used for other aspects of the study. They are the "t" test of significance between correlated means and the analysis of variance test for the significance of differences among mean scores.

The first of these methods is used to determine the significance of differences of the pretest and posttest means of all students in the final working sample. The method results in an obtained value of "t" from which it is possible to determine the extent to which gains made on the test instruments can be considered statistically significant. The "t" test may be applied when information is desired concerning differences between two mean scores, in the present instance mean scores of two correlated distributions for the same sample of students. The reader is referred to McNemar for a more thorough presentation of the procedure which is used for this significance test (53:216-226).

The analysis of variance technique may be considered an extension of the "t" technique for by this method it becomes possible to analyze mean differences among two or more sets of

scores with the resultant probability value being presented as one figure. The analysis of variance technique has been utilized in the present study to determine the significance of differences between the pretest means on the different test instruments for groups of students representing classifications within the different socioeconomic categories. The analysis of variance technique is a well-established statistical procedure and for this reason will not be discussed in any detail in this study. The reader is directed to McNemar (53), Snedecor (69), Lindquist (47), or any one of a number of texts in the field of statistics for a more complete study of this statistical method.

Because of the volume of data, only the summary calculations are presented in the dissertation. Raw data, individual data cards, and the statistical work sheets and calculations are on file with the writer.⁶

⁶ Office of the Dean of Men, Northern Illinois State Teachers College, DeKalb, Illinois.

CHAPTER III

ANALYSIS OF THE DATA FOR THE TEST OF CRITICAL THINKING

Introduction

It will be recalled from Chapter I that this study is concerned with the evaluation of a program of general education. More specifically it attempts to do so by utilizing three test instruments developed by The Cooperative Study of Evaluation in General Education of the American Council on Education. Chapter III is concerned with an analysis of the data for the Test of Critical Thinking-Form "A." An analysis of the data pertaining to the Inventory of Beliefs is presented in Chapter IV, and in Chapter V the Test of Critical Analysis in Reading and Writing is studied in light of the data which apply to that instrument.

For each of the three general-education objectives, as measured by the above-named test instruments, the data have been analyzed for various groups of students categorized according to the size of high schools attended, the size of their home communities, their fathers' occupations, and sex. The relationships with which this study is concerned are, (1) differences in pretest-posttest scores

or gains for all students over the course of the academic year, (2) differences in pretest or entrance status among the various groupings of students within the socio-economic categories at the time they enter college, and, (3) a study of differential gains among the subgroupings of students for the academic year. A discussion or description of the statistical procedures utilized for these analyses have been presented in Chapter II. Differences among the pretest means are studied by the Analysis of Variance technique (69:232-235). The pretest-posttest relationship is studied by testing the significance of differences between pretest and post-test means using the "t" test for differences between correlated means (53:225-231). The study of differential gains is by the Analysis of Variance, Covariance Adjustment technique (53:318-330; 69:340-373).

The data upon which these calculations are based are taken from tables of sums, sums of squares, and the sums of cross-products for the total working sample and the various subsamples which were run by the IBM tabulating machines from the individual IBM data cards.

Presentation of Raw Scores, Gains, and Adjusted Posttest
Scores for the Test of Critical Thinking-Form "A"

Table 5 presents a summary of the mean scores earned by the various subgroupings of students for the A. C. E. Psychological Examination, pretest and posttest scores for the Test of Critical Thinking-Form "A," and the mean gains made by each group on this test during their first academic year. The breakdown of the total working sample (302 for the Test of Critical Thinking-Form "A") into the high school size, community size, occupational, and sex categories, constitutes a redistribution of the same total sample of students into the four major categories.

In studying the table it is of interest to note the changes in rank order assumed by the various groups within the different socio-economic categories for their mean scores on the A. C. E., the pretest, the posttest, the gains, and the adjusted posttest. For example, the students representing the Farm category for the Community distribution are found to rank lowest in terms of their mean score on the A. C. E., highest among the community categories on their critical thinking pretest score, highest for their posttest score, lowest in terms of actual gain between the pretest and the posttest, and second highest among the five categories with

TABLE 5

RAW SCORES, GAINS, AND ADJUSTED POSTTEST SCORES FOR
THE TEST OF CRITICAL THINKING-FORM "A"

	N	A. C. E. Means	Pretest Means	Posttest Means	Mean Gains	Adjusted Posttest Means
<u>High Schools</u>						
Class "A"	132	105.432	39.515	39.114	7.599	38.734
Class "B"	89	102.774	32.573	38.652	6.079	38.932
Class "C"	70	103.313	31.486	39.014	7.528	39.052
Class "D"	11	100.241	34.545	41.545	7.000	42.407
Total/Avg.	302	103.936	31.930	39.043	7.113	
<u>Communities</u>						
Farm	48	100.924	33.104	39.646	6.542	39.935
250-2,500	32	102.080	30.094	38.281	8.187	39.648
2,500-25,000	78	104.261	32.974	39.615	6.641	39.040
25,000-100,000	59	101.269	30.288	38.508	8.220	40.010
over 100,000	85	108.399	32.141	38.835	6.694	37.501
Total/Avg.	302	103.936	31.930	39.043	7.113	
<u>Occupations</u>						
Professional	61	109.392	32.541	38.639	6.098	36.750
Proprietary	41	100.603	31.195	39.024	7.829	40.340
Skilled	49	102.673	31.224	37.816	6.592	38.517
Semi & unskilled	24	99.305	33.917	41.167	7.250	41.651
Clerical	21	103.093	29.048	38.190	9.142	39.731
Sales	33	100.034	33.606	39.727	6.121	39.243
Farm	30	100.767	32.467	40.467	8.000	41.164
Managerial	43	107.151	31.209	38.744	7.535	38.115
Total/Avg.	302	103.936	31.930	39.043	7.113	
<u>Sex</u>						
Male	162	104.722	32.012	39.123	7.111	38.874
Female	140	102.955	31.835	38.950	7.115	39.258
Total/Avg.	302	103.936	31.930	39.043	7.113	

respect to their posttest scores when these are adjusted for differences on the A. C. E. and the pretest. It is tempting at this point to go into a lengthy discussion of the relationships which apparently exist and some of the possible explanations which could account for these findings. Were it not for the fact that these differences do not prove to be statistically significant this kind of analysis would be very much in order.

The inclusion of the Adjusted Posttest scores in Table 5 is for the sole purpose of indicating possible trends and rankings assumed by the various groups as a result of the adjustment of posttest scores for initial differences on the Test of Critical Thinking-Form "A" and for the A. C. E. Psychological Examination. However, in the light of the fact that the differences in the mean gains do not prove to be statistically significant little or not significance can be attached to the adjusted rankings. This method utilized constitutes an extension of the procedure presented by Snedecor (69:322) for the calculation of adjusted mean gains. Table 6 presents the application of the method for adjusted means for the data for the high school categories, thus demonstrating the application of the extension of the Snedecor example.

TABLE 6

CALCULATION OF ADJUSTED POSTTEST
MEANS FOR HIGH SCHOOL GROUPS
THE TEST OF CRITICAL
THINKING-FORM "A"

High Schools	A. C. E.	Deviation	Total Sample Mean (χ_1)	$b'y1.2\chi_1$	Critical Thinking Pretest Means
	Psycho-	from			
	logical	Total			
	Total	Score			
Class "A"	105.432	1.496		0.3989	31.515
Class "B"	102.774	-1.162		-0.3099	32.573
Class "C"	103.313	-0.623		-0.0166	31.486
Class "D"	100.241	-3.695		-0.9853	34.545

Adjusted for A. C. E. Total Scores and pretest scores for
The Test of Critical Thinking-Form "A"

Yad. = Adjusted Critical Thinking Posttest Means = $y - [(b'y1.2)(x1)] - [(b'y2.1)(x2)]$.

The above calculation of adjusted posttest means for high school groups for the Test of Critical Thinking-Form "A" is presented as an indication of the effect of adjustment of posttest means for A. C. E. Scores and pretest means. Since it cannot be assumed that differences in gains for high school groups are significant, no weight or significance can be placed upon the adjusted posttest ranks or means. The table has been presented merely as an indication of possible trends and the methodology which can be used for this purpose.

TABLE 6 (Continued)

Deviation from Pretest Means (χ_2)	$b'y2 \cdot 1\chi_2$	Critical Thinking Posttest Means (Y)	Adjusted Posttest Means (Yad.)	Pretest- Posttest Raw Gains
-0.415	-0.0194	39.114	38.734	7.599
0.643	0.0301	38.652	38.932	6.079
-0.444	-0.0208	39.014	39.052	7.528
2.615	0.1225	41.545	42.407	7.000

Analysis of the Significance of Differences Between Total Sample
Pretest and Posttest Means for the Test of
Critical Thinking-Form "A"

Attention is now directed to the test of significance between the pretest and posttest means for the total sample for the Test of Critical Thinking-Form "A." The question at hand is whether the gains for all students taken as a group can be considered significant. In studying this relationship it is necessary to make allowance for the fact that the two sets of scores are not independent since they are scores of the same individuals or cases. For this purpose the following method is adapted from McNemar (53:225-231).

Since the "t" test assumes equal variances these are studied for the pretest and posttest distributions.

$$"F" = \frac{s_{ct \text{ Posttest}}^2}{2 \frac{s_{ct \text{ Pretest}}^2}{2}} = \frac{136.1600}{111.8858} = 1.2169$$

Entering a table of "F" values with $n_1 = 301$ degrees of freedom and $n_2 = 301$ degrees of freedom, the required value of "F" for significance would be 1.22 at the 5-percent level of confidence and 1.33 at the 1-percent level of confidence. However,

for this test since only two groups are being tested, these obtained values are the equivalent to the 10-percent and 2-percent levels, respectively (53:231). Therefore, since the obtained value of "F" does not reach the 5-percent level of significance, the variances can be considered as equal and the "t" test may be applied.

$$t = \frac{x_1 - x_2}{\sqrt{\sigma_1^2 + \sigma_2^2 - 2r \sigma_1 \sigma_2}}$$

where:

σ_1 and σ_2 are standard errors of the means of the pretest and posttest, respectively (standard deviations/ $\sqrt{N}$)

r = correlation coefficient between the pretest and posttest

x_1 = posttest mean

x_2 = pretest mean

Substituting values for the Test of Critical Thinking-Form "A":

$$t = \frac{39.0430 - 31.9305}{\sqrt{(0.20395 + 0.13772) - [2 (0.59496) (0.45161) (0.37110)]}}$$

$$t = 18.858$$

Entering a table of "t" values at 301 degrees of freedom, the required value of "t" would be 2.592 at the 1-percent level of confidence for differences to be considered significant. It is therefore apparent that with the obtained value of "t" = 18.858 that the

difference between the pretest and posttest means for all students (N = 302) on the Test of Critical Thinking-Form "A" is significant considerably beyond the 1-percent level of confidence.

Analysis of Pretest Differences Within the Socio-Economic
Categories for the Test of Critical Thinking-Form "A"

Thus far in Chapter III it has been discovered that differences in pretest and posttest scores for the Test of Critical Thinking-Form "A" are significant for the total sample of freshmen. Since it has been demonstrated that the Test of Critical Thinking-Form "A" is capable of measuring gain during the course of an academic year the effect of high school size, community size, fathers' occupations, and sex upon pretest or entrance status for the test can be analyzed. The statistical procedure which is used for this purpose is analysis of variance as outlined in Chapter II. The resulting "F" values obtained by this method for each of the socio-economic factors present the necessary evidence for determining whether the pretest means may be considered sufficiently different from one another as to represent real differences. Table 7 presents the summary data for the obtained analysis of variance values for each of the four socio-economic factors.

TABLE 7

SUMMARY TABLE OF ANALYSIS OF VARIANCE VALUES FOR
PRETEST MEANS ON THE TEST OF CRITICAL
THINKING-FORM "A"
(N = 302)

Socio-Economic Category	Degrees of Freedom		Obtained "F" Value	Tabular 5% "F" Value*
	Groups	Individuals		
High Schools	3	298	0.802	2.64
Communities	4	297	1.729	2.40
Occupations	7	294	1.073	2.72
Sex	1	300	0.040	3.87

* Points for the Distribution of "F," Snedecor (69:222-225).

It is evident upon inspection of the obtained "F" values in Table 7 that none of the socio-economic factors studied produced a significant effect upon the entrance or pretest scores for the Test of Critical Thinking-Form "A." None of the "F" values are large enough to be significant at the 5-percent level of confidence. Therefore, it cannot be assumed that the subsample groups within each of the socio-economic categories studied are different with respect to their pretest mean scores on the Test of Critical Thinking-Form "A," or in other words, students representing the different groups

within the high school, community, occupational, and sex categories can be considered as having come from the same population.

Analysis of Differential Gains Within the Socio-Economic
Categories for the Test of Critical Thinking-Form "A"

The final relationship of concern to this study of the Test of Critical Thinking-Form "A" is that of the effect of the four previously identified socio-economic factors upon differential gains on the test instrument over the period of one academic year. The statistical method utilized for this purpose is the analysis of variance, covariance adjustment technique outlined in Chapter II.

