RELATIONSHIP BETWEEN APTITUDES AND
MAJOR FIELDS OF STUDY

APPROVED:

Graduate Committee:

George O'Brien
Major Professor

Merl O'Rourke
Committee Member

Earl W. Hoffer
Committee Member

David Price
Committee Member

Dean of the School of Education

Robert B. Toulouse
Dean of the Graduate School
RELATIONSHIP BETWEEN APPTITUDES AND
MAJOR FIELDS OF STUDY

DISSERTATION

Presented to the Graduate Council of the
North Texas State College in Partial
Fulfillment of the requirements

For the Degree of

DOCTOR OF EDUCATION

By

Theodore Nicksick, Jr.

Denton, Texas

January, 1957
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>List of Tables</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>iv</td>
</tr>
</tbody>
</table>

## Chapter

### I. INTRODUCTION

- Statement of the Problem
- Hypotheses
- Definition of Terms
- Limitations of the Problem
- Sources of Data
- Procedures and Treatment of Data
- Implications of This Study
- Development and Scope of the GATB

### II. RELATED LITERATURE

### III. STATISTICAL DETERMINANTS OF THE RELATIONSHIP BETWEEN APTITUDES AND MAJOR FIELDS OF STUDY

- The Results
- Summary

### IV. INTERPRETATION OF THE RELATIONSHIP BETWEEN APTITUDES AND MAJOR FIELDS OF STUDY

- The Interpretation
- Summary

### V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

- Summary
- Conclusions
- Recommendations

## BIBLIOGRAPHY

... 157
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Means and Standard Deviations of the Major-Course Grade Point Averages for All Major Fields.</td>
<td>34</td>
</tr>
<tr>
<td>II. Means and Standard Deviations of the All-Course Grade Point Averages for All Major Fields.</td>
<td>35</td>
</tr>
<tr>
<td>III. Means and Standard Deviations of Aptitude G for All Major Fields</td>
<td>36</td>
</tr>
<tr>
<td>IV. Means and Standard Deviations of Aptitude V for All Major Fields</td>
<td>37</td>
</tr>
<tr>
<td>V. Means and Standard Deviations of Aptitude N for All Major Fields</td>
<td>38</td>
</tr>
<tr>
<td>VI. Means and Standard Deviations of Aptitude S for All Major Fields</td>
<td>39</td>
</tr>
<tr>
<td>VII. Means and Standard Deviations of Aptitude P for All Major Fields</td>
<td>40</td>
</tr>
<tr>
<td>VIII. Means and Standard Deviations of Aptitude Q for All Major Fields</td>
<td>41</td>
</tr>
<tr>
<td>IX. Summary of Simple Analysis of Variance in Sample 1 for Aptitude G.</td>
<td>42</td>
</tr>
<tr>
<td>X. Summary of Simple Analysis of Variance in Sample 2 for Aptitude G</td>
<td>43</td>
</tr>
<tr>
<td>XI. Summary of Simple Analysis of Variance in Sample 1 for Aptitude V</td>
<td>43</td>
</tr>
<tr>
<td>XII. Summary of Simple Analysis of Variance in Sample 2 for Aptitude V</td>
<td>44</td>
</tr>
<tr>
<td>XIII. Summary of Simple Analysis of Variance in Sample 1 for Aptitude N</td>
<td>44</td>
</tr>
<tr>
<td>XIV. Summary of Simple Analysis of Variance in Sample 2 for Aptitude N</td>
<td>45</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>XV.</td>
<td>Summary of Simple Analysis of Variance in Sample 1 for Aptitude S.</td>
</tr>
<tr>
<td>XVI.</td>
<td>Summary of Simple Analysis of Variance in Sample 2 for Aptitude S.</td>
</tr>
<tr>
<td>XVII.</td>
<td>Summary of Simple Analysis of Variance in Sample 1 for Aptitude P.</td>
</tr>
<tr>
<td>XVIII.</td>
<td>Summary of Simple Analysis of Variance in Sample 2 for Aptitude P.</td>
</tr>
<tr>
<td>XIX.</td>
<td>Summary of Simple Analysis of Variance in Sample 1 for Aptitude Q.</td>
</tr>
<tr>
<td>XX.</td>
<td>Summary of Simple Analysis of Variance in Sample 2 for Aptitude Q.</td>
</tr>
<tr>
<td>XXI.</td>
<td>Summary of Results of $t$ Test of Difference Between Any Two Means of Aptitudes G, V and N for All Major Fields in Sample 1.</td>
</tr>
<tr>
<td>XXII.</td>
<td>Summary of Results of $t$ Test of Difference Between Any Two Means of Aptitudes S, P and Q for All Major Fields in Sample 1.</td>
</tr>
<tr>
<td>XXIII.</td>
<td>Summary of Results of $t$ Test of Difference Between Any Two Means of Aptitudes G, V and N for All Major Fields in Sample 2.</td>
</tr>
<tr>
<td>XXIV.</td>
<td>Summary of Results of $t$ Test of Difference Between Any Two Means of Aptitudes S, P and Q for All Major Fields in Sample 2.</td>
</tr>
<tr>
<td>XXV.</td>
<td>Coefficients of Correlation Between Aptitudes and Major-Course Grade Point Averages for All Major Fields in Sample 1.</td>
</tr>
<tr>
<td>XXVI.</td>
<td>Coefficients of Correlation Between Aptitudes and Major-Course Grade Point Averages for All Major Fields in Sample 2.</td>
</tr>
</tbody>
</table>
Table

XXVII. Coefficients of Correlation Between Aptitudes and All-Course Grade Point Averages for All Major Fields in Sample 1. .............. 74

XXVIII. Coefficients of Correlation Between Aptitudes and All-Course Grade Point Averages for all Major Fields in Sample 2. ............ 76

XXIX. Summary of Aptitude Means for All Major Fields in Sample 1. ............ 92

XXX. Summary of Aptitude Means for All Major Fields in Sample 2. ............ 94

XXXI. Summary of Standard Deviations for All Major Fields in Sample 1. ............ 121

XXXII. Summary of Standard Deviations for All Major Fields in Sample 2. ............ 122

XXXIII. Critical Aptitude Scores for All Major Fields in Sample 1. ............ 133

XXXIV. Critical Aptitude Scores for All Major Fields in Sample 2. ............ 134

XXXV. Critical Aptitude Scores and Low Scores for Major-Course and All-Course Grade Point Average Interval of 2.0--3.0 Based on Using 85 Per Cent as a Cut-Off Point ............ 135

XXXVI. Critical Aptitude Scores and Low Scores for Major-Course and All-Course Grade Point Average Interval of 2.0--3.0 Based on Using 85 Per Cent as a Cut-Off Point ............ 137

XXXVII. Critical Aptitude Scores and Low Scores for Major-Course and All-Course Grade Point Average Interval of 1.0--1.9 Based on Using 85 Per Cent as a Cut-Off Point ............ 138
XXXVIII. Critical Aptitude Scores and Low Scores for Major-Course and All-Course Grade Point Average Interval of 1.0-1.9 Based on Using 85 Per Cent as a Cut-Off Point. . . . . . . 139
CHAPTER I

INTRODUCTION

In recent years the increase in the variety of courses offered to college students has been phenomenal. As a result students are faced with the difficult decision of wise educational choices. Frequently students faced with such a decision consult a professional guidance counselor for assistance in determining a suitable academic program.

Counselors in student personnel programs attempt to assist a student by supplying information relevant to the student's relationships with his surroundings. The student is told how his various aptitudes and interests, as estimated by test scores and past performances, compare with the aptitudes and interests of people in different jobs, schools, and curricula. The counselor assists the student in the use of such information so that the student can make sound judgments regarding plans for the future.

There are many kinds of aids which have been developed to assist the counselor to improve his efficiency in


estimating human factors and in matching these factors to educational requirements. One of these aids is the aptitude test. Traxler reports a trend toward greater use of test results in counseling and instruction of students. 4 Hoellner believes that test results can aid materially in indicating to the student what his areas of special aptitude are.

Roberts and Bauman see the possibility through the use of an aptitude test of getting some picture of the facility with which a student handles the type of concepts essential to certain academic courses without having been exposed to those courses. Woolf and Woolf state that the measurement of aptitude for a given field can help in predicting success for the student in that field. The obvious main function of standardized tests of aptitudes, according to Bingham is


4 Robert C. Hoellner, "Interpretation of Test Results in Counseling," School Review, LVIX (December, 1951), 515-517.


to help in estimating the probabilities that a person would be able to follow successfully an occupation he is considering. Related uses are to discover unsuspected talents; to suggest possible alternative fields; to bring to attention endowments which might well be capitalized, and disabilities which should be removed or compensated for; and, in general, to provide the inquirer, whether youthful or mature, with food for objective thinking about himself and his future relations to the world of work.

Successful completion of academic training is usually a prerequisite for entering a professional field of work. Therefore, when counseling situations involve the consideration of plans for a student's preparation for entering a professional field of work, a determination should be made of his potentialities for successful completion of the academic training that is a prerequisite for the field of work under consideration. An aptitude test battery can be an invaluable aid in making this determination if the relationships between test performance and academic areas are known. If such relationships do exist to a significant degree, then the aptitude test battery results may be used as a point of reference from which the student and counselor...
may begin to assay the probabilities of success in the academic areas. In no sense of the word is it intended that counseling through the aid of an aptitude test battery should become a mechanized affair, nor is it intended that an individual can be viewed and comprehended by isolated segments. However, if these relationships do exist to a significant degree, the counselor will have an opportunity to do a more thorough and accurate job and enable him to combine such information concerning the student into a useful whole.

Statement of the Problem

As new measures of aptitude are devised, their implications to education are a fertile source for research. All facets of aptitudes as they relate to education are explored. This study is concerned with such exploration in that it investigates the relationships between aptitudes, as measured by the General Aptitude Test Battery and selected major fields of study at North Texas State College, Denton, Texas. The major fields of study selected for this research are Accounting, Business Education, Elementary Education, Industrial Arts and Marketing.

\[9\]

Hereafter the General Aptitude Test Battery will be referred to as the GATB.
Hypotheses

The hypotheses of this research are as follows: (1) that it is possible to differentiate among the students in the major fields of study through significant differences in aptitude scores; (2) that academic aptitude "critical" scores for selection of major fields of study can be established for each of the aptitudes to be considered; and (3) that there is a significant relationship between aptitude scores and grade point averages and that these relationships may differ for the various majors.

Definition of Terms

Aptitude means "a condition or set of characteristics regarded as symptomatic of an individual's ability to acquire, with training, some (usually specified) knowledge, skill, or set of responses, such as the ability to speak a language, to produce music, etc."

Test refers to a "routine examination administered to individuals belonging to the same group in order to determine the position of a given individual in the group with respect to one or more mental traits, motor abilities, etc., or in order to compare one group with another in these characteristics."

---


11 Ibid., p. 275.
aptitude test is "a test designed to indicate the intrinsic, constitutional, and/or dispositional fitness of a testee for undertaking successfully a special kind of activity."  It is a method of measuring relatively constant, specific and unitary factors which are used to predict the speed and ease with which knowledge and skills will be acquired.

General Aptitude Test Battery is a product of more than ten years of research in workers' characteristics and test development by the Occupational Analysis Division of the United States Employment Service and consists of fifteen tests, the scores of which are combined to yield scores for ten aptitude factors.

Major field of study refers to "a minimum of twenty-four semester hours, including twelve semester hours of advanced work in a given subject, the number depending upon the department selected."

12 Ibid., p. 18.


Grade points indicate the quality of work of a student and are awarded on the basis of 3 for each semester hour of grade A, 2 for each semester hour of grade B and 1 for each semester hour of grade C.

Grade point average is obtained by dividing the number of grade points by the semester hours.

Major-course grade point average indicates the grade point average a student makes in courses in his major field of study.

All-course grade point average indicates the grade point average a student makes in all courses.

Limitations of the Problem

The subjects of this study are limited to 456 undergraduate students to whom the GATB was administered at North Texas State College, Denton, Texas, prior to the spring semester of 1956 and who have since been awarded bachelor's degrees in Accounting, Business Education, Elementary Education, Industrial Arts and Marketing.

Although other factors are recognized as pertinent to successful completion of the prescribed course of study in these majors, this study is concerned with the possible relationships between these major fields and the aptitudes as measured by the GATB.

16
Ibid., p. 52.
For practical reasons the apparatus tests of the GATB were not administered to all groups and the aptitudes derived from these tests are not included. The aptitudes which are considered in this study are G- (intelligence), V- (verbal aptitude), N- (numerical aptitude), S- (spatial aptitude), P- (form perception), and Q- (clerical perception).

Sources of data

The primary sources of data are the GATB scores of 456 students which were secured from the counseling files of the Guidance Office at North Texas State College, Denton, Texas. The Permanent Record which contains the grades for each of these students was obtained from the files of the registrar's office.

Secondary data were obtained from books, theses, dissertations, periodicals and test manuals, and were used for reviewing related studies as well as for comparison and evaluation of the findings of this study.

Procedures and Treatment of Data

An intensive review of literature pertinent to aptitude testing and the GATB was made in order to provide a basis for the analysis and interpretation of data gathered in this study.

The criterion used in this research was the successful completion of a prescribed course of study leading to graduation with a bachelor's degree.
Programs of the graduation ceremonies at North Texas State College for the years 1951 to 1956, inclusive, were obtained from the Registrar's Office. The names on these programs were checked against the student files in the Guidance Office to obtain a sufficient sample of the SATB results for each of the major fields. After availability of data was assured, a sample of 228 subjects was drawn. This sample was grouped into the major fields of study as follows: (1) 42 in Accounting, (2) 50 in Business Education, (3) 44 in Elementary Education, (4) 50 in Industrial Arts, and (5) 42 in Marketing.

Grade point averages for this sample were obtained from the Permanent Record files of the Registrar's Office.

After appropriate statistical procedures were used on this sample, a second sample of 228 subjects was drawn and the procedures followed were the same as in the case of the initial sample. Statistical procedures were the same for both samples to enable comparisons to be made between groups.

The means and standard deviations were obtained for the aptitude scores, the all-course grade point average and the major-course grade point average for each of the major fields of study.

Coefficient correlations were obtained between aptitude scores and both the all-course and major-course grade point.
average for each of these major fields of study. A test of significance for differences among these correlations was used.

The analysis of variance technique was used to determine significant differences among mean aptitude scores for the major fields of study. 18

To determine differences in variability a test of significance among standard deviations was used.

Following the example set by the United States Employment Service for determining critical scores for vocational selection, one standard deviation below the mean was used as the critical score for each aptitude for each major field of study.

Aptitude critical scores for each aptitude for each major field of study were established according to both all-course and major-course grade point averages. Grade point average intervals were set up as follows: (a) from 1.0 to 1.9 and (b) from 2.0 to 3.0.

Implications of This Study

The results of this study may be of value as supplementary information to individuals who are concerned with

17 To obtain the correlations and the variances the data were mechanically processed.

18 Ibid.
counseling students on the college level. The findings may be of particular interest to college counselors as regards choice of major fields of study by students. If the findings are significant, then the counselor will have additional objective evidence with which to assist the counselee in his choice of an educational objective.