The final covariance tables of gains, which are computed by this method, are presented for each of the four socio-economic factors: high school size, community size, occupations, and sex. Each results in a computed "F" value indicating the degree to which that particular socio-economic factor may contribute to differential gains on the test for the one academic year time interval. Table 8, followed by an interpretation of the resultant "F" value, presents the findings for the high school category; Table 9, the findings for the community category; Table 10, those of the occupational classification; and Table 11, those of sex.

TABLE 8

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL THINKING-
FORM "A," HIGH SCHOOL CATEGORIES

Source of Variation	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	301	12518.4404		0.40922	299	7395.6442	
Error	<u>298</u>	<u>12435.2107</u>	<u>41.7289</u>	0.41030	<u>296</u>	<u>7333.0437</u>	24.7738
Groups	3	83.2297	27.7432		3	62.6005	20.8668
$F = 20.8668/24.7738 = 0.8423$							

Entering a table of "F" values with 296 and 3 degrees of freedom, the necessary value of "F" for significance is found to be 2.63 at the 5% level of confidence and 3.85 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the four high school groups are different for scores on the Test of Critical Thinking-Form "A"; i.e., students within the four high school classifications may have come from the same population.

TABLE 9

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL THINKING-
FORM "A," COMMUNITY CATEGORIES

Source of Varia- tion	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Sauare		De- grees of Free- dom	Sum of Squares	Mean Square
Total	301	12518.4404		0.40922	299	7395.6442	
Error	<u>297</u>	<u>12436.3493</u>	<u>41.8732</u>	0.41102	<u>295</u>	<u>7324.7610</u>	24.8297
Groups	4	82.0911	20.5228		4	70.8832	17.7208
$F = 17.7208/24.8297 = 0.7137$							

Entering a table of "F" values with 295 and 4 degrees of freedom, the necessary value of "F" for significance is found to be 2.40 at the 5% level of confidence and 3.39 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the five community groups are different for scores on the Test of Critical Thinking-Form "A"; i.e., students within the community groups may have come from the same population.

TABLE 10

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL THINKING-
FORM "A," OCCUPATIONAL CATEGORIES

Source of Variation	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	301	12518.4404		0.40922	299	7395.6442	
Error	<u>294</u>	<u>12231.1517</u>	<u>41.6026</u>	0.41799	<u>292</u>	<u>7118.6561</u>	24.3790
Groups	7	287.2827	41.0404		7	276.9881	39.5697
$F = 39.5697/24.3790 = 1.6231$							

Entering a table of "F" values with 292 and 7 degrees of freedom, the necessary value of "F" for significance is found to be 2.04 at the 5% level of confidence and 2.72 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the eight occupational groups are different for scores on the Test of Critical Thinking-Form "A"; i.e., students from the occupational groups may have come from the same population.

TABLE 11

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL THINKING-
FORM "A," THE SEXES

Source of Variation	De- grees of Free- dom	Posttest		Errors of Estimate			
		Sum of Squares	Mean Square	De- grees of Free- dom	Sum of Squares	Mean Square	
Total	301	12518.4404		0.40922	299	7395.6442	
Error	<u>300</u>	<u>12516.1809</u>	<u>41.7206</u>	0.40952	<u>298</u>	<u>7390.5545</u>	24.8005
Groups	1	2.2595	2.2595	.	1	5.0897	5.0897
$F = 5.0897/24.8005 = 0.2052$							

Entering a table of "F" values with 298 and 1 degree of freedom, the necessary value of "F" for significance is found to be 3.87 at the 5% level of confidence and 6.73 at the 1% level of confidence.

Therefore it cannot be assumed that gains between the sexes are different for scores on the Test of Critical Thinking-Form "A"; i.e., they may have come from the same "population."

Summary

An analysis of the data for the Test of Critical Thinking-Form "A" has been presented in Chapter III. The effect of four different socio-economic factors upon the scores earned on the test by students categorized according to high school size, community size, fathers' occupations, and sex, has been studied for differences in entrance status and for differential gains over the period of the freshman academic year.

It was discovered that the differences between the pretest mean scores and the posttest mean scores for the total sample of freshmen tested ($n = 302$) were significant at considerably beyond the 1-percent level of confidence. In other words, significant gains on the Test of Critical Thinking-Form "A" were found to have occurred over the period of one academic year.

The data indicate that no significant differences exist on pretest or entrance scores for the samples tested among the various socio-economic subgroupings of students. Therefore, within the limits of the sample tested, it can be said that high school size, community size, fathers' occupations, and sex have no measurable effect upon scores earned by students from the different socio-economic categories when tested at the time they enter college.

The data also indicate that no significant differences exist among the gains made on the Test of Critical Thinking-Form "A" by groups of students categorized according to the various subgroupings within the high school, community, occupational, or sex classifications. Therefore, within the limits of the sample tested, it can be concluded that high school size, community size, fathers' occupations, and sex have no measurable effect upon mean gains earned by students within the different socio-economic categories during the course of their freshman year in college.

CHAPTER IV

ANALYSIS OF THE DATA FOR THE INVENTORY OF BELIEFS

Introduction

Following the general outline presented in Chapter III for the analysis of the data for the Test of Critical Thinking-Form "A," the present chapter considers the data which apply to the Inventory of Beliefs, the second of three evaluation instruments which have been utilized in this study. The third evaluation instrument is the Test of Critical Analysis in Reading and Writing, the data for which are analyzed in Chapter V.

Parallel analyses are presented for each of the three evaluation instruments. Chapter IV examines the data for the Inventory of Beliefs for groups of students classified according to the size of high schools attended, the size of their home communities, their fathers' occupations, and their sex. The relationships studied are three in number: (1) the determination of differences in pretest-posttest scores or gains for the total sample of students over the period of the freshman academic year, (2) the determination of differences in pretest or entrance status among the various groupings

of students within the socio-economic categories as they entered college, and (3) a study of differential gains within the socio-economic classifications of students for the academic year. The statistical procedures utilized are the same as those used for the analyses presented in Chapter III.

The sample studied for the Inventory of Beliefs consists of 596 Michigan State College freshmen who entered college during the fall term of the 1951-1952 academic year and are representative of all students beginning their college work that term. A little more than half of this sample is included in that studied for the Test of Critical Thinking-Form "A." The 596 cases studied for their achievement on the Inventory of Beliefs are identical to those cases utilized in the Test of Critical Analysis in Reading and Writing, the findings for which are presented in Chapter V.

Presentation of Raw Scores, Gains, and Adjusted Posttest Scores for the Inventory of Beliefs

Table 12 presents the summary of mean scores earned by the several subgroupings of students for the A. C. E. Psychological Examination, the pretest and posttest scores for the Inventory of Beliefs, and the mean gains made by each group on this test instrument during their first academic year. The raw scores earned

TABLE 12

RAW SCORES, GAINS, AND ADJUSTED POSTTEST SCORES
FOR THE INVENTORY OF BELIEFS

	N	A. C. E. Psycho- logical Total Score Means	Pretest Means	Posttest Means	Mean Gain	Adjusted Posttest Means
<u>High Schools</u>						
Class "A"	259	105.432	57.482	64.776	7.294	64.227
Class "B"	164	102.774	56.140	61.500	5.360	62.011
Class "C"	144	103.313	55.514	63.743	8.229	64.637
Class "D"	29	100.241	60.793	67.345	6.552	68.384
Total/Avg.	596	103.936	56.799	63.750	6.951	
<u>Communities</u>						
Farm	92	100.924	55.011	62.228	7.217	63.600
250-2,500	75	102.080	58.120	64.827	6.707	64.058
2,500-25,000	157	104.261	57.427	63.452	6.025	63.014
25,000-100,000	119	101.269	57.353	63.815	6.462	63.605
over 100,000	153	108.399	56.150	64.392	8.242	63.692
Total/Avg.	596	103.936	56.799	63.750	6.951	
<u>Occupations</u>						
Professional	120	109.392	57.708	64.667	6.959	63.714
Proprietary	78	100.603	55.231	63.167	7.936	64.424
Skilled	91	102.673	57.582	63.780	6.198	64.385
Semi & unskilled	59	99.305	55.881	63.627	7.746	64.533
Clerical	43	103.093	55.372	64.256	8.884	65.261
Sales	59	103.034	60.780	64.576	3.796	61.979
Farm	60	100.767	53.983	61.000	7.017	63.079
Managerial	86	107.151	56.698	64.151	7.453	64.014
Total/Avg.	596	103.936	56.799	63.750	6.951	
<u>Sex</u>						
Male	331	104.722	56.190	63.127	6.937	63.479
Female	265	102.955	57.558	64.528	6.970	64.089
Total/Avg.	596	103.936	56.799	63.750	6.951	



on the Inventory of Beliefs by the different socio-economic subgroupings of students, together with rankings which can be allocated to each mean score, again seem to be food for considerable discussion and thought as is the case for scores for the Test of Critical Thinking-Form "A." It is pointed out, however, that these apparent differences need to be analyzed for possible significance before more than cursory attention is given to them. Since the subsequent analyses indicate that the differences among pretest scores and among gains for the groups within each of the socio-economic categories do not prove to be significant, the need to discuss these scores becomes almost meaningless. In light of the above, the adjusted posttest scores also diminish in importance or significance.

Analysis of the Significance of Differences Between Total Sample Pretest and Posttest Means for the Inventory of Beliefs

The first test of significance with which this study is concerned is the difference between the means for the total sample pretest and posttest scores for the Inventory of Beliefs. The problem to be considered is whether or not significant gains have occurred during the academic year for all students considered as a group. If real gains have been measured or demonstrated, it then becomes possible to test for differences in the amount of gain among the

socio-economic groupings of students. The statistical procedure used for this purpose is the "t" test of significance between correlated means--discussed in Chapter II and used in Chapter III for the Test of Critical Thinking-Form "A."

The assumption of equal variances for the pretest and posttest distributions is tested by the value of "F" resulting from the ratio of the variances.

For the sample tested on the Inventory of Beliefs, the value of "F" was found to be 1.073. This obtained value of "F" does not reach the 5-percent level of significance (1.14), and therefore the variances of the two distributions of scores can be considered as equal and the "t" test may be applied.

Utilizing the formula for "t":

$$t = \frac{x_1 - x_2}{\sqrt{\sigma_1^2 + \sigma_2^2 - 2r \sigma_1 \sigma_2}}$$

and substituting the obtained values for the Inventory of Beliefs:

$$t = \frac{63.7500 - 56.7987}{\sqrt{(0.28022 + 0.34985) - [2(0.67523)(0.52936)(0.56805)]}} = 14.6878$$

When a table of "t" values at 595 degrees of freedom is entered, the required value of "t" would be 2.586 at the 1-percent level of confidence for differences to be considered significant. It

is therefore apparent that with the obtained value of $t = 14.6878$ that the difference between the pretest and posttest means for the total sample of students ($n = 596$) on the Inventory of Beliefs is significant considerably beyond the 1-percent level of confidence. It is interpreted, therefore, that real gains have been measured.

Analysis of Pretest Differences Within the Socio-Economic Categories for the Inventory of Beliefs

Since differences in pretest and posttest scores for the Inventory of Beliefs have been discovered to be significant for the total sample of freshmen, and since assurance is available that the test instrument is capable of measuring gain, attention is now directed to the effect of high school size, community size, fathers' occupations, and sex upon pretest scores for the Inventory of Beliefs. This relationship constitutes the second of three inquiries which are analyzed for the Inventory of Beliefs. The statistical procedure used for this inquiry is analysis of variance as outlined in Chapter II. The resulting "F" values obtained by this method make it possible to determine whether or not the pretest means may be considered sufficiently different from one another to represent real differences. Table 13 presents the summary data for

TABLE 13

SUMMARY TABLE OF ANALYSIS OF VARIANCE VALUES FOR
PRETEST MEANS ON THE INVENTORY OF BELIEFS
(N = 596)

Socio-Economic Category	Degrees of Freedom		Obtained "F" Value	Tabular 5% "F" Value*
	Groups	Individuals		
High Schools	3	592	1.789	2.62
Communities	4	591	0.879	2.39
Occupations	7	588	1.630	2.03
Sex	1	594	1.650	3.86

* Points for the Distribution of "F," Snedecor (69:222-225).

the obtained analysis of variance values for the four socio-economic factors.

From an inspection of the obtained "F" Values in Table 13, it is evident that results similar to those discovered for the Test of Critical Thinking-Form "A" have been demonstrated to exist for the Inventory of Beliefs. None of the "F" values indicated are of sufficient magnitude to be significant at the 5-percent level of confidence. Therefore, it cannot be assumed that the socio-economic factors studied produced a significant effect upon Inventory of

Beliefs pretest or entrance scores or that the scores earned by the students representing the various classifications within the socio-economic categories represent real differences in their beliefs and attitudes.

Analysis of Differential Gains Within the Socio-Economic Categories for the Inventory of Beliefs

Thus far in Chapter IV it has been demonstrated that statistically significant gains exist for a sample of 596 freshmen at Michigan State College in scores on the Inventory of Beliefs during their first academic year. Secondly, it has been discovered that when these students are classified according to high school size, community size, fathers' occupations, and sex, that there are no apparent differences among their entrance or pretest mean scores as measured by this test instrument. The third and final relationship to be analyzed for the Inventory of Beliefs is that of the effect of the four different socio-economic factors upon gains in test scores on the instrument over the course of the academic year. The total sample of freshmen distributed among the various subgroupings for each of the socio-economic categories is analyzed for mean gains by the covariance adjustment technique presented in Chapter II.

The computations for the analysis of variance, covariance adjustment technique, result in final covariance tables for each of the socio-economic factors studied. These are presented in Tables 14, 15, 16, and 17. The obtained "F" value for each of these factors presents evidence of the degree to which gains made by the subgroupings of students have been influenced by the socio-economic categories, high school size, community size, fathers' occupations, and sex.

Summary

An analysis of the effect of high school size, community size, fathers' occupations, and sex upon scores for the Inventory of Beliefs has been presented in Chapter IV. Five hundred and ninety-six freshmen classified according to subgroupings within each of the above socio-economic categories have been studied for mean differences on pretest or entrance scores and for differential gains earned during a period of one academic year in the general education program at Michigan State College.

It was demonstrated that differences between the pretest mean scores and the posttest mean scores for the total sample of freshmen ($n = 596$) were significant at considerably beyond the

TABLE 14

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE INVENTORY OF BELIEFS,
HIGH SCHOOL CATEGORIES

Source of Varia- tion	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	595	114427.7500		0.46004	593	61786.4079	
Error	<u>592</u>	<u>112950.0564</u>	<u>190.7940</u>	0.45916	<u>590</u>	<u>61087.9085</u>	103.5388
Groups	3	1477.6936	492.5645		3	698.4994	232.8331
$F = 232.8831/103.5388 = 2.2488$							

Entering a table of "F" values with 590 and 3 degrees of freedom, the necessary value of "F" for significance is found to be 2.62 at the 5% level of confidence and 3.82 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the four high school groups are different for the Inventory of Beliefs; i.e., students within the high school classifications may have come from the same population.

TABLE 15

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE INVENTORY OF BELIEFS,
COMMUNITY CATEGORIES

Source of Varia- tion	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	595	114427.7500		0.46004	593	61786.4079	
Error	<u>591</u>	<u>114050.2484</u>	<u>192.9784</u>	0.46023	<u>589</u>	<u>61560.9026</u>	104.5177
Groups	4	337.5016	84.3754		4	225.5053	56.3763
$F = 56.3763/104.5117 = 0.5394$							

Entering a table of "F" values with 589 and 4 degrees of freedom, the necessary value of "F" for significance is found to be 2.40 at the 5% level of confidence and 3.35 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the five community groups are different for the Inventory of Beliefs; i.e., students within the community categories may have come from the same population.

TABLE 16

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE INVENTORY OF BELIEFS,
OCCUPATIONAL CATEGORIES

Source of Variation	De-grees of Freedom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De-grees of Freedom	Sum of Squares	Mean Square
Total	595	114427.7500		0.46004	593	61786.4079	
Error	<u>588</u>	<u>113780.5287</u>	<u>193.5043</u>	0.46102	<u>586</u>	<u>61325.4294</u>	104.6509
Groups	7	647.2213	92.4602		7	460.9785	65.8541
$F = 65.8541/104.6509 = 0.6293$							

Entering a table of "F" values with 586 and 7 degrees of freedom, the necessary value of "F" for significance is found to be 2.03 at the 5% level of confidence and 2.68 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the eight occupational categories or groups are different for the Inventory of Beliefs; i.e., students within the occupational categories may have come from the same population.

TABLE 17

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE INVENTORY OF BELIEFS,
THE SEXES

Source of Variation	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	595	114427.7500		0.46004	593	61786.4079	
Error	<u>594</u>	<u>114138.7084</u>	<u>192.1527</u>	0.45901	<u>592</u>	<u>61747.8999</u>	104.3039
Groups	1	289.0416	289.0416		1	38.5080	38.5080
$F = 38.5080 / 104.3039 = 0.3692$							

Entering a table of "F" values with 592 and 1 degree of freedom, the necessary value of "F" for significance is found to be 3.86 at the 5% level of confidence and 6.69 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the sexes are different for the Inventory of Beliefs; i.e., they may have come from the same "population."

1-percent level of confidence. In other words, significant gains on the Inventory of Beliefs were found to have occurred over the period of one academic year.

When the data are analyzed for differences in pretest means for the Inventory of Beliefs, it is found that no significant differences exist among the various socio-economic subgroupings of students. Therefore, within the limits of the sample tested, it can be concluded that the size of high school attended, the size of the students' home communities, fathers' occupations, or sex have no measurable effect upon scores earned by students from the different categories when tested at the time they enter college.

The data also indicate that no significant differences exist among the gains made during the academic year on the Inventory of Beliefs by groups of students classified according to the different subgroupings within the high school, community, occupational, or sex classifications. Therefore, it can be concluded that within the limits of the sample tested, high school size, community size, fathers' occupations, and sex have no measurable effect upon mean gains earned by students within the different socio-economic categories during the course of their freshman year in college.

CHAPTER V

ANALYSIS OF THE DATA FOR THE TEST OF CRITICAL ANALYSIS IN READING AND WRITING

Introduction

It is the purpose of this chapter to present an analysis of the data which pertain to the Test of Critical Analysis in Reading and Writing. Groups of students classified according to the size of high schools attended, the size of home communities, their fathers' occupations, and sex are studied for (1) differences in gains in reading and writing abilities for the total sample of freshmen ($n = 596$) over the period of their first academic year, (2) differences in pretest or entrance scores on the test instrument exhibited by the various groups of students at the time they entered college, and (3) differential gains in reading and writing abilities demonstrated by classifications of students within each of the socio-economic categories during the course of their freshmen year. These analyses are made in the manner demonstrated in Chapter III and Chapter IV for the Test of Critical Thinking-Form "A" and the Inventory of Beliefs and as discussed in

Chapter II. The 596 cases utilized are the same as those studied for the Inventory of Beliefs.

Presentation of Raw Scores, Gains, and Adjusted Posttest Scores
for the Test of Critical Analysis in Reading and Writing

A summary of the mean scores earned by the various classifications of students within each of the socio-economic categories on the A. C. E. Psychological Examination, the pretest and posttest scores on the Test of Critical Analysis in Reading and Writing, and the mean gains made by each group on this test instrument over the period of the academic year are presented in Table 18. These are presented primarily for the purpose of identifying the achievements of the different groups of students and should not be seen as an indication of significant differences. The intensive analysis of these kinds of data is indicated only upon the demonstration of significant differences.

Analysis of the Significance of Differences Between Total Sample
Pretest and Posttest Means for the Test of Critical
Analysis in Reading and Writing

Attention is directed to the first test of significance for the data which apply to the Test of Critical Analysis in Reading and Writing, more specifically, the determination of the significance of

TABLE 18

RAW SCORES, GAINS, AND ADJUSTED POSTTEST SCORES FOR
THE TEST OF CRITICAL ANALYSIS IN READING AND WRITING

	N	A. C. E. Psycho- logical Total Score Means	Pretest Means	Posttest Means	Mean Gain	Adjusted Posttest Means
<u>High Schools</u>						
Class "A"	259	105.432	14.591	18.328	3.737	17.897
Class "B"	164	102.774	14.512	18.354	3.842	18.679
Class "C"	144	103.313	14.340	18.326	3.986	18.561
Class "D"	29	100.241	15.034	18.414	3.380	19.257
Total/Avgs.	596	103.936	14.530	18.339	3.809	
<u>Communities</u>						
Farm	92	100.924	14.685	17.870	3.185	18.645
250-2,500	75	102.080	14.240	18.427	4.187	19.034
2,500-25,000	157	104.261	14.783	18.860	4.077	18.677
25,000-100,000	119	101.269	14.134	18.000	3.866	18.866
over 100,000	153	108.399	14.627	18.307	3.680	16.985
Total/Avgs.	596	103.936	14.530	18.339	3.809	
<u>Occupations</u>						
Professional	120	109.392	15.150	18.858	3.708	17.178
Proprietary	78	100.603	14.359	18.000	3.641	18.955
Skilled	91	102.673	14.286	18.505	4.219	18.938
Semi & unskilled	59	99.305	14.169	18.390	4.221	19.759
Clerical	43	103.093	14.628	17.163	2.535	17.356
Sales	59	103.034	14.542	18.237	3.695	18.475
Farm	60	100.767	14.883	18.000	3.117	18.731
Managerial	86	107.151	14.023	18.605	4.582	17.915
Total/Avgs.	596	103.936	14.530	18.339	3.809	
<u>Sex</u>						
Male	331	104.722	14.323	18.003	3.680	17.860
Female	265	102.955	14.788	18.758	3.970	18.955
Total/Avgs.	596	103.936	14.530	18.339	3.809	

gains exhibited during the academic year for the total sample of students. In other words, evidence is sought for the assumption that the test instrument is capable of measuring gains for that period of the college experience. The statistical procedure which is used for this purpose is the "t" test for analyzing the significance of differences between correlated means. This procedure is the same as that outlined in Chapter II and used in the chapters which analyze the data for the Test of Critical Thinking-Form "A" and the Inventory of Beliefs.

The assumption of equal variances is first tested by the value of "F" resulting from the ratio of the variances for the pretest and posttest distributions. For the sample tested for the Test of Critical Analysis in Reading and Writing the value of "F" was found to be 1.1159. This obtained value of "F" does not reach the 5-percent level of significance (1.14) and therefore the variances of the pretest and posttest scores may be considered as being equal and the "t" test may be applied.

Utilizing the formula for "t"

$$t = \frac{x_1 - x_2}{\sqrt{\sigma_1^2 + \sigma_2^2 - 2r \sigma_1 \sigma_2}}$$

and substituting the obtained values for the Test of Critical

Analysis in Reading and Writing

$$t = \frac{18.3389 - 14.5302}{\sqrt{(0.02962 + 0.03689) - [2(0.44973)(0.17211)(0.19206)]}}$$

$$t = 19.8597$$

Entering a table of t values at 595 degrees of freedom, the value of t of 2.586 at the 1-percent level of confidence would be required for differences to be considered significant. The obtained value of t (19.8597) is of sufficient magnitude to indicate that the difference between the mean scores for the pretest and posttest earned by the total sample of freshmen on the Test of Critical Analysis in Reading and Writing is significant considerably beyond the 1-percent level of confidence. It is interpreted, therefore, that real gains have been demonstrated.

Analysis of Pretest Differences Within the Socio-Economic Categories for the Test of Critical Analysis in Reading and Writing

The next question of concern in the study of the data which apply to the Test of Critical Analysis in Reading and Writing is that of the significance of pretest or entrance score variations which result from the effect of the previously identified socio-economic factors. The statistical method used for this purpose

is again that of analysis of variance. The evidence which is sought may be determined from the resultant "F" values obtained for each of the socio-economic factors. These values of "F" for the categories, high school size, community size, fathers' occupations, and sex are presented in Table 19.

None of the "F" values resulting from the analysis of variance tests for the Test of Critical Analysis in Reading and Writing pretest means prove to be significant. It will be remembered from Chapters III and IV that this is also true for the other two evaluation instruments. Therefore, the results of the analysis of variance tests for the Test of Critical Analysis in Reading and Writing indicate that no significant differences appear to be evident as a result of the size of high schools attended, the size of students' home communities, their fathers' occupations, or the sex categories in entrance or pretest scores on the evaluation instrument. It is concluded that the socio-economic factors have no significant bearing upon the ability of college freshmen to read and write effectively at the time they embark upon their college career.

TABLE 19

SUMMARY TABLE OF ANALYSIS OF VARIANCE VALUES
FOR PRETEST MEANS ON THE TEST OF CRITICAL
ANALYSIS IN READING AND WRITING
(N = 596)

Socio-Economic Category	Degrees of Freedom		Obtained "F" Value	Tabular 5% "F" Value*
	Groups	Individuals		
High Schools	3	592	0.255	2.62
Communities	4	591	0.546	2.39
Occupations	7	588	0.736	2.03
Sex	1	594	1.808	3.86

* Points for the Distribution of "F," Snedecor (69:222-225).

Analysis of Differential Gains Within the Socio-Economic
Categories for the Test of Critical Analysis
in Reading and Writing

The final statistical test to be applied to the data for the Test of Critical Analysis in Reading and Writing is that of the significance of differences in gains during the freshman year among groupings of students within the four socio-economic categories. The statistical test is that of the covariance adjustment technique for analysis of variance as presented in Chapter II. The inquiry

which arises is the extent of the effect of socio-economic status upon gains in reading and writing abilities. It has been demonstrated that there are no apparent differences in entrance scores for the Test of Critical Analysis in Reading and Writing among students representing different socio-economic backgrounds at the time they enter college. Gains for the academic year made by the total sample of freshmen have been proven to be statistically significant. The question concerns the extent or the degree to which the factors of high school size, community size, fathers' occupations, and sex contribute to differential gains among students in reading and writing abilities during their first college year.

The final or summary data for each of the socio-economic categories are presented in the tables which follow. The resulting "F" values present the necessary evidence for determining the degree to which each socio-economic factor contributes to differential gains among the student groups.