The United States Employment Service is attempting to establish educational aptitude norms for colleges and universities in the United States and the results of this study may contribute to this development.

Development and Scope of the GATB

The GATB is a product of more than a decade of research on aptitude tests and aptitude test batteries on the part of the Occupational Analysis and Industrial Services Divisions of the United States Employment Service. Super sees this comprehensive program as an outgrowth of the Employment Stabilization Research Institute of the University of Minnesota. During this period of research a large number of batteries of tests was developed for the prediction of success in specific occupations or small groups of occupations. These batteries in most instances were standardized against a criterion of occupational success such as production records, and the Wherry-Doolittle Test Selection Method was

---

19 Super, op. cit., p. 358.
employed to determine the combination of tests having the maximum validity. The battery was originally developed for use with adults seeking employment and adolescents recently out of secondary schools who were in need of vocational counseling. The tests are used when other evidence concerning aptitudes is unsatisfactory, when other important abilities are suspected, when the applicant has difficulty choosing among several seemingly suitable fields, and when the applicant needs a better understanding of his vocational strengths and weaknesses.

In determining norms and aptitude patterns the battery was given to employees in many different occupations throughout the United States, thus enabling the standardization of the battery. Each job in which testing was done was analyzed to determine the aptitudes and abilities required in performing the operations of the particular job. Next, experimental samples were selected and the entire test battery was administered to each occupational sample. From the results of these tests norms and aptitude patterns were determined according to similarities in abilities. Occupations which were found to require similar aptitudes were grouped together

---


into the same field of work. Certain occupations were found to require similar minimum amounts of the same combinations of aptitudes. Eventually the jobs were narrowed down to 20 separate fields of work including 2,000 different occupations. Norms and minimum aptitude scores were established for each occupation and grouped according to Part IV of the Dictionary of Occupational Titles. These norms are expressed as "occupational aptitude patterns." Only the most significant aptitudes required for the groups of occupations constitute these patterns. The other aptitudes measured by the battery were found not to add anything to the predictive value of a given pattern.

The battery consists of 15 tests, the scores of which are combined to yield scores for 10 factors. The paper and pencil tests are printed in two booklets totaling 70 pages; the apparatus tests consist of a rectangular manual dexterity box or pegboard and a small rectangular board for the finger dexterity test. The subtests in the booklet appear to have been constructed of items as much as possible like those of earlier standard tests which have proved valid.

---

22 Dvorak, op. cit., p. 372.
23 Ibid., p. 372.
Administration of the CATB requires about two and one quarter hours. It is thus possible to obtain information about an individual's aptitude for several thousand occupations in a little more than two hours' time.

The ten aptitude scores obtained from the 15 tests are described as follows:

G--Intelligence: general learning ability, ability to grasp instructions and underlying principles. It is often referred to as scholastic aptitude.

V--Verbal Aptitude: ability to understand the meaning of words and paragraphs, to grasp concepts presented in verbal form, and to present ideas clearly.

N--Numerical Aptitude: ability to perform arithmetic operations quickly and accurately.

S--Spatial Aptitude: ability to visualize objects in space and to understand the relationships between plane and solid forms.

F--Form Perception: ability to perceive pertinent details in objects or in graphical material, to make visual comparisons and discriminations in shapes and shadings.

Q--Clerical Perception: ability to perceive pertinent detail in verbal or numerical material, to observe differences in copy, tables, lists, etc. It might also be likened to proof reading.

S--Sagacity or Eye-Hand Coordination: ability to coordinate hand movements with judgments made visually.

T--Motor Speed: ability to make hand movements, such as tapping, rapidly.

---


F—Finger Dexterity: ability to move fingers and to manipulate small objects rapidly and accurately.

M—Manual Dexterity: ability to move the hands easily and skillfully, a grosser type of movement than finger dexterity, involving the arms and even the body to a greater extent.

The description of each of the 15 tests which comprise the battery is given below.

Part A—Tool Matching. Consists of a series of exercises containing a stimulus drawing and four black-and-white drawings of simple shop tools. The examinee indicates which of the four black-and-white drawings is the same as the stimulus drawing. Variations exist only in the distribution of black and white in each drawing.

Part B—Name Comparison. Consists of two columns of names. The examinee inspects each pair of names, one in each column, and indicates whether the names are the same or different.

Part C—Markings. Consists of a series of large capital H's. The examinee draws a short vertical line through the bars of the H's without touching the sides, working rapidly to draw as many lines as possible during the time allowed.

Part D—Computation. Consists of a number of arithmetic exercises requiring the addition, subtraction, multiplication, or division of whole numbers.

Part E—Two-Dimensional Space. Consists of a series of exercises containing a stimulus figure and five geometrical figures (two-dimensional line drawings). The examinee indicates which one of five geometrical figures is made by a rearrangement of the parts of the stimulus figure.

Part G—Speed. Consists of a series of large rectangles. The examinee taps with a pencil to make three dots in each of the rectangles, working as rapidly as possible during the time allowed.

Part H—Three-Dimensional Space. Consists of a series of exercises containing a stimulus figure and four drawings of three-dimensional objects. The
stimulus figure is pictured as a flat piece of metal which is to be either bent, or rolled, or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which of the four drawings corresponds to the stimulus figure.

Part I—Arithmetic Reason. Consists of a number of arithmetic problems expressed verbally.

Part J—Vocabulary. Consists of sets of four words. The examinee examines each set and indicates which two of the words are related by having either the same meaning or opposite meanings.

Part K—Mark Making. Consists of a series of squares in which the examinee is to make three pencil marks, working as rapidly as possible. The marks to be made are short lines, two vertical and the third a horizontal line beneath them.

Part L—Form Matching. Consists of two groups of variously shaped line drawings. The examinee indicates which figure in the second group is exactly the same size and shape as each figure in the first or stimulus group.

Part M—Place. The equipment used for this test and for Part N consists of a rectangular wooden board (pegboard) divided into two sections, each section containing 13 holes. The upper section contains 49 cylindrical wooden pegs. The examinee removes the wooden pegs from the holes in the upper part of the board and inserts them in the corresponding holes in the lower part of the board, moving two pegs simultaneously, one in each hand. This performance is repeated two more times, with the examinee working rapidly to move as many of the pegs as possible during the time allowed for each performance.

Part N—Turn. The equipment described under Part M is used for this test. In this case the lower section contains the 48 cylindrical pegs. The examinee removes a wooden peg from a hole using one hand, turns the peg over with the same hand so that the opposite end is up, and returns the peg to the hole from which it was taken. The examinee works rapidly to turn and replace as many of the 48 cylindrical pegs as possible during the time allowed. This performance is repeated two more times.
Part O—Assemble. The equipment used for this test consists of a small rectangular board (finger dexterity board) containing 50 holes, and a supply of small rivets and washers. The examinee takes a small rivet from a hole in the upper part of the board and at the same time removes a small metal washer from the vertical rod with the other hand; examinee puts the washer on the rivet and inserts the assembled piece into the corresponding hole in the lower part of the board, using only one hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed.

Part P—Disassemble. The equipment used for this test is the same as that described for Part O. The examinee removes the small metal rivet of the assembly from the hole in the lower part of the board; slides the washer to the bottom of the board; puts the washer on the rod with one hand and the rivet into the corresponding hole in the upper part of the board with the other hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed.
CHAPTER II

RELATED LITERATURE

Since the GATB is relatively new, few studies pertinent to its use are reported in literature. The development and scope of this battery was first reported by Dvorak in identical articles as recently as 1947. Early use of the GATB was confined to adolescents in need of vocational counseling and to adults seeking employment. The battery was used when other aptitude tests proved unsatisfactory or when more information concerning an applicant was desired in order to help him select an occupation or understand his strengths and weaknesses.

The use of GATB results for counseling students in academic areas has been a more recent development. Research reports relative to this use have been restricted primarily to masters theses and doctoral dissertations, test manuals, and literature released by the United States Employment Service.


One of the earliest studies reported concerning use of GATB results in high school counseling situations was made in Ohio during the 1947 and 1948 school years. The battery was administered to 439 high school seniors as part of an experimental cooperative program for counseling and testing high school youth by the Ohio State Employment Service and the Ohio Department of Education. The purpose of this study was to determine the distribution of aptitudes and of occupational aptitude patterns in a high school senior group. Such a study would give information regarding the use of GATB results with respect to guidance and placement on the secondary school level.

Five northern Ohio secondary schools participated in this program, two of which were semi-rural while the other three were suburban communities to large industrial centers. The test scores were used by school and employment service counselors to assist in individual counseling of members of the senior class.

The means and standard deviations were computed to the nearest whole number in order to compare them with the means and standard deviations of the original standardized population. The all-school, all-aptitude mean score was 110. The all-school

all-aptitude standard deviation was 16. Since the mean of the standardized population is 100 and the standard deviation is 20, comparison between populations can readily be made.

The oldest group of seniors, whose age averaged 18 years-11 months, was compared with the youngest group, whose age averaged 16 years-11 months, and the former group scored consistently below the mean on practically all aptitudes. The greatest difference in standard deviations between the two groups was found on the G, V and H aptitudes.

Mean aptitude scores found for school course for all schools showed senior students in commercial courses having P as their highest mean aptitude and Q as the second highest. Students in industrial arts and technical courses had S as their highest mean aptitude. Students in academic courses had C as their highest mean aptitude and the H, S, and F mean aptitude scores for this group were 120 or slightly over. This group also had a higher V mean aptitude score than did the others.

The commercial course seniors qualified for the highest percentage of clerical occupational aptitude profiles or patterns while the academic or college preparatory course seniors were second in ranking. These occupational aptitude patterns corresponded to the ones used by the United States Employment Service for clerical groups.
Other evidence of scientific interest regarding the use of aptitude tests in high school situations is presented by Jackson. He used the Minnesota Vocational Test for Clerical Workers to evaluate the aptitude factors of this test as related to the departmental success of high school commercial students. Scores from this test did not materially evaluate student commercial backgrounds and no significant trends were evidenced which might forecast commercial course or clerical success.

The early phases of a longitudinal study are reported by Bennett, Seashore and Wesman on 2,900 former high school students who were given the Differential Aptitude Test Battery when they were juniors and seniors. This study revealed ability patterns of these students who subsequently achieved success in various educational and vocational undertakings. The subjects in this study were students from Mount Vernon, New York, who were tested in grade 9 and again in grade 12. Results indicate that with more than a three-year interval between testings and with a variety of differential experiences of the students during that time, the relative

---


The position of a student among his grade 12 peers can be predicted with considerable accuracy from grade 9 data. The Differential Aptitude Test Battery, in general, measures a group of abilities which are relatively stable over a three-year period.

A further progress report concerning this study reveals important profile differences among high school students who entered diverse occupational and educational careers. Those who attained college degrees are markedly superior on all tests in comparison to the average of the high school groups of which they were a part. This superiority is most pronounced in Verbal Reasoning, Numerical Ability and the grammatical section of the Language Usage Test. Among women, perhaps because of the selective factor, the superiority is somewhat greater. The forty-one men who attained advanced degrees are definitely superior to those who have attained undergraduate degrees.

Persons who attended college but who did not complete work leading to a degree are superior to the high school population but considerably less superior on aptitudes than

---


those who have attained degrees. Men who attended special schools rather than colleges are close to average on some tests but inferior in Numerical Ability, Spelling, and Sentences. Women attending special schools are not markedly different from the average of the high school girls. Those who ended formal schooling with high school are slightly below average and this tendency is more marked in men than in women.

Important differences among high school students who enter diverse occupational and educational careers are revealed in this follow-up report. Those abilities which counselors would expect to be distinctive in particular groups are actually found to be outstanding. The characteristics of high school students measured by this test seem to bear important relationships to their subsequent careers.

The GATB results are rapidly becoming part of the counseling staff’s bases for prediction of success on the college level. In 1950, the General Aptitude Battery Senior project staff at the University of Utah reported the development of aptitude patterns for fields of work requiring academic training. GATB results were correlated with grade point averages and this study reports successful differentiation of occupational aptitude patterns for several college areas.

7 "General Aptitude Test Battery Patterns for College Areas," Occupations, XXIX (April, 1951), 518-526.
This technique of testing individuals after attaining various degrees of success is comparable to the "testing-of-present employees method" described by Lawshe and used frequently in applied research in industry and government.

An exploratory step in a project designed to discover the correlation between GATB scores and subsequent college success (as opposed to success in professional or specialized college curricula) was reported by Jex and Sorenson. This project included a proposed investigation of both retest validity and reliability in which the validity is defined in terms of the coefficients of correlation between each of six aptitude scores and the first quarter grade point averages of a group of freshmen at the University of Utah. On the basis of a previous study completed by the research staff at this university, the battery was reduced to the G, V, N, S, R and Q aptitude factors. The test was administered to the entire freshman class which numbered 776 men and 515 women. There were 119 students in the test-retest reliability study and the correlations ranged from a high of .88 on both the N and Q aptitudes to a low of .70 on the R aptitude. The


coefficients of correlation between aptitude scores on this test battery and first quarter grade point averages for the entire freshman class ranged from a high of .41 on the G aptitude to a low of .15 on the R aptitude in the female group and a high of .43 on both the G and V aptitudes to a low of .20 on the S aptitude in the male group.

This study concluded that the GATB possessed considerable promise as a quick, easily obtained, predictor of college success.

The relationships between grades and aptitudes for specific curricula were investigated by Routt. She compared the occupational aptitude scores of students enrolled in beginning and advanced clerical courses in the School of Business Administration at North Texas State College with the academic grades of these same students. Only four of the ten aptitudes found by the GATB were thought to be significant for clerical work and this study was limited to the use of these four. The included V, Q, T and F. A correlation coefficient of .32 was obtained between academic grades made in beginning typing courses and aptitude T scores made by 43 students.

10 Sammye Louise Routt, "A Study to Determine the Relationship of Academic Grades of Students Enrolled in Beginning and Advanced Typing and Shorthand Courses, and in Secretarial Practice in the School of Business Administration at North Texas State College, Denton, Texas," unpublished master's thesis, School of Business Administration, North Texas State College, Denton, Texas, 1951.
No significant relationship was found between academic grades and aptitudes V, Q, and F for these same students.

A coefficient correlation of .35 was found between academic grades and aptitude V for students enrolled in beginning shorthand courses. The r was significant at the 10 per cent level. A coefficient of correlation of .64 was obtained between academic grades in beginning shorthand courses and scores made on aptitude T which was significantly different from zero at the 1 per cent level. No significant relationship was found between academic grades and scores made on aptitudes Q (r = .19) and F (r = -.03) by students enrolled in beginning shorthand courses.

No significant relationship existed between academic grades and scores made on aptitudes V (r = .17), Q (r = .02) and T (r = -.09) by students in the advanced typing courses. A high negative r was obtained between grades for this group and aptitude F. No level of significance was reported for this r.