Summary

An analysis of the data which pertain to the Test of Critical Analysis in Reading and Writing has been presented in Chapter V. The effect of four different socio-economic factors upon scores

TABLE 20

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL ANALYSIS IN
READING AND WRITING, HIGH SCHOOL
CATEGORIES

Source of Variation	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	595	13081.5369		0.26440	593	9622.7785	
Error	<u>592</u>	<u>13081.2862</u>	<u>22.0968</u>	0.26502	<u>590</u>	<u>9614.4837</u>	16.2957
Groups	3	0.2507	0.0836		3	8.2948	2.7649
$F = 2.7649/16.2957 = 0.1697$							

Entering a table of "F" values with 590 and 3 degrees of freedom, the necessary value of "F" for significance is found to be 2.62 at the 5% level of confidence and 3.82 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the four high school groups are different for the Test of Critical Analysis in Reading and Writing; i.e., the students within the high school categories may have come from the same population.

TABLE 21

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL ANALYSIS IN
READING AND WRITING, COMMUNITY
CATEGORIES

Source of Varia- tion	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	595	13081.5369		0.26440	593	9622.7785	
Error	<u>591</u>	<u>13004.2608</u>	<u>22.0038</u>	0.26533	<u>589</u>	<u>9533.8403</u>	16.2204
Groups	4	71.2761	19.3190		4	68.9382	17.2346
$F = 16.2204/17.2346 = 1.0625$							

Entering a table of "F" values with 589 and 4 degrees of freedom, the necessary value of "F" for significance is found to be 2.39 at the 5% level of confidence and 3.35 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the five community categories or groups are different for the Test of Critical Analysis in Reading and Writing; i.e., the students within the community categories may have come from the same population.

TABLE 22

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL ANALYSIS IN
READING AND WRITING, OCCUPATIONAL
CATEGORIES

Source of Varia- tion	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	595	13081.5369		0.26440	593	9622.7785	
Error	<u>588</u>	<u>12964.4695</u>	<u>22.0484</u>	0.26497	<u>586</u>	<u>9529.2740</u>	16.2616
Groups	7	117.0674	16.7239		7	93.5045	13.3578
$F = 13.3578/16.2616 = 0.8214$							

Entering a table of "F" values with 586 and 7 degrees of freedom, the necessary value of "F" for significance is found to be 2.03 at the 5% level of confidence and 2.68 at the 1% level of confidence.

Therefore it cannot be assumed that gains for the eight occupational groups are different for the Test of Critical Analysis in Reading and Writing; i.e., the students within the occupational categories may have come from the same population.

TABLE 23

ANALYSIS OF COVARIANCE OF GAINS AND ERRORS OF
ESTIMATE, THE TEST OF CRITICAL ANALYSIS IN
READING AND WRITING, THE SEXES

Source of Variation	De- grees of Free- dom	Posttest		R^2	Errors of Estimate		
		Sum of Squares	Mean Square		De- grees of Free- dom	Sum of Squares	Mean Square
Total	595	13081.5369		0.26440	593	9622.7785	
Error	<u>594</u>	<u>12997.5404</u>	<u>21.8814</u>	0.6524	<u>592</u>	<u>9550.0728</u>	16.1319
Groups	1	83.9965	83.9965		1	72.7057	72.7057
$F = 72.7057/16.1319 = 4.5070$							

Entering a table of "F" values with 592 and 1 degree of freedom, the necessary value of "F" for significance is found to be 3.86 at the 5% level of confidence and 6.69 at the 1% level of confidence.

Therefore it can be assumed that since the observed value of "F" (4.51) is greater than 3.86, that the difference in gains for the sexes is significant at the 5% level of confidence.

It may be pointed out that without information about A. C. E. Scores and pretest scores on the Test of Critical Analysis in Reading and Writing differences among the group means would be tested by $F = 83.9965/21.8814 = 3.83$, the values for posttest mean square in the third column of Table 23. This value, 3.83, is just short of the necessary 3.86 "F" value for significance at the 5% level of confidence. Therefore, in effect, the reduction of error variance from 21.8814 to 16.1319 together with adjustment of the means to a common standing on the pretest scores and A. C. E. Scores have increased the resultant "F" value to a point beyond the 5% level of

TABLE 23 (Continued)

confidence. Thus, it can be assumed that the gains made by the women for the academic year on the Test of Critical Analysis in Reading and Writing is significantly greater than that made by the men when adjustments are made for A. C. E. Scores and pretest scores.

earned on the test by students within the high school, community, occupational, and sex categories has been studied for differences in entrance status and for differential gains over the period of their freshman year.

The results of the data indicate that the differences between the pretest and posttest means on the test instrument for the total sample of freshmen are significant at considerably beyond the 1-percent level of confidence. It is therefore interpreted that the Test of Critical Analysis in Reading and Writing is capable of measuring gains in reading and writing abilities of students over the period of their freshman year.

No significant differences were found to exist among students within the different socio-economic categories for the entry scores on the reading and writing instrument. Therefore, within the limits of the sample tested, it can be interpreted that high school size, community size, fathers' occupations, and sex appear

to have no measurable effect upon the ability of students to read and write effectively at the time these students enter college.

The analysis of differential gains on the Test of Critical Analysis in Reading and Writing presents evidence of the only potentially significant relationship of socio-economic status to achievement among the general education objectives analyzed in the entire study. This is evident in only one of the four factors or categories studied, that of sex differences. The analysis of variance, covariance adjustment technique, found differences between pretest and posttest scores for the Test of Critical Analysis in Reading and Writing to be significant at the 5-percent level of confidence, with the women making larger gains for the academic year than those made by the men. However, when these differences are tested without making allowance for initial variations on pretest scores and A. C. E. Scores, it was found that their significance falls short of the 5-percent level of confidence. It is therefore interpreted that these apparent differences may not be as meaningful as might otherwise be indicated.

The other socio-economic factors do not result in significant differences for the gains in reading and writing abilities. The resultant interpretation which may be made is that with the

possible exception of sex differences, the socio-economic factors studied have no measurable effect upon mean gains on the Test of Critical Analysis of Reading and Writing earned by students within the different categories during the course of their freshman year in college.

CHAPTER VI

SUMMARY, CONCLUSIONS, AND IMPLICATIONS FOR FURTHER RESEARCH

The Purpose of the Study

During the past quarter-century, America has seen controversies growing over the purposes and design of programs of general education in our institutions of higher learning. These have developed largely as a result of the almost unique conception in our present-day world of the role of man in our democratic society. The many expressions and interpretations of this controversy have resulted in widely differing general education programs, each designed to prepare the individual for his own best contribution to the society in which he lives. Many of these programs have been developed and pursued without concrete evidence that the objectives sought are being accomplished to their greatest fulfillment.

There is evidence that educators are becoming concerned with the evaluation of existing programs and the purposes for which they are designed, to the extent that objective research

designs are being undertaken in increasing numbers and with improved evaluative methodology.

The present study is concerned with this problem as it applies to the improvement of general education programs in general and the objectives and particular applications to be found in the general education program at Michigan State College. More specifically, the study has sought to discover the effects of selected socio-economic factors upon outcomes of a program of general education. Three evaluation instruments, the Test of Critical Thinking-Form "A," the Inventory of Beliefs, and the Test of Critical Thinking in Reading and Writing, have been utilized in the study for the purpose of determining whether differences exist (1) among groups of entering freshmen and (2) in the amount of change or gain during one academic year, when freshmen are classified according to (a) size of high schools, (b) size of home communities, (c) fathers' occupations, and (d) sex. In more general terms, the investigation deals with the problem of ascertaining the nature of entering students with respect to the achievement of certain educational objectives which they bring to college and the determination of change or gain which occurs during that experience. The study was designed to augment and enhance research

being carried out by The Basic College of Michigan State College and that of The Cooperative Study of Evaluation in General Education of the American Council on Education.

Methodology

The three test instruments utilized for the purposes of the study were selected during their formative or developmental stages on the premise that they were so designed that they might be used for the purposes of ascertaining the relationships and contributions of specified socio-economic factors to commonly recognized outcomes and objectives of general educational programs. The study thereby becomes a further attempt to validate these newly-developed evaluation instruments of The Cooperative Study.

The three general education objectives, improvement in critical thinking skills, improvement in reading and writing abilities, and the development of mature attitudes, values, and beliefs were selected for study for their relevance to outcomes of total programs of general education rather than for their relationship to the objectives of any particular distribution of course work as such.

The sample chosen for study was selected for its representation of entering freshmen at Michigan State College during the fall term of the academic year 1951-1952. The data utilized consist of scores earned on the evaluation instruments during the pretesting and posttesting programs at the start and close of the academic year, together with biographical data for each of the cases. Data for each of the students were coded and placed upon IBM punch cards for the purpose of obtaining the necessary summary data by means of IBM tabulating machines.

In the analysis of the data three specific statistical procedures were used, as outlined in the study: the "t" test of significance to study differences between pretest and posttest means of correlated distributions; the analysis of variance technique for the study of pretest differences, and the analysis of variance, covariance adjustment technique for the study of differential gains.

Findings

The findings of the study indicate that similar results pertain to each of the three evaluation instruments and for the purposes of comparison, these common findings are summarized in the paragraphs which follow. It is pointed out that while certain common

conclusions may be drawn from the data, the analyses were made separately for each of the three evaluation instruments and that the comparisons are nonstatistical in nature.

The first test of significance studied for each of the three general education objectives was that of the significance of gains made on the Test of Critical Thinking-Form "A," the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing by college freshmen during their first college year. The data indicate that the gains made by the students on each of the three test instruments over the period of one academic year were highly significant. In other words, there is reason to believe that the program of basic general education at Michigan State College during the freshman year is effective within the areas measured by these test instruments. No attempt is made to compare the results of the gains made on each of the three evaluation instruments since for each objective the gains made would appear to be highly significant. It is pointed out, however, that whereas the skills measured by the Test of Critical Analysis in Reading and Writing were undoubtedly influenced by the common experience of all freshmen in the basic Communication Skills course, the gains exhibited in critical thinking and attitudes, values, and beliefs must

be assumed to have resulted to a great degree from the emphases of the total general education experience. The determination of the influence of the various college courses or experiences upon such gains must be allocated to additional research designs.

The effects of the size of high school attended, the size of students' home communities, fathers' occupations, and sex have been analyzed for each of the three general education objectives. Pretest scores on the Test of Critical Thinking-Form "A," the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing, which were earned by students at the time they entered college, have been studied for evidences of significant differences arising out of variations in socio-economic background. The data for each of the three evaluation instruments indicate no significant differences for entrance or pretest mean scores among groups of students within the various socio-economic classifications. It is therefore concluded that within the classifications of high school size, community size, fathers' occupations, and sex, that socio-economic factors produce no measurable differences among the abilities of entering college freshmen to think critically, to read and write effectively, or to demonstrate acceptable and mature attitudes, values, and beliefs.

The data indicate no significant differences among the gains made on the Test of Critical Thinking-Form "A" or the Inventory of Beliefs by groups of students tested at the beginning and end of their freshman year when classified according to high school size, community size, fathers' occupations, and sex. Furthermore, differential gains over the period of the academic year on the Test of Critical Analysis in Reading and Writing were proven to be nonsignificant for all factors except the sex category. The analysis of gains made during the freshman year by men and women proved to be statistically different at the 5-percent level of confidence with the women exhibiting higher pretest scores, higher posttest scores, and greater gains than those earned by the male students. The influence of the respective A. C. E. Mean Scores and entrance scores on the Test of Critical Analysis in Reading and Writing is reflected in this test of significance. The analysis of variance, covariance adjustment technique, in effect, factors out initial differences in test scores and analyzes gains in the light of a common initial status. When the variances are not adjusted for initial variations the differences in mean gains between the scores for men and women were found to fall short of significance. This places a qualification upon the significance of the difference in gains between the reading

and writing abilities of freshmen men and women. It is therefore concluded that with the possible exception of differences in reading and writing abilities between men and women, that gains in the ability of college freshmen to think critically, to maintain mature attitudes, values, and beliefs, and to read and write effectively are not measurably affected by the socio-economic factors studied.

Conclusions and Implications for Further Research

On the basis of the findings of this study, certain conclusions may be drawn and implications for further research indicated.

The results of this study indicate that evaluation instruments are available which can be used for the purpose of measuring apparent gains in specified general education objectives. Insofar as the three evaluation instruments studied can be deemed to measure those objectives for which they are designed, gains over the period of one academic year have been demonstrated in the areas of critical thinking, reading and writing ability, and in the maturity of attitudes, values, and beliefs. Differences between the pretest and posttest scores for the Test of Critical Thinking-Form "A," the Inventory of Beliefs, and the Test of Critical Analysis in Reading and Writing have in this study been found to be statistically

significant for the total sample of college freshmen. These findings support the research in this direction carried out by The Cooperative Study of Evaluation in General Education, as well as that of The Horowitz Study.

Since each of these studies has for the most part been primarily concerned with the measurement of gains for the freshman academic year, it is suggested that further research be undertaken with the instruments in question to ascertain the extent to which they may be utilized for the measurement of gains for differing periods of the college experience. Furthermore, it is suggested that these instruments be used to measure the selected attainments or gains of student groups that have not been subjected to formalized general education programs.

A second major conclusion resulting from this study is that with the possible exception of gains during the academic year between the sexes for scores on the Test of Critical Analysis in Reading and Writing, no significant differences appear to exist in differential gains or for entrance status among the many different socio-economic groupings of students for the evaluation instruments used.

These results may lead to two different and diametrically opposing assumptions. The first of these is the assumption that the tests are not sufficiently refined in their present developmental stage to uncover the minute and individual subtleties which are associated with varying socio-economic backgrounds. It is pointed out that the further refinement of evaluation instruments is always in order if the instruments can be sensitized to an increasing number of variables. The Cooperative Study has recognized this responsibility and has developed revised forms of the Test of Critical Thinking and the Test of Critical Analysis in Reading and Writing.

The opposing assumption which may be drawn is that no real differences exist between entrance scores and indications of gain among the general education objectives purportedly measured by the test instruments and for the socio-economic groupings studied, and that the instruments are so designed that differences would have been found if significant differences actually exist.

In support of the latter assumption it may be pointed out that The Horowitz Study did find the Inventory of Beliefs and the Test of Critical Analysis in Reading and Writing sufficiently discriminating to differentiate gains made among various preference groups during their first year in college. Furthermore, The Cooperative Study

has accumulated evidence for all three of the evaluation instruments which demonstrate the utility of the tests for the purpose of discriminating between the outcomes of college programs with differing general education emphases and socio-economic populations.

To continue with the assumption that the tests are sufficiently acute in discrimination to detect differences among various socio-economic groupings of students: support is given to the belief that the test instruments do not contain evidences of cultural bias. If the evaluation instruments were to contain a demonstration of cultural bias this would be expected to make its presence felt in the direction of significant differences among the socio-economic categories. The findings of the present study in no way support the assumption of cultural bias within the instruments. The Horowitz Study likewise reports no evidence for the assumption of cultural bias within the scope of the factors studied.

Further studies are suggested in the direction of determining the extent to which these instruments are capable of measuring differences among socio-economic groupings of students in general education objectives at the college entrance level and for gains during differing portions of the college program. Particular

emphasis is proposed for the revised forms of the Test of Critical Thinking and the Test of Critical Analysis in Reading and Writing.

An implication for further research which results from the findings of the present study is the suggestion that a further refinement or sharpening of the various socio-economic categories be made in future studies utilizing these instruments. It is conceivable that the categories used in the present study are not sufficiently unique to be of value in the study of differences among varying socio-economic backgrounds. It is quite possible that a combination of factors such as income level, educational level, religious preference, nationality or ethnic extractions or the like, could be used to differentiate among groups. The implication which pertains is that the categories more commonly associated with socio-economic classifications contain a multitude of other factors which influence the effects of a program of general education to the degree that they cancel out other possible differences.

Another implication arising out of the findings of this study and supported by evidence from The Cooperative Study is that groups of students who make lower scores on the tests upon entrance to a program of general education tend to make the largest gains on these test instruments over the period of one academic

year. Whether or not these differences are an indication of a ceiling effect cannot be determined within the scope of the present study. It does, however, raise the following question. If one is to assume that the purpose of the educational experience is to ascertain the general educational level of the student as he embarks upon a phase or portion of his formal training or education, and then to make it possible for him to develop his own peculiar abilities to the maximum, it is then suggested that necessary class sectioning at Michigan State College be made upon the basis of demonstrated achievements on evaluation instruments such as those studied in the present research effort. The effect which would be accomplished would be to place students in rather homogeneous groupings with respect to their general education achievements, making it possible to work toward the greatest advancement of every student concerned. This procedure would make it more nearly possible to meet the needs of each student rather than to teach for the median level of a heterogeneous group. It is recognized that care must be taken not to isolate the student from that part of his total college experience which comes from rubbing elbows with differing experiences and all kinds of people, but it is suggested that this would be less apt to take place with classes

made up of students sectioned according to their pretest scores on measures of general educational objectives than it would for groups sectioned on the basis of preference or socio-economic classifications.

A final conclusion is presented in the form of a recommendation for further study. The results of this study indicate that there is need for the evaluation instruments utilized by this study to be used in an ever-increasing number of ways for the purpose of establishing the different uses for which they may be considered valid. No single study is capable of ascertaining the many possible ways in which new test instruments may be used or the purposes for which they may be utilized to advantage. To this end it is suggested that the findings of this study carry additional significance due to the additive nature of these results to those discovered by The Horowitz Study and the research programs of The Cooperative Study of Evaluation in General Education.

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APPENDIX

Biographical Data Sheet

Each of the following items is designed to give certain biographical data about you to help us interpret the scores you make on some of the tests of the Cooperative Study of Evaluation in General Education. Some items may be completed by filling in the information desired. Other items are stated as questions followed by several possible answers. You are asked to select the response for each question which seems to you to describe your own situation best. Record the number of your answer in the space provided to the left of each question number. You will find that some of the question numbers do not follow consecutively. Don't worry about this. The questions are numbered to correspond with those on a card on which your scores for a number of tests will eventually be recorded.

* * * * *

1-3. Your name: _____ 4. Your age: _____

() 5. Your sex: (1) M (2) F 6-7. Your school: _____

() 8. Your year or class: (1) F. (2) So. (3) J. (4) S. (5) Grad.

() 9. What is, or is likely to be, the general area of your undergraduate major?

- | | | |
|-------------------|-----------------------------------|-----------------------|
| 1. Humanities | 4. Business and Commerce | 7. Biological Science |
| 2. Social Science | 5. Physical Science & Mathematics | 8. Agriculture |
| 3. Education | 6. Engineering | 9. Other _____ |
- (specify)

() 10. What is the highest academic degree you hope to attain?

1. Two year terminal (e.g., Associate of Arts)
2. Four year terminal (e.g., Bachelor's degree)
3. Five or six year terminal (e.g., Master's degree)
4. Doctor's degree (Academic or professional)

() 11. What was your approximate academic position in your high school graduating class?

1. Lower third
2. Middle third
3. Upper third

() 12. What is your approximate over-all college average? (Beginning students do not answer)

- | | | | |
|-------|--------|--------|--------|
| 1. A. | 3. C/. | 5. C-. | 7. D-. |
| 2. B. | 4. C. | 6. D. | |

13. Mark a circle around the figure showing the highest level of formal education which your father attained.

												College									
School level	Grammar School								High School				Junior College				Graduate or Professional School				
Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

() 14. If you can and are willing to, please indicate what is or was approximately your father's last yearly income?

- | | | |
|--------------------------|-------------------------|--------------------------|
| 1. \$ 5,000 or under, | 2. \$5,000 to \$10,000, | 3. \$10,000 to \$20,000, |
| 4. \$20,000 to \$40,000, | 5. Over \$40,000 | |

Please Print: Your name _____ Your school _____

()15. Before coming to college, in what kind of a community did you live most of your life?

1. Farm.
2. Village, 250 to 2500 population.
3. Town, 2500 to 25,000 population.
4. City, 25,000 to 100,000 population.
5. City, over 100,000 population.

()16. What is (was) your father's occupation? _____

Student: Do not write below this line. This information will be filled in by the teacher or some other specifically designated official.

* * * * *

17-18. Academic Aptitude Test Score (Total raw score) _____

19-20. Major (raw) subscore _____.

21-22. Major (raw) subscore _____.

23. Name of test _____

23.1 Form of test and date published _____

24. Student's all-college grade average expressed in letter grades _____ *

25-34. Do not fill in spaces 25-34 unless specifically asked to do so.

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

33. _____

34. _____

Supplementary Biographical Questionnaire

American Council on Education.

QUESTIONNAIRE

1. NAME _____
last first middle
2. Student number _____
3. What is your major? _____
4. Have you changed majors during the year? _____
yes no
5. If you have made a change of major, please indicate what this change was, and when you made it.
1. from _____ to _____; date _____
Fall winter spring terms
2. from _____ to _____; date _____
Fall winter spring terms
6. What was the approximate size of your high school?
- Class "A" (800 pupils and up) _____
- Class "B" (325 to 799) _____
- Class "C" (150 to 324) _____
- Class "D" (up to 150) _____

The Individual Data Sheet

Items marked (*) indicate data collected and coded for use in this study.

Items marked (H) indicate data utilized only in the Horowitz Study.

	DATA	IBM	IBM
	*		
	*		
	*		
	*		
	*		
	*		
	Not Used		
	Not Used		
	Not Used		
High School Size	*		
	*		
	*		
	*		
	*		
	*		
	*		
	*		
	*		
	*		
	*		
	*		
Preference, Entrance	H		
Preference, Final	H		
	*		
	*		
	*		
	Not Used		
	Not Used		
	*		
	*		

The Evaluation Instruments

Cooperative Study of Evaluation in General Education
of the
American Council on Education

A TEST OF CRITICAL THINKING

FORM A

Read these directions before beginning the test.

Improvement of your ability to think critically and effectively is one of the aims of general education. This test is designed to provide a measure of your competence in dealing with a variety of problems, all of which require some kind of critical thinking. The test does not cover all aspects of critical thinking, but it does involve several important types of thinking.

Within the test you will find directions for groups of questions. Read these directions carefully so that, before you answer a question, you know just what is being asked.

You are expected to complete the test within 45 minutes.

Your score will be the number of questions you answer correctly.

You may, in some cases, come across words which are not familiar to you. If you do, don't worry about it. The unfamiliarity of such words will not prevent your answering the questions.

Your answers to the questions are to be recorded on a separate answer sheet. Fill in the blank spaces on the side of your answer sheet (your name, the date, etc.). For Name of Test, write Critical Thinking. For Part, write Form A.

Mark only the ONE BEST ANSWER to each question.

Do not make any marks on this test booklet. Use scratch paper if necessary.

Items 1 through 9 refer to the following story and conclusion:

In a radio broadcast the following story was told: "The people in a little mining town in Pennsylvania get all their water without purification from a clear, swift-running mountain stream. In a cabin on the bank of the stream about half a mile above the town a worker was very sick with typhoid fever during the first part of December. During his illness his waste materials were thrown on the snow. About the middle of March the snow melted rapidly and ran into the stream. Approximately two weeks later typhoid fever broke out in the town. Many of the people became sick and 114 died."

Conclusion: The speaker then said that this story showed how the sickness of this man caused widespread illness and the death of over one hundred people.

Items 1 through 9 are statements which might appear in a discussion of this conclusion. Assuming that the story as told was true, mark each statement according to the following scale:

1. The statement argues for the conclusion.
 2. The statement argues against the conclusion.
 3. The statement argues neither for nor against the conclusion.
1. Typhoid fever organisms have been known to survive for several months at temperatures near the freezing point.
 2. Good doctors should be available when an epidemic hits a small town.
 3. There may have been other sources of contamination along the stream.
 4. The waste materials of a person who has a severe case of typhoid fever contain active typhoid organisms.
 5. Typhoid fever may be contracted by using water which contains typhoid germs.
 6. Typhoid organisms are usually killed if subjected to temperatures near the freezing point for a period of several months.
 7. Sickness and death usually result in a great economic loss to a small town.
 8. There may have been other sources of typhoid fever germs in the town, such as milk or food contaminated by some other person.
 9. The symptoms of typhoid fever usually appear about two weeks after contact with typhoid germs.

* * * * *

Select the one best answer to each of the following items (10-13).

10. "There are women Eskimos. How do I know? Because everyone knows some men are not adult Eskimos, and this means some adult Eskimos are not men. That's how I know there are women Eskimos." This argument is
 1. acceptable reasoning, because the conclusion is true.
 2. faulty reasoning, because it is not true that "if they're not men they would have to be women."
 3. acceptable reasoning, because "some men are not adult Eskimos" does mean "some adult Eskimos are not men" and it is true that if they're not men they would have to be women.
 4. faulty reasoning, because we can believe "some men are not adult Eskimos" without believing also that "some adult Eskimos are not men."
 5. acceptable reasoning, because the conclusion, regardless of its truth, certainly follows from the reasons given.
11. A stock breeder plans to ship 50 horses, 50 cows, 50 goats, 50 sheep, and 50 pigs to a new location. In order to make a fairly accurate estimate of the total weight of his animals, which of the following would be most useful to him?
 1. The total weight of 50 animals from his stock, selected at random.
 2. The average weight of 50 animals from his stock, selected at random.
 3. The total weight of one horse, one goat, one cow, one pig, and one sheep, each selected at random.
 4. The combined average weights of 5 pigs, 5 sheep, 5 goats, 5 horses, and 5 cows, all selected at random.
 5. The average weight of the first 125 animals to enter the barn.
12. The head physician at Cowlick College wishes a reasonably accurate estimate of the number of cases of chicken pox treated at the infirmary during the past five years, but his time is limited. A total of 10,000 cases of all kinds of sickness were treated during the period. A study of which of the following samples from his records would probably be adequate and still conserve his time?
 1. Every odd-numbered case from the 10,000.
 2. Every twentieth case from the 10,000.
 3. 400 cases selected to represent proportionately each age group.
 4. The last 400 cases treated.
 5. The last 200 cases treated.
13. Which of the samples in Item 12 would probably be the LEAST accurate?