No relationship was found between grades and aptitudes Q (r = .06), and T (r = .10) for students in advanced shorthand courses. A significant relationship was found between grades in these courses and scores made by these students on aptitude V (r = .56). This r was significant at the 1 per cent level. A high negative relationship was indicated between grades and aptitude F (r = -.32) but no level of significance was reported.
No significant relationship was obtained between scores made by students enrolled in beginning clerical courses when compared with those scores made by students enrolled in advanced clerical courses on aptitudes G, T, and F. A slight relationship was found between scores made on aptitude V by students enrolled in beginning and advanced clerical courses.

Noel used GATB results in an investigation of two areas in the college curriculum. He analyzed the converted scores made on aptitudes G and V and the raw scores made on Part II and Part I of the GATB. Subjects in this study were enrolled in beginning Industrial Arts courses, advanced Industrial Arts courses, and beginning English courses at North Texas State College. The criteria used in this study were the grades made by students in courses relative to these two areas. No significant relationship was obtained between converted scores on aptitude G and academic grades in beginning metal work, beginning woodwork, beginning drawing, advanced Industrial Arts courses, and beginning English courses. No significant relationship was found between raw scores on Part II of the battery and academic grades in courses used in this study. Correlation coefficients ranged from a low of .02 to a high of .09.

12

significant relationship was indicated between raw scores on Part I and academic grades in courses used in this research. Correlation coefficients ranged from a low of .00003 (beginning English courses) to a high of .12 (beginning metal courses).

No significant relationship was obtained between converted scores on aptitude V and academic grades in courses used in this study. Correlation coefficients ranged between a low of .007 (beginning woodwork courses) to a high .13 (beginning English courses).

The predictive possibilities of aptitudes were investigated by Evans at North Texas State College. He used the McQuarrie Mechanical Ability Test and the Bennett Mechanical Comprehension Test to determine the relationship between mechanical aptitude and academic grades of 175 students who had completed at least 60 semester hours of college work. Subjects used in this study were from the departments of Music, Art, Business Administration, Industrial Arts, English and Government. No significant relationship was obtained between academic grades and mechanical aptitude. The study reports that mechanical ability and mechanical comprehension do not indicate achievement in any of the academic areas investigated in this research.

---

Ralph found significant correlations between academic grades and the G, V, and N aptitudes measured by the GATB at the University of Utah. Correlation coefficients of .39 for aptitude G, .31 for aptitude V and .31 for aptitude N were obtained against a criterion of grades in courses required for graduation in the School of Pharmacy.

Gibson studied the relationship between academic achievement and GATB scores in the School of Business at Indiana University. No definite aptitude patterns for areas in this school could be obtained. Accountants and business statisticians tended to have higher scores on the G and N aptitudes while the secretarial science majors had higher scores in the Q and A aptitudes. Further analysis of these relationships is suggested by this study.

Beamer and Rose present research aimed at discovering students who are capable of achieving success in the field of

---

13 Sally Ralph, "The Prediction of Success in the College of Pharmacy at the University of Utah," unpublished master's thesis, School of Pharmacy, University of Utah, Salt Lake City, 1948.


Accounting. The subjects in this study were 87 students who had completed one year of Accounting courses at North Texas State College and who had taken the American Institute of Accountants Test and the GATB. The purpose of the study was to determine: (1) if the GATB's accounting pattern as determined by the United States Employment Service could be used with college students; (2) the relationship between scores made on the GATB and the AIA Test; (3) the relationship between scores made on the GATB and grades in Accounting courses; and (4) the relationship between grades made in Accounting courses and the scores made on the AIA Test.

The AIA Test consists of three parts. Part 1 is an orientation test. Part 2 is composed of tests of achievement which are given at two levels. Level I is given at the end of the first year of study in Accounting. Level II is given at the end of the senior year or at the point of employment.

This study reports that only the G, V and N aptitudes discriminate between the general student body population and the subjects used in this research. Cutting scores for the G aptitude and N aptitude were established. (G = 113.8) (N = 127.3). These are lower than cutting scores established by the United States Employment Service but tend to follow the occupational pattern of accountants given in the GATB manual.

Results of the study indicate that the G, V and N aptitudes correlate with scores on the AIA Test at the 1 per cent
level of significance. The $r$ for aptitude $G$ was .46. The $r$ for aptitude $V$ was .38. The correlation coefficient for aptitude $N$ was .30.

Scores on the GATB were correlated with grades in accounting after the first year to determine the ability of the GATB to predict achievement. Correlation coefficients of .12 for aptitude $G$, .14 for aptitude $V$, and .23 for aptitude $N$ did not reach the 1 per cent level of significance.

The AIA Test scores were correlated with grades made in first year accounting courses and a correlation coefficient of .31 was found to be significant at the 1 per cent level.

This study concluded that an aptitude pattern for students majoring in accounting can be established. The GATB is useful in selecting students to major in accounting but it is not predictive of achievement in accounting courses.

Of the measures in the GATB, the $G$ and $V$ aptitudes seem to be most closely related to college scholarship. Other factors bear slight relationship to academic achievement but further research is needed before positive conclusions can be made.

---

CHAPTER III

STATISTICAL DETERMINANTS OF THE RELATIONSHIP BETWEEN APTITUDES AND MAJOR FIELDS OF STUDY

This research was undertaken to determine the relationship between aptitudes and major fields of study. Two random samples of 228 subjects each were used in this problem. The data obtained from these samples were subjected to statistical techniques and the results of this application are presented in Chapter III.

These findings are reported sequentially with the means and standard deviations for the major-course and all-course grade point averages presented in the initial part of the chapter.

The simple analysis of variance technique was applied to the means of the aptitudes of the major fields of study and the results are submitted.

Bartlett's test of the homogeneity of variance among each sample of the major fields of study was used and the results of this statistic are reported.

Where the analysis of variance technique indicated significant F values a t test of significance of the difference

1

The letter M will be used interchangeably with the word mean in this chapter and the letters SD used to indicate standard deviation.
between the means of aptitudes of any two major fields of study was applied and the results are presented.

A t test of the significance of the difference between the means of aptitudes comparing Sample 1 with Sample 2 was used and the results are indicated next.

Coefficients of correlation between aptitudes and major-course grade point averages are reported followed by the presentation of the correlations of aptitudes with all-course grade point averages. Tests of significance of these correlations were made and the findings are indicated.

The Results

The means and standard deviations of the major-course grade point averages for all major fields of study are presented in Table 1. In Sample 1 the mean major-course grade point average ranged from a low of 1.55 for Marketing majors to a high of 1.98 for both Accounting and Elementary Education majors. In Sample 2 the major field with the highest mean major-course grade point average is Accounting (M = 2.05) while the Marketing major field had the low mean of 1.68.

In Sample 1 the smallest SD is indicated for the Elementary Education major field (SD = .379) and the largest is attributed to the Business Education majors (SD = .472). In Sample 2 the Accounting majors show the
TABLE I
MEANS AND STANDARD DEVIATIONS OF THE MAJOR-COURSE GRADE POINT AVERAGES FOR ALL MAJOR FIELDS

<table>
<thead>
<tr>
<th>Major</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-1</td>
<td>S-2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounting</td>
<td>1.98</td>
<td>2.05</td>
</tr>
<tr>
<td>Business Education</td>
<td>1.89</td>
<td>1.89</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>1.98</td>
<td>1.98</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>1.94</td>
<td>1.88</td>
</tr>
<tr>
<td>Marketing</td>
<td>1.55</td>
<td>1.68</td>
</tr>
</tbody>
</table>

* Indicates Sample 1
** Indicates Sample 2

largest spread with an SD of .450 and the Industrial Arts majors have the least spread with an SD of .380.

Means and Standard Deviations of All-Course Grade Point Average

The means and standard deviations of the all-course grade point averages for all major fields of study are presented in Table II. In Sample 1 the Accounting majors have the highest mean (M = 1.84) while the mean for Marketing majors is the lowest (M = 1.40). In Sample 2 the Accounting majors were high with a mean of 1.85 and the Industrial Arts majors had the lowest mean (M = 1.49).
### TABLE II

**Means and Standard Deviations of the All-Course Grade Point Averages for All Major Fields of Study**

<table>
<thead>
<tr>
<th>Major</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-1</td>
<td>S-2</td>
</tr>
<tr>
<td>Accounting</td>
<td>1.34</td>
<td>1.35</td>
</tr>
<tr>
<td>Business Education</td>
<td>1.79</td>
<td>1.77</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>1.65</td>
<td>1.63</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>1.55</td>
<td>1.49</td>
</tr>
<tr>
<td>Marketing</td>
<td>1.40</td>
<td>1.52</td>
</tr>
</tbody>
</table>

In Sample 1 the smallest SD is revealed for Marketing majors (SD = .230) while the largest is shown for the Business Education major field (SD = .472). In Sample 2 the sigmas range from a high of .438 for the Accounting field to a low of .233 for the Industrial Arts majors.

### Means and Standard Deviations of All Aptitudes

The means and standard deviations of aptitude G for all major fields of study are presented in Table III. In Sample 1 the mean scores range from a high of 130 for the Accounting majors to a low of 116 for Elementary Education majors. In Sample 2 Accounting majors are high with a mean
score of 133 and the Elementary Education majors are low with a mean score of 114.

**TABLE III**

**MEANS AND STANDARD DEVIATIONS OF APTITUDE C FOR ALL MAJOR FIELDS**

<table>
<thead>
<tr>
<th>Major</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5-1</td>
<td>5-2</td>
</tr>
<tr>
<td>Accounting</td>
<td>130</td>
<td>133</td>
</tr>
<tr>
<td>Business Education</td>
<td>119</td>
<td>125</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>116</td>
<td>114</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>119</td>
<td>121</td>
</tr>
<tr>
<td>Marketing</td>
<td>124</td>
<td>123</td>
</tr>
</tbody>
</table>

In Sample 1 the Business Education majors show the least spread with an SD of 13.0 while the greatest spread is indicated for Marketing majors with an SD of 15.6. In Sample 2 an SD of 15.5 is revealed for the Accounting field and the Marketing majors have the lowest SD of 11.8.

The means and standard deviations of aptitude V for all major fields of study are presented in Table IV. The mean scores in Sample 1 range from a high of 115 for the Accounting field to a low of 105 for Industrial Arts majors. In Sample 2 the Accounting majors have the highest mean.
score ($\bar{x} = 115$) while the Industrial arts majors have the lowest mean score ($\bar{x} = 104$).

**TABLE IV**

**MEANS AND STANDARD DEVIATIONS OF APTITUDE $V$ FOR ALL MAJOR FIELDS**

<table>
<thead>
<tr>
<th>Major</th>
<th>S-1</th>
<th>S-2</th>
<th>S-1</th>
<th>S-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>115</td>
<td>115</td>
<td>13.3</td>
<td>18.0</td>
</tr>
<tr>
<td>Business Education</td>
<td>110</td>
<td>114</td>
<td>11.3</td>
<td>14.4</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>113</td>
<td>110</td>
<td>11.5</td>
<td>16.6</td>
</tr>
<tr>
<td>Industrial arts</td>
<td>105</td>
<td>104</td>
<td>13.5</td>
<td>13.0</td>
</tr>
<tr>
<td>Marketing</td>
<td>109</td>
<td>111</td>
<td>12.8</td>
<td>14.1</td>
</tr>
</tbody>
</table>

The Industrial Arts majors show the greatest SD of 13.5 in Sample 1 and the smallest SD is indicated for the Business Education field (SD = 11.3). The largest spread in Sample 2 is indicated for the Accounting majors (SD = 18.0) and the least spread is accounted for by the Industrial Arts field (SD = 13.0).

The means and standard deviations of aptitude $V$ for all major fields of study are presented in Table V. The highest mean score of 134 is disclosed for the Accounting
major field while the Elementary Education majors and the
Marketing majors have the low mean score of 109 in Sample
1. The means in Sample 2 range from a high of 136 for
accounting majors to a low of 112 for the Elementary Educa-
tion major field.

<table>
<thead>
<tr>
<th>Major</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8-1</td>
<td></td>
</tr>
<tr>
<td>Accounting</td>
<td>134</td>
<td>11.6</td>
</tr>
<tr>
<td>Business Education</td>
<td>124</td>
<td>13.4</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>109</td>
<td>15.9</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>112</td>
<td>13.0</td>
</tr>
<tr>
<td>Marketing</td>
<td>109</td>
<td>12.3</td>
</tr>
</tbody>
</table>

The smallest SD in Sample 1 is indicated for accounting
majors (SD = 11.6) while the Elementary Education majors have
the largest spread with an SD of 15.9. Data obtained for
Sample 2 indicate a range of sigmas from a high of 15.0 for
Industrial Arts majors to a low of 10.1 for the Marketing
major field.
Means and standard deviations of aptitude S for all major fields of study are presented in Table VI. The Industrial Arts majors have the high mean score of 131 for Sample 1 while the Business Education majors have the low mean score of 110. In Sample 2 the mean scores range from a high of 132 for Industrial Arts majors to a low of 113 for majors in Elementary Education.

<table>
<thead>
<tr>
<th>Major</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>121</td>
<td>19.4</td>
</tr>
<tr>
<td>Business Education</td>
<td>110</td>
<td>16.6</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>118</td>
<td>17.4</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>131</td>
<td>14.7</td>
</tr>
<tr>
<td>Marketing</td>
<td>121</td>
<td>13.2</td>
</tr>
</tbody>
</table>

The least spread on aptitude S is indicated for the Industrial Arts majors (SD = 14.7) in Sample 1. The greatest spread is accounted for by the majors in accounting (SD = 19.4). In Sample 2 the sigmas range from a high of 16.2 for Marketing majors to a low of 14.8 for majors in Elementary Education.
The means and standard deviations of aptitude P for all major fields of study are reported in Table VII. Data obtained for Sample 1 indicate that the mean scores range from a high of 123 for both the Marketing majors and the Elementary Education majors to a low of 120 for majors in Industrial arts. Data on Sample 2 reveal a high mean score of 124 for majors in Business Education and a low mean score of 113 for Industrial arts majors.

**TABLE VII**

**MEANS AND STANDARD DEVIATIONS OF APTITUDE P FOR ALL MAJOR FIELDS**

<table>
<thead>
<tr>
<th>Major</th>
<th>$M_{S-1}$</th>
<th>$M_{S-2}$</th>
<th>$SD_{S-1}$</th>
<th>$SD_{S-2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>121</td>
<td>118</td>
<td>17.1</td>
<td>25.0</td>
</tr>
<tr>
<td>Business Education</td>
<td>121</td>
<td>124</td>
<td>16.0</td>
<td>19.0</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>123</td>
<td>122</td>
<td>13.2</td>
<td>17.3</td>
</tr>
<tr>
<td>Industrial arts</td>
<td>120</td>
<td>113</td>
<td>20.3</td>
<td>14.0</td>
</tr>
<tr>
<td>Marketing</td>
<td>123</td>
<td>120</td>
<td>15.2</td>
<td>17.5</td>
</tr>
</tbody>
</table>

Data on Sample 1 indicate that the high SD of 20.8 is attributed to majors in Industrial arts while the Marketing majors have the lowest SD of 15.2. In Sample 2 the SDs
range from a high of 25.0 for majors in Accounting to a low of 14.0 for Industrial Arts majors.