* * * * *

In Items 14 through 17 you are to accept as true that all window-washers are poorly paid, and some window-washers have large families. Mark each of the conclusions, 14 through 17 according to the following scale:

1. Must be true on the basis of the given statements.
 2. Might be true on the basis of the given statements.
 3. Must be false on the basis of the given statements.
14. Some people who have large families are not poorly paid.
15. Some people who are poorly paid have large families.
16. All people who are poorly paid have large families.
17. No people who are poorly paid have large families.

* * * * *

At a faculty conference Professor Chatterry said:
NO EDUCATED MAN IS UNPREPARED FOR MARRIAGE.

Other faculty members commented on this remark, and their comments are given in Items 18 through 21. Mark each of these comments according to the following scale:

1. That means just the same thing Chatterry said.
 2. No. That can't be true if Chatterry is right.
 3. You can't tell from what Chatterry said whether that is true or not.
18. Everyone who is prepared for marriage is educated.
19. Some men who are unprepared for marriage are educated.
20. If a man is not educated, he is prepared for marriage.
21. No one who is unprepared for marriage is an educated man.

* * * * *

Items 22 through 27 refer to the following argument:

The college committee in charge of social regulations was holding an open hearing on a proposal that the rule on chaperoning coeducational outings (wiener roasts, overnight hikes, campfires, etc.) should be more strictly applied. A student in the audience got the floor and made this speech:

- A. This whole discussion is ridiculous, for we shouldn't have chaperones at all!
- B. You see, any chaperone you get will either arrange not to see what happens or he will be so badly outnumbered he can't keep track of what is going on.
- C. But chaperones are supposed to guarantee that what goes on is respectable.

- D. So the chaperone system is utterly ineffective and full of hypocrisy.
- E. Besides, collegians will never develop maturity unless they are given responsibilities to exercise and are really trusted with these responsibilities.

22. There is one statement which the student did not offer as a reason for any other statement. That statement, his main conclusion, is

1. A
2. B
3. C
4. D
5. E

23. The student A as a reason for

1. B
2. C
3. D
4. E
5. none of these.

24. The student offered B as a reason for

1. C
2. D
3. C and D
4. E
5. none of these.

25. The student offered C as a reason for

1. B
2. D
3. E
4. D and E
5. none of these.

26. The student offered D as a reason for

1. A
2. B
3. C
4. E
5. none of these.

27. The student offered E as a reason for

1. A
2. B
3. C
4. D
5. none of these.

* * * * *

Items 28 through 33 concern definitions of problems. Each item is a brief description of a situation, followed by five possible statements of the problem involved. Select from the five statements the one which

- a. faces the problem, and
- b. is broadest and most inclusive.

The statement you select need not be the wisest one or the one you would personally accept. You are to select only on the basis of whether the statement faces the problem and is broad and more inclusive than the other statements.

28. The Kemp family wishes to repaint its living room walls. Their problem is:

1. What color and kind of paint will best fit the family's use of the room and budget of time and money.
2. What color goes best with the rugs and curtains.
3. How best to time the painting in relation to baby's sleep, Jane's birthday party, and other events scheduled for the house.
4. What kind of paint--water or oil base, etc.--is cheaper in the long run, immediate area covered and washability and durability all considered.
5. Whether they should use wallpaper since it will be cheaper and more colorful.

29. A recently married couple decide that they will give \$200 of their annual income to charity. Their problem is:

1. What charity-supported works are most deserving and in need of the money they can give, and what distribution of their \$200 best balances these demands?
2. How to deal with those making the appeals, with the least time and bother and with the most congenial response to their requests.
3. Which of the appeals which come to them is most worthy?
4. Whether this amount (\$200) is too much or too little for the cause they want to aid.
5. Whether concentration of their gifts in one agency would do more ultimate good than distribution of it among several users.

30. A housewife is trying to decide upon a menu for a dinner for eight. Her problem is what choice of foods would be most

1. indicative of a cultured, hospitable, and moderately well-off family.
2. economical to prepare and, in view of their different needs, healthful for all of her guests.
3. likely to conserve time, energy, and expense in preparation and serving.
4. novel and interesting as works of culinary art, and sure to keep conversation going if no other topics catch on.
5. satisfying to the tastes and needs of the group and of the occasion and within her budget.

31. A college junior, Howard is enrolled in English History. In the mid-semester test he found that he was near the low end of the grade curve, chiefly because a large number of students had used "ponies" on the test. Howard told the professor about the cheating, but this professor could not believe that cheating could occur in his classes without his observing it. Howard must receive a high grade in this course if he is to maintain his membership in the college honor society, Howard's problem is:

1. Should he give up getting into the honor society in favor of concentrating on other benefits in English History?
2. How could he do something effective to improve the conduct of examinations at his college while getting the best honest grade possible?
3. How could he get a good grade in the course even though his examination grade was low?
4. Considering not only "ponies" and other means of improving his own grade, but also ways to confuse or otherwise trap his cheating competitors into showing their hand, how could Howard compete with them?
5. How could he get the professor to see the real situation and lead an effort to correct it?

32. A shy but talented freshman, who has had little experience in dating, telephones a popular and considerate upperclass woman for a date to the main dance of the year just two days before the big event. Which of the following answers shows the best perception of the problem she is dealing with?

1. "Sorry! I'm all dated up. I didn't think you would ask me."
2. "I'd love to, Doug, but I have a date already. Give me a chance again next year, will you?"
3. "Thanks, Doug, but Jack got here first. I can get you a date though, and a bid to a gay old party afterwards where you can really let your hair down. Are you game?"
4. "Gee, I've already accepted Jack's bid. But, say, would you like a tip on a cute girl who's holding out another day on a bid she's got in hopes you'd call?"
5. "Sorry, Doug. Have you tried calling any of the freshman girls?"

33. "Where are you going to settle?" one graduate asked another. Which of the following responses shows the best perception of the problem?

1. "Albany. That's where my best job offer is."
2. "We're not going to settle right away. First we'll see a bit of the world and then maybe look for a job."
3. "Somewhere in the Southwest. We prefer the country and people, and the wife's asthma isn't so bad there."
4. "I can make a living anywhere, so we'll probably live near Washington, D.C. It's interesting to be near the center of political activities."
5. "Millie likes the mountains, and I like the seashore; the best jobs are in the Midwest; so we've decided to cross that bridge when we come to it."

* * * * *

Items 34 through 47 refer to the following newspaper advertisement:

"Wanna buy a duct? If you're planning to install a warm air heating system, ask your contractor about the advantages of Blake Aluminum for duct-work. Many have already found it saves money because it's easier for workmen to handle, gives more long-run satisfaction because it never rusts, never needs painting, is always neat. Aluminum's natural insulation prevents excessive heat loss; sound is deadened too. Approved for FHA financing."

In this advertisement the writer makes a number of claims for his product. He also takes for granted a number of ideas about it, about prospective buyers of heating systems, etc. Mark each of the statements, 34 through 47, according to this scale:

1. The writer states this, although maybe not in just these words.
 2. The writer does not state this, but he does state something which shows that he must have taken it for granted.
 3. The writer does not state this, nor does it have any relation to his argument.
 4. The writer does not state this and it would weaken his argument if he did state it.
34. Installation expense is a significant item in considering the cost of heating equipment.
35. Ordinary ducts are harder to handle than aluminum ducts.
36. Some people are thinking of installing warm-air heating systems.
37. Aluminum ducts cost more than galvanized iron ducts.
38. Durability as well as initial expense should be considered in buying heating equipment.
39. Brick houses take a different shape of heating duct than do frame houses.
40. Some buyers of ducts live in the country.

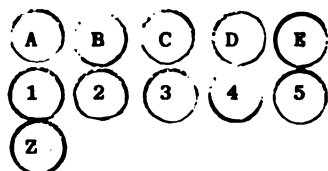
41. Blake Aluminum ducts do save money for the buyer.
42. Delivery on orders for aluminum products is slow at present.
43. FHA approval for a building product is an asset.
44. The prospective buyer's contractor knows about Blake Aluminum ducts.
45. Blake Aluminum ducts may not be the best aluminum ducts on the market today.
46. A house in which sound is deadened is usually preferred to a house in which sound is not deadened.
47. Ordinary galvanized ducts don't need to be painted anyway.

* * * * *

(Please go on to the next page)

Items 48 through 57 form a sequence based on a developing situation. In answering an item, consider only the information given you in it and in the preceding items. (Do not consider information presented in the items which follow. The correct choice in one item may appear to be incorrect if you consider information presented in later items.)

You find yourself stranded late at night in the deserted waiting room of a Balkonian airport. You are hungry. You find a large vending machine about which you know nothing. It has no display windows or pictures, and the directions are written in the Balkonian language, which you cannot understand at all. Beside the machine is a waste basket containing a few discarded food wrappers and beverage cups. On the front of the machine you find a coin slot the size of a Balkonian dollar, a delivery chute, and a panel of buttons arranged as follows:



You must depend upon your own ingenuity to operate the machine.

48. You insert a Balkonian dollar in the coin slot, but nothing happens. On the basis of the little information about the machine you now have, which of the following explanations of the machine's failure to operate would be most likely to be true? (NOTE: in answering this item, do not consider information presented in later items.)

1. You did not insert the right kind of coin.
2. You must push one or more of the buttons to make the machine operate.
3. You must push the button marked Z to make the machine operate.
4. The machine is out of order.
5. The machine is empty.

49. You push the button marked A and nothing happens; then you push the Z button and still nothing happens. Finally you push the 1 button, and the machine promptly delivers a package of peppermint chewing gum and three Balkonian quarters. On the basis of the little information given you up to and including this item (do not consider later items), which is the most likely explanation of the machine's behavior?

1. The machine will not operate unless the A button is pushed.
2. The machine will not operate unless the Z button is pushed.
3. You must push a numbered button to make the machine operate.
4. The order in which the buttons are pushed determines whether the machine will operate.
5. The machine contains only chewing gum.

50. Since the gum does not satisfy your hunger, you risk another dollar, pushing, in order, buttons B 1 Z and getting a package of Elephant cigarettes, but no change. At this point which of the following is the most likely explanation of the machine's behavior? (NOTE: the choice you should mark is the one for which you now have the most evidence; the correct choice here may not prove to be the true explanation later.)

1. The numbered buttons determine the type of product (gum, cigarettes, etc.) delivered.
2. The A button causes change to be returned.
3. Buttons A B C D E determine the type of product delivered.
4. The Z button causes change to be returned.
5. The machine contains only gum and cigarettes.

51. You are still hungry. Again you insert a dollar and push, in order, only buttons B and 2 and you get a package of Lion cigarettes (a different brand) and no change. For which of the following explanations do you have the most evidence at this point?

1. The machine contains only cigarettes and gum.
2. The Z button must be pushed to secure change.
3. Pushing or not pushing the Z button determines the particular brand or flavor of product dispensed.
4. The numbered buttons determine the particular brand or flavor of product dispensed.
5. The buttons A B C D E determine the particular brand or flavor of product dispensed.

52. You are still hungry. You push, in order, the buttons marked A 2 Z and you get a package of wintergreen chewing gum (a different flavor) and three Balkonian quarters in change. The evidence now in hand points most strongly to the theory that

1. different brands or flavors of products are delivered purely by chance.
2. the numbered buttons determine the brand or flavor of product delivered.
3. the order in which the buttons are pressed determines whether or not change is returned.
4. change is returned only when the A button is pushed.
5. the Z button must be pressed in order to get change.

53. Still hungry, you try again. You push, in order, buttons (C) (3) (Z). The machine promptly delivers a cup of steaming, unsweetened black coffee and two quarters. On the basis of this information, the best explanation of the machine's operation is:

1. You get change according to the price of the product, not according to the buttons you push.
2. You must push the (Z) button to get change.
3. You must push the (A) button to get change.
4. You must push the (3) button to get coffee.
5. You must push the (Z) button to make the machine operate.

The results you have obtained so far are summarized below. A dollar was inserted each time.

Buttons Pushed			Results Obtained
(A)	(Z)	(1)	1 pkg. peppermint gum and 3 quarters
(B)	(1)	(Z)	1 pkg. Elephant cigarettes, but no change
(B)	(2)		1 pkg. Lion cigarettes, but no change
(A)	(2)	(Z)	1 pkg. wintergreen chewing gum and 3 quarters
(C)	(3)	(Z)	black, unsweetened coffee and 2 quarters

54. You like your coffee with cream. Which of the following combinations of buttons now seems most likely to deliver this?

1. (C) (A) (1)
2. (Z) (A) (1)
3. (C) (E) (2)
4. (C) (4) (Z)
5. (A) (B) (C)

55. You push buttons (D) and (5) and get a ham sandwich but no change. Which one of the following explanations is most likely?

1. The machine contains only one variety of sandwich.
2. You do not get a sandwich if you push the (Z) button.
3. You must buy coffee before you can get a sandwich.
4. You must push the (D) button to get a sandwich.
5. You must push the (5) button to get a sandwich.

56. By this time one sandwich is not enough. You try buttons (Z) (D) (5) and get another ham sandwich and one quarter in change. The evidence you now have points clearly to which of the following explanations of how change is delivered?