The means and standard deviations of aptitude Q for all major fields of study are reported in Table VIII. Data for Sample 1 indicate that the mean scores range from a high of 121 for Business Education majors to a low of 102 for majors in Industrial Arts. The high mean score for Sample 2 is 123 for Business Education majors and the low mean score is 97 for majors in Industrial Arts.

### TABLE VIII

**MEANS AND STANDARD DEVIATIONS OF APTITUDE Q FOR ALL MAJOR FIELDS OF STUDY**

<table>
<thead>
<tr>
<th>Major</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S-1</td>
<td>S-2</td>
<td>S-1</td>
<td>S-2</td>
</tr>
<tr>
<td>Accounting</td>
<td>114</td>
<td>113</td>
<td>16.0</td>
<td>14.1</td>
</tr>
<tr>
<td>Business Education</td>
<td>121</td>
<td>123</td>
<td>13.9</td>
<td>15.9</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>120</td>
<td>115</td>
<td>13.9</td>
<td>14.3</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>102</td>
<td>97</td>
<td>15.6</td>
<td>11.2</td>
</tr>
<tr>
<td>Marketing</td>
<td>107</td>
<td>111</td>
<td>12.8</td>
<td>13.6</td>
</tr>
</tbody>
</table>

In Sample 1 Marketing majors have the lowest SD of 12.8 while the highest SD is attributed to majors in Business Education (SD = 18.0). Data for Sample 2 indicate that the
SDs range from a high of 15.9 for majors in Business Education to a low of 11.2 for majors in Industrial Arts.

Simple Analysis of Variance

Simple analysis of variance was used to test the significance of differences in aptitude means among the major fields of study for both samples. A summary of the results for Sample 1 for aptitude G is given in Table IX. A value of \( F = 6.853 \) was obtained which is significant beyond the .001 level.

**Table IX**

**Summary of Simple Analysis of Variance in S-1 for Aptitude G**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>5251</td>
<td>4</td>
<td>1312.750</td>
<td>6.853</td>
</tr>
<tr>
<td>Within</td>
<td>42713</td>
<td>223</td>
<td>191.538</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>47964</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A summary of the results of simple analysis of variance among aptitude means in Sample 2 for aptitude G is indicated in Table X. A value of \( F = 10.419 \) was obtained which is significant at better than the .001 level.

\(^2\) In the table headings hereafter Sample 1 will be referred to as S-1 and Sample 2 will be referred to as S-2.
TABLE X

SUMMARY OF SIMPLE ANALYSIS OF VARIANCE
IN S-2 FOR APTITUDE G

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>7872</td>
<td>4</td>
<td>1968.000</td>
<td>10.419</td>
</tr>
<tr>
<td>Within</td>
<td>42119</td>
<td>223</td>
<td>138.374</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>49991</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A summary of simple analysis of variance results among Sample 1 means for aptitude V is given in Table XI. A value of F = 4.581 was obtained which is significant beyond the .01 level.

TABLE XI

SUMMARY OF SIMPLE ANALYSIS OF VARIANCE
IN S-1 FOR APTITUDE V

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>2927</td>
<td>4</td>
<td>731.750</td>
<td>4.581</td>
</tr>
<tr>
<td>Within</td>
<td>35619</td>
<td>223</td>
<td>159.726</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>38546</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A summary of the results of simple analysis of variance among means in Sample 2 for aptitude V is given in Table XII.
A value of $F = 3.943$ was obtained which is significant at greater than the .01 level.

**TABLE XII**

**SUMMARY OF SIMPLE ANALYSIS OF VARIANCE IN S-2 FOR APTITUDE V**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3736</td>
<td>4</td>
<td>940.750</td>
<td>3.943</td>
</tr>
<tr>
<td>Within</td>
<td>53193</td>
<td>223</td>
<td>233.533</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>56956</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A summary of simple analysis of variance results among means in Sample 1 for aptitude N is indicated in Table XIII. A value of $F = 23.080$ was obtained which is significant beyond the .001 level.

**TABLE XIII**

**SUMMARY OF SIMPLE ANALYSIS OF VARIANCE IN S-1 FOR APTITUDE N**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>18122</td>
<td>4</td>
<td>4530.500</td>
<td>23.080</td>
</tr>
<tr>
<td>Within</td>
<td>43773</td>
<td>223</td>
<td>196.291</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>61995</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A summary of the results of simple analysis of variance among means in Sample 2 for aptitude \( m \) is given in Table XIV. A value of \( F = 26.338 \) was obtained which is significant at greater than the .001 level.

**Table XIV**

**Summary of Simple Analysis of Variance in S-2 for Aptitude \( m \)**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>17532</td>
<td>4</td>
<td>4383.000</td>
<td>26.338</td>
</tr>
<tr>
<td>Within</td>
<td>37116</td>
<td>223</td>
<td>166.412</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>54642</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A summary of results of simple analysis of variance among means in Sample 1 for aptitude \( s \) is given in Table XV. A value of \( F = 7.459 \) was found to be significant at greater than the .001 level.

**Table XV**

**Summary of Simple Analysis of Variance in S-1 for Aptitude \( s \)**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>10452</td>
<td>4</td>
<td>2613.000</td>
<td>7.459</td>
</tr>
<tr>
<td>Within</td>
<td>78119</td>
<td>223</td>
<td>350.309</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>88571</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A summary of the results of simple analysis of variance among means in Sample 2 for aptitude S is given in Table XVI. A value of $F = 9.682$ was found to be significant at greater than the .001 level.

**TABLE XVI**

**SUMMARY OF SIMPLE ANALYSIS OF VARIANCE IN S-2 FOR APTITUDE S**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>9578</td>
<td>4</td>
<td>2394.500</td>
<td>9.682</td>
</tr>
<tr>
<td>Within</td>
<td>55148</td>
<td>223</td>
<td>247.300</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>64726</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A summary of results of simple analysis of variance among means in Sample 1 for aptitude P is indicated in Table XVII. The value of $F = .427$ was much smaller than that needed for significance.

**TABLE XVII**

**SUMMARY OF SIMPLE ANALYSIS OF VARIANCE IN S-1 FOR APTITUDE P**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>547</td>
<td>4</td>
<td>136.750</td>
<td>.427</td>
</tr>
<tr>
<td>Within</td>
<td>71251</td>
<td>223</td>
<td>319.511</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>71798</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results of simple analysis of variance among means in sample 2 for aptitude P are indicated in Table XVIII. The value of $F = 2.686$ is significant beyond the .05 level.

**TABLE XVIII**

**SUMMARY OF SIMPLE ANALYSIS OF VARIANCE IN S-2 FOR APTITUDE P**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>3387</td>
<td>4</td>
<td>346.750</td>
<td>2.686</td>
</tr>
<tr>
<td>Within</td>
<td>70293</td>
<td>223</td>
<td>315.237</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>73685</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results obtained when the means for aptitude Q in sample 1 were subjected to simple analysis of variance are indicated in Table XIX. The $F$ value obtained was 12.965 which is significant at greater than the .001 level.

**TABLE XIX**

**SUMMARY OF SIMPLE ANALYSIS OF VARIANCE IN S-1 FOR APTITUDE Q**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>12752</td>
<td>4</td>
<td>3188.000</td>
<td>12.965</td>
</tr>
<tr>
<td>Within</td>
<td>54832</td>
<td>223</td>
<td>245.333</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>67584</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A summary of the results obtained when the means for aptitude $Q$ were subjected to simple analysis of variance in Sample 2 are given in Table XX. The $F$ value of 21.277 was found to be significant at better than the .001 level.

**TABLE XX**

**SUMMARY OF SIMPLE ANALYSIS OF VARIANCE IN S-2 FOR APTITUDE $Q$**

<table>
<thead>
<tr>
<th>Source</th>
<th>Sums of Squares</th>
<th>df</th>
<th>Variance Estimate</th>
<th>$F$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>16916</td>
<td>4</td>
<td>4229.000</td>
<td>21.277</td>
</tr>
<tr>
<td>Within</td>
<td>44323</td>
<td>223</td>
<td>198.757</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>61239</td>
<td>227</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Test of Homogeneity of Variance

Bartlett's test of homogeneity of variance was used to determine the significance of the difference in standard deviations of aptitudes among the major fields of study in both samples.

The standard deviations of the aptitudes were not significantly different among the major fields of study in Sample 1.

The standard deviations of aptitude $W$ were significantly different among the major fields of study in Sample 2. A chi square value of 12.21 was obtained which is significant at greater than the .02 level.
The standard deviations of aptitude \( P \) were significantly different among the major fields of study in Sample 2. A chi square value of 16.33 was obtained which is significant at greater than the .01 level.

The remainder of the standard deviations of aptitudes were not significantly different among the major fields of study in Sample 2.

\[ t \text{ Test of Significance of Difference} \]
\[ \text{Between Any Two Means} \]

After the \( F \) value obtained through the technique of simple analysis of variance was determined to be significant, the \( t \) test was used to determine the significance of the difference between any two means of aptitudes. A summary of the results obtained from this comparison of aptitudes \( G, V \) and \( N \) for all major fields in Sample 1 is given in Table XXI. Only those differences which were significant in both samples are reported.

In Sample 1 the means of the Accounting major field on aptitude \( G \) differed significantly from the means of the Business Education field, the Elementary Education field, the Industrial Arts field and the Marketing field. These differences were in favor of the Accounting major field.
### TABLE XXI

**SUMMARY OF RESULTS OF t TEST OF DIFFERENCE BETWEEN ANY TWO MEANS OF APTITUDES G, V AND N FOR ALL MAJOR FIELDS IN S-1**

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Fields</th>
<th>Major Fields</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Acct.</td>
<td>3.79&lt;sup&gt;b&lt;/sup&gt;</td>
<td>4.69&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.78&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.98&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I.A.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| V        | Acct.        | 3.41<sup>b</sup> | 8.36<sup>b</sup> | 7.51<sup>b</sup> | 8.19<sup>b</sup> |
|          | B.Ed.        |              |        |      |      |
|          | El.Ed.       |              |        |      |      |
|          | I.A.         |              |        |      |      |
|          | Mrkt.        |              |        |      |      |

| N        | Acct.        | 5.19<sup>b</sup> | 4.28<sup>b</sup> | 3.41<sup>b</sup> |   |
|          | B.Ed.        |              |        |      |      |
|          | El.Ed.       |              |        |      |      |
|          | I.A.         |              |        |      |      |
|          | Mrkt.        |              |        |      |      |

<sup>a</sup> In these tables the major fields are abbreviated as follows: Acct. (Accounting), B. Ed. (Business Education), El. Ed. (Elementary Education), I. A. (Industrial Arts), Mrkt. (Marketing).

<sup>b</sup> These values are significant at greater than the .001 level.

<sup>c</sup> These values are significant at better than the .01 level.

<sup>d</sup> These values are significant at better than the .05 level.
A t value of 3.79 which is significant at greater than the .001 level was obtained for the difference in means of aptitude G between the Accounting majors and the Business Education majors in Sample 1. A t value of 4.69 which is significant at greater than the .001 level was obtained for the difference between means for aptitude G of the Accounting majors and the Elementary Education majors in Sample 1. A t value of 3.78 which is significant at greater than the .001 level was obtained for the difference between the means of aptitude G of the Accounting majors and the Industrial Arts majors in Sample 1. A t value of 1.98 which is significant at greater than the .05 level was obtained for the difference in means of aptitude G of the Accounting majors and the Marketing majors in Sample 1.

No significant difference between means of aptitude G was evident in comparing the Business Education major field with the Elementary Education major field in Sample 1.

No significant difference between means of aptitude G was evident in comparing the Business Education major field with the Industrial Arts major field in Sample 1.

No significant difference between means of aptitude G was evident in comparing the Elementary Education majors with the Industrial Arts majors in Sample 1.

No significant difference between means of aptitude G was evident in comparing the Industrial Arts major
field with the Marketing major field in Sample 1.

A $t$ value of 2.68 which is significant at greater than the .01 level was obtained for the difference between the means of aptitude $G$ for the Marketing majors and the Elementary Education majors in Sample 1. This difference is in favor of the Marketing major field.

In Sample 1 a $t$ value of 3.78 which is significant at greater than the .001 level was obtained for the difference in means of aptitude $V$ between the Accounting majors and the Industrial Arts majors in Sample 1. This difference is in favor of the Accounting majors. No significant differences were apparent in the means of aptitude $V$ between the Accounting major field and the Business Education major field, the Elementary Education major field and the Marketing major field.

A $t$ value of 3.95 which is significant at beyond the .001 level was obtained for the difference in means of aptitude $G$ of the Business Education major field and the Industrial Arts major field in Sample 1. This difference is in favor of the Business Education majors. No significant difference was evident in the means of aptitude $V$ between the Business Education major field and the Elementary Education major field. No significant difference was apparent in the means of aptitude $V$ between the Business Education majors and the Marketing majors.
No significant differences were apparent in the means of aptitude V between the Elementary Education majors and the Industrial Arts majors. No significant difference was evident in the means of aptitude V between the Elementary Education majors and the Marketing majors in Sample 1.

A t value of 2.57 which is significant at greater than the .01 level was obtained for the difference in means of aptitude V between the Marketing majors and the Industrial Arts majors in Sample 1. This difference is in favor of the Marketing majors.

In Sample 1 the means of the Accounting major field for aptitude N differed significantly from those of the Business Education major field, the Elementary Education major field, the Industrial Arts major field and the Marketing major field. These differences were all in favor of the Accounting majors. A t value of 3.41 which is significant at greater than the .001 level was obtained for the difference in means of aptitude N between the Accounting majors and the Business Education majors. A t value of 8.30 which is significant at greater than the .001 level was obtained for the difference between the means of aptitude N of the Accounting majors and the Elementary Education majors. A t value of 7.51 which is significant at beyond the .001 level was obtained for the difference in means of aptitude N between the Accounting majors and the Industrial Arts majors.
A \( t \) value of 8.19 which is significant at beyond the .001 level was obtained for the difference in means of aptitude \( N \) between the Accounting majors and the Marketing majors.

A \( t \) value of 5.19 which is significant at greater than the .001 level was obtained for the difference in means of aptitude \( N \) between the Business Education major field and the Elementary Education major field, in Sample 1. This difference favored the Business Education majors. A \( t \) value of 4.28 which is significant at greater than the .001 level was obtained for the difference in means of aptitude \( N \) between the Business Education major field and the Industrial Arts major field. This difference favored the Business Education major field. No significant difference was apparent in the means of aptitude \( N \) between the Business Education major field and the Marketing major field in Sample 1.

No significant difference was evident in the means of aptitude \( N \) between the Elementary Education majors and the Industrial Arts majors. No significant difference was evident in the means of aptitude \( N \) between the Elementary Education major field and the Marketing major field.

A \( t \) value of 3.41 which is significant at greater than the .001 level was obtained for the difference in means of aptitude \( N \) between the Marketing major field and the Industrial Arts major field in Sample 1. This difference was in favor of the Marketing major field of study.
A summary of the results of the \( t \) test of significance of difference between any two means of aptitudes S, P and Q for all major fields in Sample 1 is given in Table XXII. Only those differences which were significant in both samples are reported.

In Sample 1 no significant differences were evident for the means of aptitude S in comparing the Accounting majors with the Business Education majors, the Elementary Education majors and the Marketing majors.

No significant differences were evident in the means of aptitude S in comparing the Business Education major field with the Elementary Education major field and the Marketing major field.

No significant difference was evident in the means of aptitude S in comparing the Elementary Education majors and the Marketing majors in Sample 1.

A \( t \) value of 2.55 which is significant at greater than the .01 level was obtained for the difference in means when the Industrial Arts majors were compared with the Accounting majors in Sample 1. A \( t \) value of 5.61 which is significant at beyond the .001 level was obtained for the difference in means of aptitude S when the Industrial Arts majors were compared with the Business Education majors. This value is in favor of the Industrial Arts majors. A \( t \) value of 3.37 which is significant at greater than the .001 level was
obtained for the difference in means of aptitude S when the
Industrial Arts majors were compared with the Elementary Edu-
cation majors. This value is in favor of the Industrial Arts
majors.

**TABLE XXII**

**SUMMARY OF RESULTS OF t TEST OF DIFFERENCE BETWEEN ANY TWO MEANS OF APTITUDES S, P**
**AND Q FOR ALL MAJOR FIELDS IN S-1**

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Field</th>
<th>Major Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Acct.</td>
<td>2.55</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>El. Ed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I.A.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>Acct.</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>El. Ed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I.A.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Acct.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>El. Ed.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I.A.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td></td>
</tr>
</tbody>
</table>

*This value is significant at better than the .01 level.

bThese values are significant at greater than the .001
level.

cNo significant F values were obtained for this aptitude
in Sample 1 and the t test was not used.

dThis value is significant at greater than the .05 level.
A t value of 3.41 which is significant at greater than the .001 level was obtained for the difference in means of aptitude S when the Industrial Arts majors were compared with the Marketing majors. This value is in favor of the Industrial Arts majors.

In Sample 1 no significant differences in means of aptitude P were evident among the major fields of study.

In Sample 1 a t value of 3.66 which is significant at beyond the .001 level was obtained for the difference in means of aptitude Q when the Accounting majors were compared with the Industrial Arts majors. This value is in favor of the Accounting major field. No significant differences were apparent in the means of aptitude Q between the Accounting major field and the Business Education major field. No significant difference in means of aptitude Q was evident between the Accounting majors and the Elementary Education majors. No significant difference in the means of aptitude Q was apparent between the Accounting major field and the Marketing major field.

A t value of 2.13 which is significant at greater than the .05 level was obtained for the difference in the means of aptitude Q when the Business Education majors were compared with the Accounting majors in Sample 1. This value is in favor of the Business Education major field. A t value of 6.15 which is significant at beyond the .001 level was
obtained for the difference in means of aptitude \( Q \) when the Business Education majors were compared with the Industrial Arts majors. This value is in favor of the Business Education majors. A \( t \) value of 4.27 which is significant at greater than the .001 level was obtained for the difference in means of aptitude \( Q \) when the Business Education major field was compared with the Marketing major field. This value is in favor of the Business Education major field. No significant difference was evident in the means of aptitude \( Q \) when the Business Education majors were compared with the Elementary Education majors in Sample 1.

No significant difference in means of aptitude \( Q \) was apparent when the Elementary Education major field was compared with the Marketing major field in Sample 1. A \( t \) value of 5.55 which is significant at greater than the .001 level was obtained for the difference in means when the Elementary Education majors were compared with the Industrial Arts majors in Sample 1. This value is in favor of the Elementary Education major field.

A \( t \) value of 4.27 which is significant at greater than the .001 level was obtained for the difference in means of aptitude \( Q \) when the Marketing major field of study was compared with the Industrial Arts major field of study in Sample 1. This value is in favor of the Marketing major field of study.
A summary of the results of the **t** test of significance of difference between any two means of aptitudes G, V and N for all major fields in Sample 2 are given in Table XXIII. Only those differences which were significant in both samples are reported.

**TABLE XXIII**

**SUMMARY OF RESULTS OF **t** TEST OF DIFFERENCE BETWEEN ANY TWO MEANS OF APTITUDES G, V AND N FOR ALL MAJOR FIELDS IN S-2**

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Field</th>
<th>Major Field</th>
<th>Major Field</th>
<th>Major Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Acct.</td>
<td>....</td>
<td>2.78</td>
<td>6.44</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>....</td>
<td>3.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I.A.</td>
<td>....</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td>....</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Acct.</td>
<td>....</td>
<td>4.08</td>
<td>8.66</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>....</td>
<td>4.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I.A.</td>
<td>....</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td>....</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*These values are significant at better than the .01 level.

**These values are significant at better than the .001 level or better.

**This value is significant at better than the .05 level.
In Sample 2 the means of the Accounting major field differed significantly for aptitude G from those of the Business Education majors, the Elementary Education majors, the Industrial Arts majors and the Marketing majors. These differences were all in favor of the Accounting major field of study. A $t$ value of 2.78 which is significant at greater than the .01 level was obtained for the difference in means of aptitude G when the Accounting major field was compared with the Business Education major field. A $t$ value of 6.41 which is significant at greater than the .001 level was obtained for the difference in means of aptitude G when the Accounting majors were compared with the Elementary Education majors. A $t$ value of 4.18 which is significant at greater than the .001 level was obtained for the difference in means of aptitude G when the Accounting majors were compared with the Industrial Arts majors. A $t$ value of 3.34 which is significant at greater than the .001 level was obtained for the difference in means of aptitude G when the Accounting major field was compared with the Marketing major field.

No significant differences in means of aptitude G were indicated when the Business Education majors were compared with the Elementary Education majors, the Industrial Arts majors and the Marketing majors.
No significant difference was evident in the means of aptitude G when the Elementary Education majors were compared with the Industrial Arts majors.

There was no significant difference in the means of aptitude G between the Industrial Arts major field and the Marketing major field.

A t value of 3.04 which is significant at greater than the .01 level was obtained for the difference in means of aptitude G when the Marketing majors were compared with the Elementary Education majors. This value is in favor of the Marketing majors.

In Sample 2 on aptitude V the comparison of the Accounting major field mean with all other major field means revealed only one significant difference. This difference was in favor of the Accounting field. A t value of 3.42 which is significant at greater than the .001 level was obtained for the difference in means of aptitude V when the Accounting major field was compared with the Industrial Arts major field.

No significant differences were evident in the means of aptitude V when the Business Education majors were compared with the Elementary Education majors and the Marketing majors. A t value of 3.24 which is significant at greater than the .01 level was obtained for the difference in means of aptitude V when the Business Education majors were compared with the Industrial Arts majors. This difference favored the Business Education majors.
No significant differences in the means of aptitude \( V \) were evident when the Elementary Education majors were compared with the Industrial Arts majors and the Marketing majors.

A \( t \) value of 2.14 which is significant at greater than the .05 level was obtained for the difference in means of aptitude \( V \) when the Marketing major field was compared with the Industrial Arts major field. This value favored the Marketing major field.

In Sample 2 a comparison of the Accounting major field mean of aptitude \( N \) with the other major field means of aptitude \( N \) indicated significant differences in four cases. A \( t \) value of 4.08 which is significant at greater than the .001 level was obtained for the difference between the means of the Accounting majors and the Business Education majors. This value is in favor of the Accounting major field. A \( t \) value of 8.66 which is significant at greater than the .001 level was obtained for the difference in means between the Accounting major field and the Elementary Education major field. This value is in favor of the Accounting majors. A \( t \) value of 8.18 which is significant at greater than the .001 level was obtained for the difference in means between the Accounting major field and the Industrial Arts major field. This value favored the Accounting major field. A \( t \) value of 4.33 which is significant at greater than the .001 level
was obtained for the difference in means between the Accounting majors and the Marketing majors. This value favored the Accounting major field.

The Business Education major field mean of aptitude N differed significantly from the mean of aptitude N for the Elementary Education major field and the Industrial Arts major field. These differences favored the Business Education major field. A $t$ value of 4.92 which is significant at greater than the .001 level was obtained for the difference in means between the Business Education majors and the Elementary Education majors. A $t$ value of 4.28 which is significant at greater than the .001 level was obtained for the difference in means between the Business Education major field and the Industrial Arts major field. No significant differences in means were evident in comparing the Business Education means of aptitude N with the mean of aptitude N for the Marketing major field.

No significant differences in means of aptitude N were apparent when the Elementary Education major field was compared with the Industrial Arts major field and the Marketing major field.

The Marketing major field mean of aptitude N differed significantly from that of the Industrial Arts major field. A $t$ value of 3.71 which is significant at greater than the .01 level was obtained for this difference. This value was in favor of the Marketing majors.
A summary of the results of the $t$ test of significance of difference between any two means of aptitudes $S$, $P$ and $Q$ for all major fields in Sample 2 are indicated in Table XXIV. Only those differences which were significant in both samples are reported.

**TABLE XXIV**

**SUMMARY OF RESULTS OF $t$ TEST OF DIFFERENCE BETWEEN ANY TWO MEANS OF APTITUDES $S$, $P$ AND $Q$ FOR ALL MAJOR FIELDS IN S-2**

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Field</th>
<th>Major Field</th>
<th>Major Field</th>
<th>Major Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S$</td>
<td>Acct.</td>
<td>2.74$^a$</td>
<td>4.82$^b$</td>
<td>5.89$^b$</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td>3.39$^b$</td>
<td>5.42$^b$</td>
<td>9.92$^b$</td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$P$</td>
<td>Acct.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Q$</td>
<td>Acct.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^a$This value is significant at better than the .01 level.

$^b$These values are significant at better than the .001 level.

$^c$No significant values were obtained for aptitude $P$. 
In Sample 2 the means of aptitude $S$ were not significantly different when comparing the Accounting major field with the Business Education major field, the Elementary Education major field and the Marketing major field.

The means of aptitude $S$ were not significantly different in comparing the Business Education major field with the Elementary Education major field and the Marketing major field.

The means of aptitude $S$ were not significantly different between the Elementary Education major field and the Marketing major field.

The mean of aptitude $S$ for the Industrial Arts major field differed significantly with all other major field means of aptitude $S$. These differences were in favor of the Industrial Arts major field. A $t$ value of 2.74 which is significant at greater than the .01 level was obtained for the difference in means of aptitude $S$ between the Industrial Arts majors and the Accounting majors. A $t$ value of 4.82 which is significant at greater than the .001 level was obtained for differences in means between the Industrial Arts majors and the Business Education major field. A $t$ value of 5.89 which is significant at greater than the .001 level was obtained for the differences in aptitude $S$ means between the Industrial Arts major field and the Elementary Education major field. A $t$ value of 3.96 which is significant
at greater than the .001 level was obtained for the difference in means of aptitude $S$ between the Industrial Arts major field and the Marketing major field.

In Sample 2 no significant differences in the means of aptitude $P$ were evident.

In Sample 2 a $t$ value of 5.42 which is significant at greater than the .001 level was obtained for the difference in means of aptitude $Q$ when the Accounting major field was compared with the Industrial Arts major field. This value is in favor of the Accounting major field. No significant differences were evident in the means of aptitude $Q$ when the Accounting major field was compared with the Elementary Education major field and the Marketing major field.

The mean of aptitude $Q$ for the Business Education majors differed significantly from those of the Accounting majors, the Industrial Arts majors and the Marketing majors. These differences were all in favor of the Business Education majors. A $t$ value of 3.39 which is significant at greater than the .001 level was obtained for the difference in means between the Business Education majors and the Accounting majors. A $t$ value of 9.92 which is significant at greater than the .001 level was obtained for the difference in means between the Business Education major field and the Industrial Arts major field. A $t$ value of 4.07 which is significant at greater than the .001 level was obtained for the
difference in means between the Business Education major field and the Marketing major field. No difference in means was evident between the Business Education major field and the Elementary Education major field.

The mean of aptitude Q for the Elementary Education majors differed significantly from the mean of aptitude Q for the Industrial Arts majors. A \( t \) value of 6.22 which is significant at greater than the .001 level was obtained for the difference in means between the Elementary Education major field and the Industrial Arts major field. This value is in favor of the Elementary Education major field of study. No significant difference in the means of aptitude Q was evident when the Elementary Education major field of study was compared with the Marketing major field of study.

The mean of aptitude Q for the Marketing majors differed significantly from the mean of aptitude Q for the Industrial Arts majors. A \( t \) value of 4.74 which is significant at greater than the .001 level was obtained. This value favored the Marketing major field of study.

### \( t \) Test of Significance of Difference Between Sample 1 and Sample 2 Means of Aptitudes

The \( t \) test was used to determine the significance of the difference between Sample 1 and Sample 2 means of aptitudes. Each major field in Sample 1 was compared with the identical major field in Sample 2.
No significant difference was obtained for the means of aptitudes of the Accounting major field in Sample 1 and Sample 2.

A t value of 2.208 was obtained for the means of aptitude C in a comparison of the Business Education major field in Sample 1 and Sample 2. This value is significant at beyond the 5 per cent level.

A comparison of the means of aptitude G from sample to sample of the Business Education majors revealed a t value of 2.158 which is significant at beyond the 5 per cent level.

No significant difference was evident between the means of aptitudes for the Elementary Education majors in Sample 1 and Sample 2.

No significant difference between the means of aptitudes was evident for the Industrial Arts majors from sample to sample.

A significant t value of 5.891 was obtained for the comparison of the means of aptitude N between samples of the Marketing major field. This value is significant at beyond the .001 level.

Coefficients of Correlation

Coefficients of correlation between aptitudes and major-course grade point averages were calculated. A summary of the results of this calculation for Sample 1 is indicated in Table XXV.
TABLE XXV

COEFFICIENTS OF CORRELATION BETWEEN APTITUDES
AND MAJOR-COURSE GRADE POINT AVERAGES FOR
ALL MAJOR FIELDS IN S-1

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Accounting</th>
<th>Business Education</th>
<th>Elementary Education</th>
<th>Industrial Arts</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>.136</td>
<td>.340</td>
<td>.319</td>
<td>.206</td>
<td>.348</td>
</tr>
<tr>
<td>V</td>
<td>.349</td>
<td>.245</td>
<td>.304</td>
<td>.196</td>
<td>.406</td>
</tr>
<tr>
<td>N</td>
<td>.079</td>
<td>.251</td>
<td>.343</td>
<td>.184</td>
<td>.455</td>
</tr>
<tr>
<td>S</td>
<td>-.070</td>
<td>.322</td>
<td>.044</td>
<td>.100</td>
<td>.295</td>
</tr>
<tr>
<td>P</td>
<td>.068</td>
<td>.071</td>
<td>.182</td>
<td>.123</td>
<td>.215</td>
</tr>
<tr>
<td>Q</td>
<td>.322</td>
<td>.210</td>
<td>.074</td>
<td>.156</td>
<td>.267</td>
</tr>
</tbody>
</table>

aSignificant at the .01 level or greater.

bSignificant at the .05 level or greater.