1. Change is returned automatically by the machine according to the price of the product; the buttons have nothing to do with it.
2. Change is returned according to the price of the product, but only when the (Z) button is pushed.
3. The order in which the buttons are pushed determines the change.
4. You must push one of the odd-numbered buttons to get change.
5. You must push buttons (A) or (B) to get change.

57. You have now tried all of the lettered buttons except (E). Which of the following products, according to the evidence now on hand, is most likely to be controlled by this button?

1. Handkerchiefs
2. Pocket-size books
3. Coffee with cream
4. Candy
5. A third brand of cigarettes

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INVENTORY OF BELIEFS

FORM I

This inventory consists of 120 statements which range over a wide variety of topics. As you read each statement you are asked to indicate quickly your agreement or disagreement with it in terms of the key given below. People have different reactions to these statements. This is not a test in which there are "right" and "wrong" answers. What is wanted here is your own quick personal reaction. You should be able to finish taking the inventory in 30 minutes or less.

In responding to these statements you will notice that there is no way provided for indicating a neutral position. It is desired that you indicate a tendency toward either agreement or disagreement even though you may prefer to remain undecided. It is important that you respond to every one of the 120 statements.

Before beginning work please record at the top of your answer sheet (1) your name, (2) date, (3) the name of your school, (4) your sex, (5) your academic class i.e., (Freshman, Sophomore, etc.), and (6) the name of this inventory.

The key you are to use in responding to these statements is reproduced at the top of each page. (Note that you will never use the fifth response space on your answer sheet.)

Key: 1. I strongly agree or accept the statement.
2. I tend to agree or accept the statement.
3. I tend to disagree or reject the statement.
4. I strongly disagree or reject the statement.

1. If you want a thing done right, you have to do it yourself.
2. There are times when a father, as head of the family, must tell the other family members what they can and cannot do.
3. Lowering tariffs to admit more foreign goods into this country lowers our standard of living.
4. Literature should not question the basic moral concepts of society.
5. Reviewers and critics of art, music and literature decide what they like and then force their tastes on the public.
6. Why study the past, when there are so many problems of the present to be solved.
7. Business men and manufacturers are more important to society than artists or musicians.
8. There is little chance for a person to advance in business or industry unless he knows the right people.
9. Man has an inherent guide to right and wrong--his conscience.
10. The main thing about good music is lovely melody.
11. It is only natural and right for each person to think that his family is better than any other.
12. All objective data gathered by unbiased persons indicate that the world and universe are without order.
13. Any man can find a job if he really wants to work.
14. We are finding out today that liberals really are soft-headed, gullible, and potentially dangerous.
15. A man can learn as well by striking out on his own as he can by following the advice of others.
16. The predictions of economists about the future of business are no better than guesses.
17. Being a successful wife and mother is more a matter of instinct than of training.
18. A person often has to get mad in order to push others into action.
19. There is only one real standard in judging art works--each to his own taste.
20. Business enterprise, free from government interference, has given us our high standard of living.
21. Nobody can make a million dollars without hurting other people.
22. Anything we do for a good cause is justified.
23. Public resistance to modern art proves that there is something wrong with it.
24. Sending letters and telegrams to congressmen is mostly a waste of time.
25. Many social problems would be solved if we did not have so many immoral and inferior people.
26. Art which does not tell a human story is empty.
27. You can't do business on friendship: profits are profits; and good intentions are not evidence in a law court.
28. A person has troubles of his own; he can't afford to worry about other people.
29. Books and movies should start dealing with entertaining or uplifting themes instead of the present unpleasant, immoral, or tragic ones.
30. Children should be made to obey since you have to control them firmly during their formative years.

- Key: 1. I strongly agree or accept the statement.
2. I tend to agree or accept the statement.
3. I tend to disagree or reject the statement.
4. I strongly disagree or reject the statement.

31. The minds of many youth are being poisoned by bad books.
32. Speak softly, but carry a big stick.
33. Ministers in churches should not preach about economic and political problems.
34. Each man is on his own in life and must determine his own destiny.
35. New machines should be taxed to support the workers they displace.
36. The successful merchant can't allow sentiment to affect his business decisions.
37. Ministers who preach socialistic ideas are a disgrace to the church.
38. Labor unions don't appreciate all the advantages which business and industries have given them.
39. It's only natural that a person should take advantage of every opportunity to promote his own welfare.
40. We should impose a strong censorship on the morality of books and movies.
41. The poor will always be with us.
42. A person who is incapable of real anger must also be lacking in moral conviction.
43. If we allow more immigrants into this country, we will lower our standard of culture.
44. People who live in the slums have no sense of respectability.
45. We acquire the highest form of freedom when our wishes conform to the will of society.
46. Modern paintings look like something dreamed up in a horrible nightmare.
47. Voting determines whether or not a country is democratic.
48. The government is more interested in winning elections than in the welfare of the people.
49. Feeble-minded people should be sterilized.
50. In our society, a person's first duty is to protect from harm himself and those dear to him.
51. Those who can, do; those who can't, teach.
52. The best government is one which governs least.
53. History shows that every great nation was destroyed when its people became soft and its morals lax.
54. Philosophers on the whole act as if they were superior to ordinary people.
55. A woman who is a wife and mother should not try to work outside the home.
56. We would be better off if people would talk less and work more.
57. In some elections there is not much point in voting because the outcome is fairly certain.
58. The old masters were the only artists who really knew how to draw and paint.
59. Most intellectuals would be lost if they had to make a living in the realistic world of business.
60. You cannot lead a truly happy life without strong moral and religious convictions.

Key: 1. I strongly agree or accept the statement.
 2. I tend to agree or accept the statement.
 3. I tend to disagree or reject the statement.
 4. I strongly disagree or reject the statement.

61. If we didn't have strict immigration laws, our country would be flooded with foreigners.
62. When things seem black, a person should not complain, for it may be God's will.
63. Miracles have always taken place whenever the need for them has been great enough.
64. Science is infringing upon religion when it attempts to delve into the origin of life itself.
65. A person has to stand up for his rights or people will take advantage of him.
66. A lot of teachers, these days, have radical ideas which need to be carefully watched.
67. Now that America is the leading country in the world, it's only natural that other countries should try to be like us.
68. Most Negroes would become overbearing and disagreeable if not kept in their place.
69. Foreign films emphasize sex more than American films do.
70. Our rising divorce rate is a sign that we should return to the values which our grandparents held.
71. Army training will be good for most modern youth because of the strict discipline they will get.
72. When operas are sung in this country they ought to be translated into English.
73. People who say they're religious but don't go to church are just hypocrites.
74. What the country needs, more than laws or politics, is a few fearless and devoted leaders in whom the people can have faith.
75. Pride in craftsmanship and in doing an honest day's work is a rare thing these days.
76. The United States may not have had much experience in international dealings but it is the only nation to which the world can turn for leadership.
77. In practical situations, theory is of very little help.
78. No task is too great or too difficult when we know that God is on our side.
79. A sexual pervert is an insult to humanity and should be punished severely.
80. A lot of science is just using big words to describe things which many people already know through common sense.
81. Manual labor and unskilled jobs seem to fit the Negro mentality and ability better than more skilled or responsible work.
82. A person gets what's coming to him in this life if he doesn't believe in God.
83. Public officials may try to be honest but they are caught in a web of influence which tends to corrupt them.
84. Science makes progress only when it attempts to solve urgent practical problems.
85. Most things in life are governed by forces over which we have no control.
86. Young people today are in general more immoral and irresponsible than young people of previous generations.
87. Americans may tend to be materialistic, but at least they aren't cynical and decadent like most Europeans.
88. The many different kinds of children in school these days force teachers to make a lot of rules and regulations so that things will run smoothly.
89. Jews will marry out of their own religious group whenever they have the chance.
90. The worst danger to real Americanism during the last 50 years has come from foreign ideas and agitators.

- Key: 1. I strongly agree or accept the statement.
2. I tend to agree or accept the statement.
3. I tend to disagree or reject the statement.
4. I strongly disagree or reject the statement.

91. Europeans criticize the United States for its materialism but such criticism is only to cover up their realization that American culture is far superior to their own.
92. The scientist that really counts is the one who turns theories into practical use.
93. No one can really feel safe when scientists continue to explore whatever they wish without any social or moral restraint.
94. Nudist colonies are a threat to the moral life of a nation.
95. One trouble with Jewish businessmen is that they stick together and prevent other people from having a fair chance in competition.
96. No world organization should have the right to tell Americans what they can or cannot do.
97. There is a source of knowledge that is not dependent upon observation.
98. Despite the material advantages of today, family life now is not as wholesome as it used to be.
99. The United States doesn't have to depend on the rest of the world in order to be strong and self-sufficient.
100. Foreigners usually have peculiar and annoying habits.
101. Parents know as much about how to teach children as public school teachers.
102. The best assurance of peace is for the United States to have the strongest army, navy, air force, and the most atom bombs.
103. Some day machinery will do nearly all of man's work, and we can live in leisure.
104. There are too many people in this world who do nothing but think about the opposite sex.
105. Modern people are superficial and tend to lack the finer qualities of manhood and womanhood.
106. Members of religious sects who refuse to salute the flag should be punished for their lack of patriotism.
107. Political parties are run by insiders who are not concerned with the public welfare.
108. As young people grow up they ought to get over their radical ideas.
109. Negroes have their rights, but it is best to keep them in their own districts and schools and to prevent too much contact with whites.
110. The twentieth century has not had leaders with the vision and capacity of the founders of this country.
111. There are a lot of things in this world that will never be explained by science.
112. Sexual relations between brother and sister are contrary to natural law.
113. There may be a few exceptions, but in general Jews are pretty much alike.
114. The world will get so bad that some of these times God will destroy it.
115. Children should learn to respect and obey their teachers.
116. Other countries don't appreciate as much as they should all the help that America has given them.
117. We would be better off if there were fewer psychoanalysts probing and delving into the human mind.
118. American free enterprise is the greatest bulwark of democracy.
119. If a person is honest, works hard, and trusts in God, he will reap material as well as spiritual rewards.
120. One will learn more in the school of hard knocks than he ever can from a textbook.

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CRITICAL ANALYSIS TEST

Paul B. Diederich

DIRECTIONS: This test will require an analysis and comparison of the three passages that are printed on page 2. The passages discuss essentially the same subject from different points of view, and it will be your first task to discover what this subject is. Then there will be two sets of questions:

1. questions on the passages themselves,
2. questions on a paper written about these passages by a college freshman.

For all questions, blacken the answer space corresponding to the best answer. There are no strict time limits, but most students will be able to finish easily within a fifty-minute period.

Before beginning the test, fill in the blanks at the side of the answer sheet.

I

The nation, with all its so-called internal improvements, which are all external and superficial, is just an unwieldy and overgrown establishment, cluttered with furniture and tripped up by its own traps, ruined by luxury and heedless expense, by want of calculation and a worthy aim; and the only cure for it is in a rigid economy, a stern and more than Spartan simplicity of life and elevation of purpose. It lives too fast. Men think it essential that the Nation have commerce, and talk through a telegraph, and ride thirty miles an hour, whether they do or not; but whether we should live like baboons or like men is a little uncertain. If we do not get out sleepers,* and forge rails, and devote days and nights to the work, but go to tinkering upon our lives to improve them, who will build railroads? And if railroads are not built, how shall we get to heaven in season? But if we stay at home and mind our business, who will want railroads? We do not ride on the railroad, it rides upon us. Did you ever think what those sleepers are that underlie the railroad? Each one is a man, an Irishman, or a Yankee man. The rails are laid on them, and they are covered with sand, and the cars run smoothly over them. They are sound sleepers, I assure you. And every few years a new lot is laid down and run over; so that, if some have the pleasure of riding on a rail, others have the misfortune to be ridden upon. And when they run over a man that is walking in his sleep and wake him up, they suddenly stop the cars and make a hue and cry about it, as if this were an exception. I am glad to know that it takes a gang of men for every five miles to keep the sleepers down and level in their beds, for this is a sign that they may sometime get up again.

II

Myself when young did eagerly frequent
Doctor and Saint, and heard great argument
About it and about: but evermore
Came out by the same door where in I went.

With them the seed of wisdom did I sow,
And with mine own hand wrought to make it grow;
And this was all the harvest that I reaped--
"I came like water, and like wind I go."

Into this universe, the why not knowing
Nor whence, like water willy-nilly flowing;
And out of it, as wind along the waste,
I know not whither, willy-nilly blowing.

Waste not your hour, nor in the vain pursuit
Of This and That endeavor and dispute;
Better be jocund with the fruitful grape
Than sadden after none, or bitter, fruit.

The moving finger writes; and, having writ,
Moves on: nor all your piety nor wit
Shall lure it back to cancel half a line,
Nor all your tears wash out a word of it.

* sleepers= railroad ties

III

No man can serve two masters: for either he will hate the one and love the other; or else he will hold to the one and despise the other. Ye cannot serve God and mammon.

Therefore I say unto you, Take no thought for your life, what ye shall eat, or what ye shall drink; nor yet for your body, what ye shall put on. Is not the life more than meat, and the body than raiment? Behold the fowls of the air: for they sow not, neither do they reap, nor gather into barns; yet your Heavenly Father feedeth them. Are ye not much better than they?