For the Accounting major field in Sample 1 a correlation coefficient of .349 between aptitude V and major-course grade point average is significantly different from zero at greater than the 5 per cent level. A coefficient of .322 for Accounting majors in Sample 1 is significantly different from zero at greater than the .05 level.

For the Business Education major field in Sample 1 a coefficient of correlation of .340 between aptitude G and major-course grade point average is significantly different
from zero at greater than the .05 level. A coefficient of correlation of .322 between aptitude S and major-course grade point average is significantly different from zero at greater than the .05 per cent level.

For the Elementary Education major field of study in Sample 1 a coefficient of correlation between aptitude G and major-course grade point average of .319 was obtained. This correlation is significantly different from zero at beyond the .05 level.

No significant correlations between aptitudes and major-course grade point averages were obtained for the Industrial Arts major field in Sample 1.

For the Marketing major field in Sample 1 three significant correlations were obtained. A coefficient of correlation of .348 between aptitude G and major-course grade point average is significantly different from zero at greater than the .05 level. A coefficient of correlation of .406 between aptitude V and major-course grade point average approached significance at the .01 level. A coefficient of correlation of .455 between aptitude N and major-course grade point average is significantly different from zero at greater than the .01 level.

Coefficients of correlation between aptitudes and major-course grade point averages were computed for Sample 2 and a summary of the results is presented in Table XXVI.
### TABLE XXVI

COEFFICIENTS OF CORRELATION BETWEEN APTITUDES AND MAJOR-COURSE GRADE POINT AVERAGES FOR ALL MAJOR FIELDS IN S-2

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Accounting</th>
<th>Business Education</th>
<th>Elementary Education</th>
<th>Industrial Arts</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>.503 (^b)</td>
<td>.539 (^a)</td>
<td>.539 (^a)</td>
<td>.324 (^c)</td>
<td>.391 (^b)</td>
</tr>
<tr>
<td>V</td>
<td>.372 (^c)</td>
<td>.577 (^a)</td>
<td>.610 (^a)</td>
<td>.118</td>
<td>.299</td>
</tr>
<tr>
<td>N</td>
<td>.538 (^a)</td>
<td>.401 (^b)</td>
<td>.571 (^a)</td>
<td>.342 (^c)</td>
<td>.417 (^b)</td>
</tr>
<tr>
<td>S</td>
<td>.244</td>
<td>.112</td>
<td>.009</td>
<td>.284</td>
<td>.061</td>
</tr>
<tr>
<td>P</td>
<td>.061</td>
<td>.036</td>
<td>.076</td>
<td>.048</td>
<td>.183</td>
</tr>
<tr>
<td>Q</td>
<td>.175</td>
<td>.215</td>
<td>.289</td>
<td>.047</td>
<td>.380 (^b)</td>
</tr>
</tbody>
</table>

\(^a\) Significant at the .001 level or greater.
\(^b\) Significant at the .01 level or greater.
\(^c\) Significant at the .05 level or greater.

For the Accounting major field in Sample 2 a significant correlation between aptitude G and major-course grade point average was obtained. A correlation of .503 is significantly different from zero at beyond the .01 level. A correlation of .372 between aptitude V and major-course grade point average is significantly different from zero beyond the .05 level. A correlation coefficient of .538 between aptitude N and major-course grade point average is significantly different from zero beyond the .001 level.
For the Business Education major field in Sample 2 a significant correlation between aptitude G and major-course grade point average was indicated. This correlation of .539 is significant beyond the .001 level. A correlation of .577 between aptitude V and the major-course grade point average is significantly different from zero beyond the .001 level. A correlation of .401 between aptitude N and major-course grade point average is significant beyond the .01 level.

For the Elementary Education major field in Sample 2 three significant correlations were obtained. A correlation of .539 between aptitude G and major-course grade point average is significantly different from zero at greater than the .001 level. A correlation of .610 between aptitude V and major-course grade point average is significantly different from zero at greater than the .001 level. A correlation of .571 between aptitude N and major-course grade point average is significantly different from zero at greater than the .001 level.

Two significant correlations were obtained for the Industrial Arts major field in Sample 2. A correlation of .324 between aptitude G and major-course grade point average is significantly different from zero at greater than the .05 level. A correlation of .342 between aptitude N and
major-course grade point average is significantly different from zero at beyond the .05 level.

Significant correlations between aptitudes and major-course grade point averages were obtained in three instances for the Marketing major field in Sample 2. A correlation of .391 between aptitude G and major-course grade point average is significantly different from zero at greater than the .01 level. A correlation of .417 between aptitude N and major-course grade point average is significant at greater than the .01 level. A correlation of .380 between aptitude Q and major-course grade point average is significantly different from zero at greater than the .01 level.

Coefficients of correlation between aptitudes and all-course grade point averages were computed for Sample 1 and a summary of the results appears in Table XXVII.

For the Accounting major field in Sample 1 a significant correlation of .381 was obtained between aptitude Q and all-course grade point average. This correlation is significantly different from zero at greater than the .01 level.

For the Business Education major field in Sample 1 a significant correlation of .340 was obtained between aptitude G and all-course grade point average. This correlation is significantly different from zero at greater than the .05 level.
TABLE XXVII

COEFFICIENTS OF CORRELATION BETWEEN APTITUDES AND ALL-COURSE GRADE POINT AVERAGES FOR ALL MAJOR FIELDS IN S-1

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Accounting</th>
<th>Business Education</th>
<th>Elementary Education</th>
<th>Industrial Arts</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>.267</td>
<td>.340&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.265</td>
<td>.232</td>
<td>.560&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>V</td>
<td>.312</td>
<td>.265</td>
<td>.265</td>
<td>.346&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.402&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>N</td>
<td>.112</td>
<td>.168</td>
<td>.300</td>
<td>.185</td>
<td>.509&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>S</td>
<td>-.105</td>
<td>.295</td>
<td>.010</td>
<td>.095</td>
<td>.301</td>
</tr>
<tr>
<td>F</td>
<td>.045</td>
<td>.034</td>
<td>.263</td>
<td>.119</td>
<td>.139</td>
</tr>
<tr>
<td>Q</td>
<td>.361&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-.002</td>
<td>.123</td>
<td>.402&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.285</td>
</tr>
</tbody>
</table>

<sup>a</sup>Significant at the .001 level or greater.
<sup>b</sup>Significant at the .01 level or greater.
<sup>c</sup>Significant at the .05 level or greater.

No significant correlations were obtained between aptitudes and all-course grade point averages for the Elementary Education major field in Sample 1.

Significant correlations were obtained in two instances for the Industrial Arts major field in Sample 1. A correlation of .346 between aptitude V and all-course grade point average is significantly different from zero at greater than the .05 level. A correlation of .402 between aptitude Q and all-course grade point average is
significant at greater than the .01 level.

For the Marketing major field in Sample 1 significant correlations between aptitudes and all-course grade point averages were obtained in three instances. A correlation of .560 between aptitude $G$ and all-course grade point average is significantly different from zero at greater than the .001 level. A correlation of .402 between aptitude $V$ and all-course grade point average is significantly different from zero at greater than the .01 level. A correlation of .509 between aptitude $N$ and all-course grade point average is significant at better than the .001 level.

Coefficients of correlation between aptitudes and all-course grade point averages were obtained for Sample 2. A summary of the results is presented in Table XXVIII.

Two significant correlations were obtained for the Accounting major field in Sample 2. A correlation of .486 between aptitude $G$ and all-course grade point average is significantly different from zero at greater than the .001 level. A correlation of .415 between aptitude $V$ and all-course grade point average is significantly different from zero at greater than the .01 level.

For the Business Education major field in Sample 2 significant correlations were obtained in three instances. A correlation of .520 between aptitude $G$ and all-course grade point average is significantly different from zero
at greater than the .001 level. A correlation of .492 between aptitude V and all-course grade point average was significantly different from zero at greater than the .001 level. A correlation of .429 between aptitude N and all-course grade point average is significant at greater than the 1 per cent level.

TABLE XXVIII
COEFFICIENTS OF CORRELATION BETWEEN APTITUDES AND ALL-COURSE GRADE POINT AVERAGES FOR ALL MAJOR FIELDS IN S-2

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Accounting</th>
<th>Business Education</th>
<th>Elementary Education</th>
<th>Industrial Arts</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q</td>
<td>.486&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.520&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.357&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.370&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.357&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>V</td>
<td>.415&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.492&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.408&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.279</td>
<td>.178</td>
</tr>
<tr>
<td>N</td>
<td>.193</td>
<td>.429&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.465&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.348&lt;sup&gt;c&lt;/sup&gt;</td>
<td>.308</td>
</tr>
<tr>
<td>S</td>
<td>.258</td>
<td>.120</td>
<td>.160</td>
<td>.225</td>
<td>.185</td>
</tr>
<tr>
<td>F</td>
<td>.132</td>
<td>.066</td>
<td>.143</td>
<td>.088</td>
<td>.239</td>
</tr>
<tr>
<td>Q</td>
<td>.226</td>
<td>.267</td>
<td>.240</td>
<td>.105</td>
<td>.256</td>
</tr>
</tbody>
</table>

<sup>a</sup> Significant at the .001 level or greater.
<sup>b</sup> Significant at the .01 level or greater.
<sup>c</sup> Significant at the .05 level or greater.
Three significant correlations were obtained for the Elementary Education major field in Sample 2. A correlation of .357 between aptitude G and all-course grade point average is significant at greater than the .05 level. A correlation of .408 between aptitude V and all-course grade point average is significantly different from zero at greater than the .01 level. A correlation of .465 between aptitude N and all-course grade point average is significant at greater than the .01 level.

For the Industrial Arts major field in Sample 2 significant correlations were obtained in two instances. A correlation of .370 between aptitude G and all-course grade point average is significantly different from zero at greater than the .01 level. A correlation of .348 between aptitude N and all-course grade point average is significantly different from zero at greater than the .05 level.

For the Marketing major field in Sample 2 a significant correlation of .357 between aptitude G and all-course grade point average is significantly different from zero at greater than the .01 level.

Comparison of Sample 1 and Sample 2 Correlations
Between Aptitudes and Major-Course Grade Point Averages

Critical ratios were computed to determine the significance of the difference between the correlations of
aptitudes with major-course grade point averages in Sample 1 and Sample 2.

For a comparison of the accounting majors from sample to sample a critical ratio of 1.90 was obtained for the correlations between aptitude v and major-course grade point average which approaches significance at the .05 level. A critical ratio of 2.10 for the correlations between aptitude t and major-course grade point average is significant at greater than the .05 level.

A comparison of the business education major field from sample to sample indicated a critical ratio of 1.93 for correlations between aptitude v and major-course grade point average which is significant at greater than the .05 level.

No significant differences were revealed between Sample 1 and Sample 2 correlations of aptitudes with major-course grade point averages for the elementary education major field.

No significant differences were revealed for the correlations between aptitudes and major-course grade point averages from sample to sample for the industrial arts major field.

No significant critical ratios were obtained in a comparison of the correlations between aptitudes and major-course grade point averages from sample to sample of the marketing major field of study.
Comparison of Sample 1 and Sample 2
Correlations between aptitudes and all-course grade point averages

Critical ratios were computed to determine the significance of the difference between correlations of aptitudes with all-course grade point averages in Sample 1 and Sample 2.

For the accounting major field in Sample 1 and Sample 2 the correlations between aptitudes and all-course grade point averages were not significantly different.

So significant differences in correlations between aptitudes and all-course grade point averages were indicated from sample to sample of the business education major field of study.

The coefficients of correlations of aptitudes with all-course grade point averages for the elementary education major field of study were not significantly different from sample to sample.

A comparison of the industrial arts major field in Sample 1 and Sample 2 revealed a critical ratio of 2.59 for the correlations between aptitude 7 and all-course grade point average. This figure is significant at better than the .01 level.

The correlations of aptitudes with all-course grade point averages for the marketing major field of study were not significantly different from sample to sample.
Significance Test for Correlations Between
Aptitudes and Major-Course Grade Point
Averages Within Each Sample

A chi square technique was used to determine the sig-
nificance of the correlations between aptitudes and major-
course grade point averages within each sample.

No significant chi square values were obtained for the
correlations between aptitudes and major-course grade point
averages in Sample 1.

A chi square value of 10.748 was obtained for the cor-
relations between aptitude V and major-course grade point
average in Sample 2. This value is significant at greater
than the .05 level. The remaining correlations in Sample
2 were not significantly different.

Significance Test for Correlations Between
Aptitudes and All-Course Grade Point
Averages Within Each Sample

A chi square technique was used to determine the sig-
nificance of the correlations between aptitudes and all-
course grade point averages in Sample 1.

A chi square value of 14.050 for the correlations be-
tween aptitude V and all-course grade point average in
Sample 1 was obtained. This value is significant at bet-
ter than the .01 level. The remainder of the correlations
in Sample 1 were not significantly different.
No significant chi square values were indicated for the correlations between aptitudes and all-course grade point averages within Sample 2.

Summary

Chapter III is devoted to reporting the results of the application of statistical techniques to the data used in this study.

Means and standard deviations for the major-course and all-course grade point averages are indicated. The means and standard deviations of all the aptitudes used in this study are reported.

The simple analysis of variance technique was used to test the significance of the difference among the means of the aptitudes for both samples. An F value of .427 for aptitude 1 in Sample 1 was much smaller than that needed for significance. The remainder of the F values in both samples was significant.

A test of homogeneity of variance was applied to determine the significance of the difference in the standard deviations of the aptitudes among the major fields of study in both samples. No significant differences were evident in the standard deviations among the major fields of study in Sample 1. In Sample 2 significant differences in the standard deviations among the major fields of study were obtained for aptitude 6 and aptitude 7. The remainder of the standard...
deviations was not significantly different in Sample 2.

The t technique was used to test the significance of the difference between any two means of aptitudes. In Sample 1 the means of aptitude E for the Accounting majors differed significantly from the means of aptitude O for all other majors. This difference was in favor of the Accounting majors.

The mean of aptitude O for the Marketing majors differed significantly from that of the Elementary Education majors. This difference was in favor of the Marketing majors.

In Sample 1 the means of aptitude V for the Accounting majors differed significantly from that of the Industrial Arts majors. This difference favored the Accounting majors.

The mean of aptitude V for the Business Education majors differed significantly from that of the Industrial Arts majors. This difference favored the Business Education majors.

The mean of aptitude V for the Marketing majors differed significantly from the mean of aptitude V for the Industrial Arts majors. This difference favored the Marketing majors.