Which of you by taking thought can add one cubit unto his stature?

And why take ye thought for raiment? Consider the lilies of the field, how they grow; they toil not, neither do they spin: and yet I say unto you that even Solomon in all his glory was not arrayed like one of these.

Wherefore if God so clothe the grass of the field, which today is, and to-morrow is cast into the oven, shall he not much more clothe you, O ye of little faith? Therefore, take no thought, saying, what shall we eat? or, What shall we drink? or, Wherewithal shall we be clothed? For after all these things do the Gentiles seek: for your heavenly Father knoweth that ye have need of all these things. But seek ye first the kingdom of God and his righteousness; and all these things shall be added unto you.

Take therefore no thought for the morrow: for the morrow shall take thought for the things of itself. Sufficient unto the day is the evil thereof.

Part I

DIRECTIONS: Mark the best answer.

- Which of the following questions is the central concern of all three passages?
 - Is the pursuit of pleasure a desirable goal in life?
 - Is hard work necessary for success in life?
 - What should be our chief purpose in life?
 - Is the pursuit of material values contrary to religion?
- Which of the following best represents the goal proposed in Passage I?
 - The development of the Nation.
 - Simplicity and elevation of purpose.
 - To ride upon the railroad rather than to be ridden upon.
 - To keep the sleepers down and level in their beds.
- Which of the following best represents the opposite of the goal proposed in Passage I?
 - The Nation.
 - Spartan simplicity.
 - The sleepers.
 - Building railroads.

4. Which of the following best represents the goal proposed in Passage II?
 1. To sow the seed of wisdom.
 2. To come like water and to go like wind.
 3. To be jocund with the fruitful grape,
 4. To do whatever the moving finger writes.
5. Which of the following best represents the opposite of the goal proposed in Passage II?
 1. Doctor and Saint.
 2. Sowing the seed of wisdom.
 3. Whatever the moving finger writes.
 4. Endeavor and dispute over This and That.
6. Which of the following best represents the goal proposed in Passage III?
 1. The kingdom of God and his righteousness.
 2. Sufficient unto the day is the evil thereof.
 3. Take no thought for your life.
 4. Refrain from any sort of labor.
7. Which of the following best represents the opposite of the goal proposed in Passage III?
 1. Mammon.
 2. The morrow.
 3. Food and clothing.
 4. Hard work of any kind.
8. Which of the following descriptions of man's role in life as conceived in these passages is least accurate?
 1. I: Man is a tool-using animal.
 2. II: Man is a puppet of fate.
 3. III: Man is a child of God.
9. Which passage expresses concern over the exploitation of workmen in the pursuit of material values?
 1. Passage I.
 2. Passage II.
 3. Passage III.
 4. None of them.
10. Which passage places chief emphasis upon service to others?
 1. Passage I.
 2. Passage II.
 3. Passage III.
 4. None of them.
11. Which passage or passages emphasize simplicity as essential to a good life?
 1. All, about equally.
 2. None of them.
 3. Passages I and III.
 4. Passage II.
12. Which of these views is based on the feeling that there are no answers, that effort is useless?
 1. Passage I.
 2. Passage II.
 3. Passage III.
 4. None of them.
13. Passages II and III both deny the value of "taking thought." How do they differ?
 1. II regards thought as unrewarding; III as a necessary evil.
 2. II refers to thought about philosophic issues; III to thought about making a living.
 3. II prefers action to thought; III prefers faith.
 4. II refers to thought about fate; III to thought about God.
14. All three passages seem to regard material possessions as unimportant. Which statement of their reason for thinking so is least accurate?
 1. We should reduce our wants rather than increase our means of satisfying them.
 2. It is pleasanter to drink wine.
 3. Striving for worldly goods interferes with the service of God.
15. In which of the following ways are the "sleepers" in Passage I like the "lilies" in Passage III?
 1. Both are subjects of parables.
 2. Both illustrate how men should act.
 3. Both illustrate what happens to people who concentrate on material things.
 4. Both illustrate the advantages of simplicity.
16. Which of the following pairs of passages are closest together in point of view?
 1. I and II.
 2. I and III.
 3. II and III.
17. Which passage or passages emphasize the thought expressed in the following quotation?
 "The world is too much with us;
 late and soon,
 Getting and spending, we lay waste
 our powers."
 1. All of them.
 2. None of them.
 3. I and III.
 4. II.

(Go on to the next page.)

18. Which passage agrees with the thought expressed in the following quotation:
 "Life's but a walking shadow, a poor player
 That struts and frets his hour upon
 the stage,
 And then is heard no more; it is a tale
 Told by an idiot, full of sound and fury,
 Signifying nothing."

1. Passage I.
2. Passage II.
3. Passage III.
4. None of them.

19. Which passage agrees with the point of view expressed in the following quotation:
 "Go to the ant, thou sluggard;
 Consider her ways, and be wise:
 Which having no chief,
 Overseer or ruler,
 Provideth her meat in the summer,
 And gathereth her food in the harvest."

1. Passage I.
2. Passage II.
3. Passage III.
4. None of them.

20. Which passage emphasizes the thought expressed in the following quotation:
 "And the great cry that rises from our manufacturing cities, louder than their furnace blast, is all in very deed for this,--that we manufacture everything there except men; we blanch cotton, and strengthen steel, and refine sugar, and shape pottery; but to brighten, to strengthen, to refine, or to form a single living spirit never enters into our estimate of advantages."

1. Passage I.
2. Passage II.
3. Passage III.
4. None of them.

PART II

DIRECTIONS: First, read the following paper. The student was asked to review and compare the positions of the three authors and then to state his own.

1 The three authors regard success in
 2 a job as unimportant because many in
 3 obtaining success use others as stepping
 4 stones. Success is seeing the good in
 5 others and living a good life.

6 Passage I considers any improvement
 7 in mechanical things as unnecessary and
 8 unsuccessful because thousands of people
 9 are often hurt in making the improvement.

10 Passage II says learning is important;
 11 it also says that if you're going to do
 12 anything, don't do something you'll regret,
 13 for what's done can't be undone.

14 Passage III stresses the point that
 15 you shouldn't struggle for material things;
 16 food and clothing are nothing compared to
 17 everlasting life.

18 All the authors agree that in success
 19 there is happiness, and there is no
 20 happiness in gains made crookedly.

21 I believe success in work can't be
 22 the most important element in life but
 23 is very important. Being successful in
 24 business doesn't necessarily mean that
 25 you're leading a good life. Many success-
 26 ful people have reached their goal by
 27 robbing and cheating others. Success in
 28 business often leads to conceit, and many
 29 successful people can't see the beauty in
 30 life for thinking only of themselves.

31 Success in business is important in
 32 that it proves you can accomplish something.
 33 It is a good thing if you reach your goal
 34 honestly and get happiness out of your
 35 success. Many successful people aren't
 36 happy.

37 The real success in life is happiness
 38 and making others happy. Many people
 39 are so busy rushing toward their goal that
 40 they haven't time to be happy. I believe
 41 success in business is important if you
 42 don't let it obstruct your vision so that
 43 you can't see good in people, and it takes
 44 up all your time.

DIRECTIONS: Mark the best answer to each of the following questions.

21. In items 21-29 assume that this student's purpose was to show that success in work is important, provided that--and he mentioned all of the following but one. Which one did he overlook?

1. Provided that it is honestly attained.
2. Provided that it brings happiness in itself and leaves time for other forms of happiness.
3. Provided that it makes a constructive contribution to the common welfare.
4. Provided that it does not inflate the ego and prevent seeing good in others.

22. In the light of this purpose, as stated in Item 21, his review of the passages is

1. adequate, for he covers their chief objections to regarding success in work as important.
2. adequate, for he points out that the only fundamental objection is to dishonest success in work.
3. inadequate, for he includes only what is relevant to his purpose and leaves out many other points that could be made.
4. inadequate, for he neither recognizes nor refutes important objections to his position that may be found in the passages.

23. In the light of Item 21, the student's review is

1. star
- pass
- only
- tion
2. star
- fall
3. star
- point
- favo
4. star
- tell
- point
- hold

24. In the light of Item 21, the student's review is

1. is t
- his v
2. is o
- his c
3. is o
- in s
4. is i
- his c

25. The student's review of work is

1. first
- three
- own c
2. setti
- the o
- and t
3. overl
- of th
- asser
4. the p
- beggi
- reite

26. The student's review in his review is

1. Passa
2. Passa
3. Passa

27. At what point in the development of the student's review is the following

1. In li
2. In li
3. In li
4. In li

28. There is one point in the student's review of the following

1. In li
2. In li
3. In li
4. In li

23. In the light of this purpose, as stated in Item 21, the opening sentence
1. starts at a good point in reviewing the passages and immediately shows their only serious objection to his own position.
 2. starts at a good point but immediately falls into a misinterpretation.
 3. starts at a bad point; he first should point out what these passages say in favor of his position.
 4. starts at a bad point; he should first tell what each passage said before pointing to any conclusion that they hold in common.
24. In the light of this purpose, as stated in Item 21, the sentence in lines 37-38
1. is the logical conclusion toward which his whole argument is directed.
 2. is one of the major reasons upon which his conclusion is based.
 3. is only a restatement of his conclusion in slightly different terms.
 4. is irrelevant to and inconsistent with his conclusion.
25. The student attempts to show that "success in work is important" by
1. first refuting the objections of the three passages and then building up his own case.
 2. setting up a straw man by misstating the objections of the three passages and then knocking it down.
 3. overlooking or misstating the objections of the three passages and then chiefly asserting and qualifying his conclusion.
 4. the propaganda devices of name-calling, begging the question, exaggeration, and reiteration without proof.
26. The student misinterprets at least one point in his review of each passage, but everything he says about one of the passages is a misinterpretation. Which passage is that?
1. Passage I.
 2. Passage II.
 3. Passage III.
27. At what point in the paper does the student's development of his own position begin?
1. In line 18.
 2. In line 21.
 3. In line 31.
 4. In line 37.
28. There is one logical argument in support of the student's conclusion. In which of the following lines does it occur?
1. In lines 23-25.
 2. In lines 27-30.
 3. In lines 31-32.
 4. In lines 37-38.
29. Which of the following is the best comment on the student's own arguments in support of his conclusion?
1. They are true as far as they go, but the argument is incomplete.
 2. They are chiefly repetitions of the conclusion in different terms, not arguments to support it.
 3. They sound plausible but commit many logical fallacies.
 4. There are about twice as many statements opposed to his conclusion as there are in favor of it.
30. Lines 3-4, "use others as stepping stones." This phrase is suggested by
1. the remarks about the "sleepers" in Passage I.
 2. a misinterpretation of what Passage II means by "the moving finger."
 3. the position of all three authors.
 4. nothing that is stated or implied in any of the three passages.
31. Lines 4-5. This sentence is
1. intended as a statement of the position of the three authors.
 2. intended as a statement of the writer's own position.
 3. intended as a statement both of the writer's own position and of that of the three authors.
 4. not clear as to which position is intended.
32. Lines 21-30. This paragraph
1. is a fair statement of the main point at issue.
 2. misses the point, which is whether even honest success in work is an essential element of the good life.
 3. misses the point, which is whether individual success makes for social progress.
 4. misses the point, because none of the passages mentions "conceit."
33. Lines 31-32. This sentence is
1. good, because it gives a reason for regarding success in work as important.
 2. good, because it makes no mistakes in grammar or punctuation.
 3. poor, because "something" is vague.
 4. poor, because no one needs to be told why success in business is important.

(Go on to the next page.)

34. Lines 37-38. Compare this sentence with the sentence in lines 4-5.

1. The writer is inconsistent in these two sentences.
2. The writer is consistent because the two sentences mean the same thing.
3. The writer is consistent if the first sentence is taken as the position of the three authors while the second is taken as his own position.
4. Even so, the writer is inconsistent, because "happiness" is not necessarily the same thing as "living a good life."

35. Lines 8-9. Which is the most accurate interpretation of what Passage I meant?

1. people are often hurt
2. workmen are injured
3. investors are defrauded
4. lives are used up

36. Line 10. Which is the most accurate interpretation of what Passage II meant?

1. important
2. vital
3. insufficient
4. useless

37. Lines 11-15. Which is the most accurate interpretation of what Passage II meant?

1. if you're going to do anything, don't do something you'll regret, for what's done can't be undone.
2. if you have to decide on a course of action, be very careful, for one mistake may ruin you.
3. striving to accomplish anything is futile, because everything that happens is determined by fate.
4. life should be devoted to pleasure, because it will end soon enough anyway.

38. Line 17. Which is the most accurate interpretation of what Passage III meant?

1. everlasting life.
2. health and success in life.
3. the birds and the lilies.
4. the service of God.

39. Line 20. Which is the most accurate interpretation of all three passages?

1. gains made crookedly.
2. ill-gotten gains.
3. material wealth.
4. the fruitful grape.

40. Line 43. Which states most accurately what the student means?

1. it takes
2. it does not take
3. if you let it take
4. if you don't let it take

* * * * *
END OF TEST

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