In Sample 1 the mean of aptitude N for the Accounting majors differed significantly from the means of aptitude N for all other majors. These differences all favored the accounting major field.
The mean aptitude $a$ for the business education majors differed significantly from the means of aptitude $a$ for the elementary education majors and the industrial arts majors. These differences favored the business education majors.

The mean of aptitude $b$ for the marketing majors differed significantly from the mean of aptitude $b$ for the industrial arts majors. This difference favored the marketing majors.

In Sample 1 the mean of aptitude $c$ for the industrial arts majors differed significantly from the means of all other major fields. These differences were all in favor of the industrial arts major field.

No significant differences were observed in comparing the means of aptitude $d$ in Sample 1.

In Sample 1 the mean of aptitude $e$ for the accounting major field differed significantly from the mean of aptitude $e$ for the industrial arts major field. This difference favored the accounting major field.

The mean of aptitude $f$ for the business education majors differed significantly from the mean of the accounting majors, the industrial arts majors and the marketing majors. These differences all favored the business education majors.

The mean of aptitude $g$ for the elementary education majors differed significantly from the mean of the industrial arts majors. This difference favored the elementary education majors.
The mean of aptitude $Q$ for the Marketing majors differed significantly from the mean of aptitude $Q$ for the Industrial Arts majors. This difference favored the Marketing majors.

Only those values which were significantly different in both samples were reported. The difference between any two means of aptitudes in Sample 2 can be observed from the summary of the differences in Sample 1.

The $t$ test was used to determine the significance of difference in means of aptitudes from sample to sample. The means of aptitudes for each major field in Sample 1 were compared with the means of aptitudes of the identical major field in Sample 2. No significant differences were evident for the Accounting major field, the Elementary Education major field and the Industrial Arts major field.

A comparison of the means of aptitudes for the Business Education major field in Sample 1 and Sample 2 indicated two significant $t$ values. Significant differences were obtained for the means of aptitude $G$ and $H$. The remainder of the means of aptitudes were not significantly different for the Business Education major field from sample to sample.

A significant $t$ value for aptitude $K$ was obtained in a comparison of the means of aptitudes for the Marketing major field in Sample 1 and Sample 2. The remainder of the means of aptitudes for the Marketing major field did not differ significantly from sample to sample.
Coefficients of correlation between aptitudes and major-course grade point averages are reported for Sample 1 and Sample 2.

In Sample 1 significant correlations between aptitudes and major-course grade point averages are indicated for the accounting major field (aptitude V and aptitude q), the business education major field (aptitude G and aptitude S), the elementary education major field (aptitude G and aptitude A), and the marketing major field (aptitude G, aptitude V, and aptitude A). No significant correlations between aptitudes and major-course grade point averages were obtained for the industrial arts major field.

In Sample 2 significant correlations between aptitudes and major-course grade point averages are indicated for the accounting major field (aptitude G, aptitude V and aptitude A), the business education major field (aptitude G, aptitude V, and aptitude A), the elementary education major field (aptitude G, aptitude V, and aptitude A), the industrial arts major field (aptitude G and aptitude A), and the marketing major field (aptitude G, and aptitude A and aptitude q).

Coefficients of correlation between aptitudes and all-course grade point averages are reported for Sample 1 and Sample 2.

In Sample 1 significant correlations between aptitudes and all-course grade point averages are indicated for the
Accounting major field (aptitude G), the Business Education major field (aptitude G), the Industrial Arts major field (aptitude V and aptitude C), and the Marketing major field (aptitude G, aptitude V and aptitude N). No significant correlations between aptitudes and all-course grade point averages were obtained for the Elementary Education major field.

In Sample 2 significant correlations between aptitudes and all-course grade point averages are indicated for the Accounting major field (aptitude G and aptitude V), the Business Education major field (aptitude G, aptitude V and aptitude N), the Elementary Education major field (aptitude G, aptitude V and aptitude N), and the Marketing major field (aptitude G), and the Industrial Arts major field (aptitude G, and aptitude N).

Critical ratios were obtained to determine the significance of the differences of the correlations between aptitudes and major-course grade point averages in Sample 1 and Sample 2.

For the Accounting major field in Sample 1 and Sample 2 a significant difference was indicated for the correlations between aptitudes G and N and major-course grade point average. The remaining correlations were not significantly different.

For the Business Education major field in Sample 1 and Sample 2 a significant difference between correlations was indicated for aptitude V.
No significant critical ratios were obtained for the correlations between aptitudes and major-course grade point averages in Sample 1 and Sample 2 for the elementary education major field, the industrial arts major field, and the marketing major field.

Critical ratios were obtained to determine the significance of the difference of the correlations between aptitudes and all-course grade point averages in Sample 1 and Sample 2.

For the accounting major field of study the correlations between aptitudes and all-course grade point averages were not significantly different from sample to sample.

No significant differences between correlations were indicated from sample to sample of the Business Education major field of study.

The correlations between aptitude and all-course grade point average differed significantly from sample to sample of the Industrial Arts major field of study.

No significant differences in correlations between aptitudes and all-course grade point averages were indicated for the elementary education major field and the marketing major field from sample to sample.

A chi square technique was used to determine the significance of the correlations between aptitudes and major-course grade point averages within each sample of the major fields of study.
No significant chi square values were obtained for the correlations between aptitudes and major-course grade point averages within Sample 1.

A significant chi square value was indicated for the correlation between aptitude V and major-course grade point average in Sample 2. The remainder of the chi square values for the correlations within Sample 2 was not significant.

A chi square technique was used to determine the significance of the correlations between aptitudes and all-course grade point averages within each of the samples.

A significant chi square value was indicated for the correlation between aptitude V and all-course grade point average within Sample 1. The remainder of the chi square values was not significant.

No significant chi square values were obtained for the correlations between aptitudes and all-course grade point averages within Sample 2.
CHAPTER IV

INTERPRETATION OF THE RELATIONSHIP BETWEEN
APTITUDES AND MAJOR FIELDS OF STUDY

The preceding chapter was confined to reporting the results of the application of certain statistical techniques to the data used in this study. Chapter IV contains an interpretation of these results.

The means are the initial results to be considered in this chapter. Interpretations follow in order for: the simple analysis of variance among the means of the aptitudes in both samples; the $t$ test of significance of difference between any two means of aptitudes; and the $t$ test of significance of difference between the means of aptitudes from sample to sample.

The standard deviations of the aptitudes for each major field are reported next. An analysis of these variances through the use of a test of homogeneity of standard deviations follows.

Interpretations are presented of the correlations between aptitudes and grade point averages. Tests of significance for these correlations are then considered.

Critical aptitude scores based on the standard deviation method are presented next. The final part of the
chapter contains the critical aptitude scores relative to grade point average intervals.

The Means

The data reported for the means of the grade point averages indicate that the Accounting majors and the Elementary Education majors have the highest means for the major-course grade point averages in Sample 1. The Accounting majors have the highest mean score for major-course grade point average again in Sample 2. The lowest mean score for the major-course grade point average is attributed to the Marketing major field of study.

The Accounting majors have the highest mean for the all-course grade point averages in Sample 1 and Sample 2. The Marketing majors have the low mean for the all-course grade point average among major fields in Sample 1 while the Industrial Arts majors exhibit the low mean in Sample 2.

The material provided by the United States Employment Service pertinent to the establishment of academic aptitude patterns for college areas indicates that the peaks of mean aptitude score profiles, or the fact that a group exhibits significantly higher performance on some aptitudes than on others, are clues to the abilities that are important to that group. Greater homogeneity of performance, evidenced by relatively small standard deviations, also provides
indications of significant aptitudes. Analyses of these data in terms of combinations of these descriptive characteristics can be employed in the development of aptitude patterns which are of value in determining a counselee's potentialities for successful completion of the academic training that is a prerequisite to entering various professional fields.

A summary of all of the aptitude means for all major fields in Sample 1 is presented in Table XXIX.

The simple analysis of variance technique provides an over-all test for the significance of the differences between several means considered simultaneously. The F value (6.853) obtained from the application of simple analysis of variance to the means on aptitude G in Sample 1 is significant beyond the .001 level. These five sets of scores have not been drawn from the same population of scores and test performance on aptitude G is a real source of variation.

An F value of 4.581 was obtained for aptitude V means in Sample 1 which is significant at greater than the 1 percent level. These scores were not drawn from the same set.

---

population of scores and test performance on aptitude V is a real source of variation.

TABLE XXIX
SUMMARY OF APTITUDE MEANS FOR ALL MAJOR FIELDS IN S-1

<table>
<thead>
<tr>
<th>Major Field</th>
<th>G</th>
<th>V</th>
<th>N</th>
<th>S</th>
<th>P*</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>130</td>
<td>115</td>
<td>134</td>
<td>121</td>
<td>121</td>
<td>114</td>
</tr>
<tr>
<td>Business Education</td>
<td>119</td>
<td>110</td>
<td>124</td>
<td>110</td>
<td>121</td>
<td>121</td>
</tr>
<tr>
<td>Elementary Education</td>
<td>116</td>
<td>113</td>
<td>109</td>
<td>118</td>
<td>123</td>
<td>120</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td>119</td>
<td>105</td>
<td>112</td>
<td>131</td>
<td>120</td>
<td>102</td>
</tr>
<tr>
<td>Marketing</td>
<td>124</td>
<td>109</td>
<td>109</td>
<td>121</td>
<td>123</td>
<td>107</td>
</tr>
</tbody>
</table>

*The means for aptitude P were not significantly different.

An F value of 23.020 was obtained for aptitude N in Sample 1. This value is significant at beyond the .001 level and the hypothesis of no difference is rejected. It may be concluded with high confidence that the scores were not drawn from the same population of scores or that test performance on aptitude N is a real source of variation for the major fields of study.
The results of application of simple analysis of variance among means in Sample 1 for aptitude \( S \) indicate an \( F \) value of 7.459 which is significant at greater than the .001 level. The null hypothesis is rejected and test performance on aptitude \( S \) is a real source of variation among the major fields.

An \( F \) value of .427 for aptitude \( P \) in Sample 1 is much smaller than that needed for significance. The null hypothesis is accepted and test performance on aptitude \( P \) in Sample 1 cannot be considered as a real source of variation.

The results obtained when the aptitude means in Sample 1 were subjected to simple analysis of variance for aptitude \( Q \) indicate an \( F \) value of 12.965. This value is significant at greater than the .001 level. It may be concluded with high confidence that the scores were not drawn from the same population of scores or that test performance on aptitude \( Q \) is a real source of variation.

Table XXX presents a summary of aptitude means for all major fields of study in Sample 2.

A summary of the results of simple analysis of variance among aptitude means for Sample 2 on aptitude \( G \) indicates an \( F \) value of 10.419. The hypothesis of no differences in means is rejected at beyond the .001 level. Test performance on aptitude \( G \) in Sample 2 may be considered as a real source of variation among these major fields.
An F value of 3.943 was obtained for aptitude V means for Sample 2. This value is significant at greater than the 1 per cent level and the null hypothesis is rejected. Test performance on aptitude V may be considered as a true source of variation.

The simple analysis of variance technique indicated an F value of 26.338 for aptitude N in Sample 2. The hypothesis of no differences in means is rejected at greater than the .001 level. It may be concluded with high confidence that the aptitude scores did not come from the same population of Sample 2.
aptitude scores and the test performance on aptitude \( N \) is a real source of variation.

An F value of 7.459 was obtained for aptitude \( S \) in Sample 2. These means were significantly different at better than the .001 level. Test performance on aptitude \( S \) may be considered as a true source of variation.

A summary of the results of simple analysis of variance of means in Sample 2 on aptitude \( P \) indicates an F value of 2.686. The null hypothesis is rejected at greater than the .05 level. It may be concluded that the aptitude scores did not come from the same population of aptitude scores and test performance is a real source of variation.

An F value of 21.277 is indicated for aptitude \( Q \) in Sample 2. This value is significant at beyond the .001 level and the hypothesis of no difference among means is rejected. It may be concluded that the aptitude scores did not come from the same population of aptitude scores and test performance is a real source of variation.

### Test of Significance of Difference Between Any Two Means of Aptitudes

After determining that significant differences in means of aptitudes did exist among all major fields, the test of significance of difference between any two means was applied. The mean of all aptitudes for one major field was compared with the means of all other major fields. A
summary of the results of this comparison appears in Table XXI, Table XXII, Table XXIII and Table XXIV. Only those values which were significant in both samples are reported.

In Sample I the means of aptitude G for the Accounting major field differed significantly from the mean of aptitude G for the Business Education major field. A t value of 3.79 was obtained for this difference in means. The null hypothesis is rejected at beyond the .001 level. These aptitude scores were not drawn from the same population of aptitude scores. Test performance on aptitude G is a real source of variation between the Accounting major field and the Business Education major field in this sample. This variation is in favor of the Accounting major field.

A t value of 4.69 was obtained for the difference in means of aptitude G when comparing the Accounting majors with the Elementary Education majors. The null hypothesis is rejected at greater than the .001 level. These scores were not drawn from the same population of aptitude scores. Test performance on aptitude G is a real source of variation between the Accounting majors and the Elementary Education majors in this sample. This variation favors the Accounting majors.

A t value of 3.78 which is significant at greater than the .001 level was obtained for the difference in means of aptitude G when the Accounting major field and the Industrial
Arts major field were compared in this sample. This variation favored the Accounting major field.

A t value of 1.98 which is significant at greater than the .05 level was obtained for the difference in means of aptitude G when the Accounting major field and the Marketing major field were compared. The null hypothesis is rejected and test performance may be considered as a real source of variation between the Accounting major field and the Marketing major field in this sample. This variation favors the Accounting major field.

No significant differences in the means of aptitude G were obtained when the Business Education majors were compared with the Elementary Education majors, the Industrial Arts majors and the Marketing majors. The hypothesis of no difference in means is tenable. Test performance on aptitude G is not a real source of variation between the Business Education major field and the Elementary Education major field. Test performance on aptitude G is not a real source of variation between the Business Education major field and the Industrial Arts major field. Test performance on aptitude G is not a real source of variation between the Business Education major field and the Marketing major field in this sample.

No significant difference in the means of aptitude G was evident between the Elementary Education majors and the Industrial Arts majors. The null hypothesis is tenable.
Test performance on aptitude G is not a real source of variation between these two fields in this sample.

No significant difference was indicated in the means of aptitude G when the Industrial Arts major field was compared with the Marketing major field. The hypothesis of no difference in means is tenable. These scores were drawn from a common normal population. Test performance on aptitude G is not a real source of variation between the Industrial arts majors and the Marketing majors in this sample.

The Marketing major field mean of aptitude G was compared with the mean of aptitude G for the Elementary Education major field and a t value of 2.68 was obtained. The null hypothesis is rejected at greater than the .01 level. These aptitude scores were not drawn from the same population of aptitude scores. Test performance on aptitude G is a real source of variation between the Marketing majors and the Elementary Education majors in this sample. This variation favors the Marketing majors.

In Sample 1 the mean of aptitude V for the Accounting major field differed significantly from the mean of aptitude V for the Industrial Arts major field. A t value of 3.78 was obtained which is significant at beyond the .001 level. The hypothesis of no difference is rejected. These scores were not drawn from a common normal population of scores. Test
performance on aptitude V is a real source of variation between the Accounting major field and the Industrial Arts major field in this sample. This variation favors the Accounting Major field.

No significant differences were evident in the means of aptitude V when the Accounting majors were compared with the Business Education majors, the Elementary Education majors and the Marketing majors. The null hypothesis is tenable and test performance on aptitude V is not a real source of variation in this comparison.

A t value of 3.95 was obtained for the difference in the means of aptitude V when the Business Education major field was compared with the Industrial Arts major field. The hypothesis of no difference in means is rejected at greater than the .001 level. These aptitude scores were not drawn from the same population of scores. Test performance on aptitude V is a real source of variation between the Business Education majors and the Industrial Arts majors in this sample. This variation is in favor of the Business Education major field. No significant difference in means of aptitude V was indicated when the Business Education major field was compared with the Elementary Education major field and the Marketing major field. The hypothesis of no difference is tenable. These scores came from a common normal population of aptitude scores.
Test performance on aptitude V is not a real source of variation when the mean of the Business Education majors is compared with the means of the Elementary Education majors and the Marketing majors in this sample.

No significant differences were evident in the means of aptitude V when the Elementary Education majors were compared with the Industrial Arts majors and the Marketing majors. The hypothesis of no difference in means is tenable. These scores came from a common normal population of scores. Test performance on aptitude V is not a real source of variation between the Elementary Education majors and both the Industrial Arts majors and the Marketing majors in this sample.

A $t$ value of 2.57 was obtained for the comparison of the mean of aptitude V between the Marketing major field and the Industrial Arts major field. The hypothesis of no difference in means is rejected at greater than the .05 level. These aptitude scores were not drawn from a common normal population of scores. Test performance on aptitude V is a real source of variation between the Marketing major field and the Industrial Arts major field in this sample. This variation favors the Marketing major field.

In Sample 1 the mean of aptitude N for the Accounting major field differed significantly from the mean of aptitude N for all other major fields. These differences were all in
favor of the Accounting major field. A t value of 3.41 was obtained for the difference in means of aptitude II between the Accounting major field and the Business Education major field. The null hypothesis is rejected at greater than the .001 level. Test performance on aptitude I is a real source of variation between the Accounting major field and the Business Education major field in this sample. A t value of 2.30 was obtained for the difference in means of aptitude II between the Accounting majors and the Elementary Education majors. The hypothesis of no difference in means is rejected at greater than the .001 level. Test performance on aptitude III is a real source of variation between Accounting majors and Elementary Education majors in this sample. A t value of 7.51 was indicated for the difference in means of aptitude III between the Accounting majors and the Industrial Arts majors. The null hypothesis is rejected at beyond the .001 level. Test performance on aptitude III is a real source of variation between the Accounting majors and the Industrial Arts majors in this sample. A t value of 8.19 was obtained for the difference in the means of aptitude III between the Accounting majors and the Marketing majors. The null hypothesis is rejected at beyond the .001 level. Test performance on aptitude III is a real source of differentiation between the Accounting majors and the Marketing majors in this sample.
A comparison of the mean of aptitude $T$ for the Business Education majors with the means of aptitude $N$ for the Elementary Education majors revealed a $t$ value of 5.19. The hypothesis of no difference in means of aptitude $N$ is rejected at greater than the .001 level. These aptitude scores were not drawn from a common normal population of aptitude scores. Test performance on aptitude $N$ is a real source of differentiation between the Business Education majors and the Elementary Education majors in this sample. This variation is in favor of the Business Education majors.

A comparison of the mean of aptitude $N$ for the Business Education majors with the mean of aptitude $M$ for the Industrial Arts majors indicated a $t$ value of 4.28. The hypothesis of no difference in means is rejected at greater than the .001 level. These scores were not drawn from the same population of aptitude scores. Test performance on aptitude $M$ is a real source of variation between the Business Education majors and the Industrial Arts majors in this sample. This variation favors the Business Education majors.

The means of aptitude $N$ were not significantly different between the Business Education majors and the Marketing majors in this sample. The hypothesis of no difference is tenable. Test performance on aptitude $N$ does not differentiate between these two fields in this sample.
No significant differences in the means of aptitude $M$ were revealed when the Elementary Education major field was compared with the Industrial Arts field and the Marketing major field. The null hypothesis is tenable and test performance on aptitude $M$ does not differentiate between the Elementary Education major field and the Industrial Arts major field in this sample. Test performance does not differentiate between the Elementary Education major field and the Marketing major field in this sample.

The Marketing major field mean of aptitude $M$ was compared with the Industrial Arts major field mean of aptitude $M$ and a $t$ value of 3.41 was obtained. The hypothesis of no difference in means is rejected at beyond the .001 level. These scores were not drawn from the same population of scores. Test performance on aptitude $M$ is a real source of variation between the Marketing major field and the Industrial Arts major field in this sample. This variation favors the Marketing major field.

In Sample 1 the $t$ test of significance of difference in means of aptitude $S$ revealed variations only in the comparisons involving the Industrial Arts major field. These variations were all in favor of the Industrial Arts major field.

A $t$ value of 2.55 was obtained for the difference in means of aptitude $S$ in a comparison of means between the
Industrial Arts majors and the Accounting majors. The hypothesis of no difference in means is rejected at greater than the .01 level. Test performance on aptitude S is a real source of variation between the Industrial Arts majors and the Accounting majors in this sample. A t value of 5.61 was obtained for the difference in means of aptitude S between the major fields of Industrial Arts and Business Education. The null hypothesis is rejected at beyond the .001 level. These aptitude scores were not drawn from the same population of aptitude scores. Test performance on aptitude S is a real source of differentiation between the Industrial Arts major field and the Business Education major field in this sample. A t value of 3.37 was obtained for the difference in means of aptitude S between the Industrial Arts majors and the Elementary Education majors. The hypothesis of no difference in means is rejected at greater than the .001 level. Test performance on aptitude S is a real source of variation between the Industrial Arts majors and the Elementary Education majors in this sample. A t value of 3.41 was obtained for the difference in means of aptitude S between the Industrial Arts majors and the Marketing majors. The hypothesis of no difference in means is rejected at beyond the .001 level. Test performance on aptitude S is a real source of differentiation between the Industrial Arts majors and the Marketing majors in this sample.
In Sample 1 the test of significance of difference in means of aptitude P did not reveal significant values in any comparison of the major fields of study. Test performance on aptitude P is not a real source of differentiation between any two of the major fields in this sample.

In Sample 1 a t value of 3.66 was obtained for the difference in means of aptitude Q between the Accounting majors and the Industrial Arts majors. The hypothesis of no difference in means is rejected at beyond the .001 level. Test performance is a real source of variation between the Accounting majors and the Industrial Arts majors in this sample. This variation is in favor of the Accounting majors.

No significant t values were obtained for differences in the means of aptitude Q when the Accounting major field was compared with the Elementary Education major field and the Marketing major field. These scores were drawn from a common normal population of scores. Test performance on aptitude Q is not a real source of differentiation when the Accounting majors are compared with the Elementary Education majors and the Marketing majors in this sample.

A t value of 2.13 was obtained for the difference in means of aptitude Q between the Business Education major fields and the Accounting major field. The null hypothesis is rejected at greater than the 5 per cent level. Test performance on aptitude Q is a real source of variation between
the Business Education majors and the Accounting majors in this sample. This variation favors the Business Education major field.

A t value of 6.15 was obtained for the difference in means of aptitude Q between the Business Education major field and the Industrial Arts major field. The null hypothesis is rejected at beyond the .001 level. It may be concluded with high confidence that test performance on aptitude Q is a real source of variation between the Business Education majors and the Industrial Arts majors in this sample. This variation favors the Business Education majors.

A t value of 4.27 was obtained for the difference in the means of aptitude Q between the Business Education majors and the Marketing majors. The hypothesis of no difference is rejected at beyond the .001 level. Test performance on aptitude Q is a real source of variation between the Business Education majors and the Marketing majors in this sample. This variation favors the Business Education majors.

No significant difference in means was evident when the Business Education majors and the Elementary Education majors were compared. Test performance on aptitude Q does not differentiate between these two major fields in this sample.
The Marketing major field mean of aptitude Q was compared with the aptitude Q mean of the Industrial Arts major field and a t value of 4.27 was indicated. The hypothesis of no difference in means is rejected at greater than the .001 level. These aptitude scores were not drawn from the same population of aptitude scores. Test performance on aptitude Q is a real source of variation between the Marketing majors and the Industrial Arts majors in this sample. This variation favors the Marketing major field.

In Sample 2 the mean of aptitude G for the Accounting major field differed significantly from the mean of aptitude G for all other major fields. The variations in means were all in favor of the Accounting major field. A t value of 2.78 was obtained for the difference in means of aptitude G for the Accounting majors when compared with the mean of aptitude G for the Business Education majors. The hypothesis of no difference in means is rejected at better than the 1 percent level. Test performance on aptitude G is a real source of variation between the Accounting majors and the Business Education majors in this sample.

A t value of 6.41 was obtained for the difference in means of aptitude G between the Accounting majors and the Elementary Education majors. The hypothesis of no difference in means is rejected at better than the .001 level.
It may be concluded with high confidence that test performance on aptitude \( Q \) is a real source of differentiation between these two fields.

A \( t \) value of 4.18 was obtained for the difference in means of aptitude \( Q \) in a comparison of the Accounting majors and the Industrial Arts majors. The null hypothesis is rejected at greater than the .001 level. Test performance is a real source of variation between the Accounting majors and the Industrial Arts majors in this sample.

A \( t \) value of 3.34 was obtained for the difference in means of aptitude \( Q \) between the Accounting majors and the Marketing majors. The hypothesis of no difference is rejected at greater than the .001 level. Test performance on aptitude \( Q \) is a real source of differentiation between the Accounting major field and the Marketing major field in this sample.

A comparison of the mean of aptitude \( Q \) of the Business Education majors with the means of aptitude \( Q \) for the Elementary Education majors, the Industrial Arts majors and the Marketing majors revealed no significant differences. Test performance on aptitude \( Q \) is not a real source of differentiation between Business Education majors and the majors in these three fields.

A comparison of the mean of aptitude \( Q \) of the Elementary Education major field with the means of the Industrial
Arts major field and the Marketing major field revealed no significant differences. Test performance on aptitude G is not a real source of variation between Elementary Education and these two major fields.

A comparison of the Marketing major field and the Industrial Arts major field revealed a significant difference between means of aptitude G. A t value of 3.04 is significant at better than the .01 level. The hypothesis of no difference is rejected. These scores were not drawn from a common normal population of scores. Test performance on aptitude G is a real source of variation between the Marketing majors and the Industrial Arts majors in this sample. This variation favors the Marketing major field.

In Sample 2 the Accounting major field mean of aptitude V was compared with the Industrial Arts major field mean of aptitude G and a t value of 3.42 was obtained. The hypothesis of no difference in means is rejected at greater than the .001 level. Test performance on aptitude V is a real source of variation between the Accounting majors and the Industrial Arts majors in this sample. This variation favors the Accounting majors.

No significant values were obtained in comparing the Accounting major field mean of aptitude V with the means of aptitude V for the remaining three major fields. Test
performance on aptitude V is not a real source of differentiation between the Accounting major field and these three fields in this sample.

A t value of 3.24 was obtained for the difference in means of aptitude V in comparing the Business Education majors and the Industrial Arts majors. The hypothesis of no difference in means is rejected at better than the .01 level. Test performance on aptitude V is a real source of variation between the Business Education majors and the Industrial Arts majors in this sample.

No significant differences in means of aptitude V were evident in comparing the Business Education majors with the Elementary Education majors and the Marketing majors. Test performance on aptitude V does not differentiate between the Business Education majors and these two major fields in this sample.

No significant differences were evident when the Elementary Education major field mean of aptitude V was compared with the mean of aptitude V for the Industrial Arts major field and the Marketing major field. Test performance on aptitude V is not a real source of variation between Elementary Education majors and these two major fields.

A comparison of the Marketing major field mean of aptitude V with the mean of aptitude V for the Industrial Arts major field revealed a t value of 2.14. The hypothesis of
no difference in means is rejected at better than the .05 level. Test performance on aptitude V is a real source of variation between the Marketing major field and the Industrial Arts major field in this sample. This variation favors the Marketing major field.

In Sample 2 the mean of aptitude N for the Accounting majors differed significantly from the means of aptitude N for the remaining four majors. These differences were all in favor of the Accounting major field. A t value of 4.08 was obtained for the difference in means of the Accounting majors and the Business Education majors. The null hypothesis is rejected at better than the .001 level. These aptitude scores were not drawn from the same population of scores. It may be concluded with high confidence that test performance on aptitude N is a real source of differentiation between the Accounting majors and the Business Education majors in this sample.

A t value of 8.66 was obtained for the difference in means of aptitude N for a comparison of the Accounting majors with the Elementary Education majors. The hypothesis of no difference in means is rejected at better than the .001 level. Test performance on aptitude N is a real source of differentiation between the Accounting majors and the Elementary Education majors in this sample.
A $ value of 4.18 was obtained for the difference in means of aptitude $ when the Accounting major field was compared with the Industrial Arts major field. The hypothesis of no difference in means is rejected at beyond the .001 level. Test performance on aptitude $ is a real source of differentiation between the Accounting majors and the Industrial Arts majors in this sample.

A $ value of 3.34 was obtained for the differences in the means of aptitude $ when the Accounting major field was compared with the Marketing major field. The hypothesis of no difference in means is rejected at better than the .001 level. Test performance on aptitude $ is a real source of variation between the Accounting major field and the Marketing major field in this sample.

The means of aptitude $ differed significantly when the Business Education majors were compared with the Elementary Education majors and the Industrial Arts majors. A $ value of 4.92 was obtained for the difference between the Business Education major field and the Elementary Education major field which is significant at beyond the .001 level. The hypothesis of no difference in means is rejected and test performance on aptitude $ is a real variation between these two fields. This variation favors the Business Education major field.
A $t$ value of 4.28 was obtained for the difference in means of aptitude $N$ for the comparison of the Business Education majors with the Industrial Arts majors. The hypothesis of no difference in means is rejected at beyond the .001 level. It may be concluded with high confidence that test performance on aptitude $N$ is a real source of differentiation between these two fields. This variation favored the Business Education major field.

The mean of aptitude $N$ for the Business Education majors did not differ significantly from the mean of aptitude $N$ for the Marketing majors. Test performance on aptitude $N$ is not a real source of differentiation between these two fields.

A comparison of the means of aptitude $N$ for the Elementary Education major field with the means of aptitude $N$ for the Industrial Arts major field and the Marketing major field revealed no significant differences. These scores were drawn from a common normal population of scores. Test performance on aptitude $N$ is not a real source of variation between the Elementary Education majors and these two major fields.

A comparison of the means of aptitude $N$ between the Marketing major field and the Industrial Arts major field revealed a $t$ value of 3.71. The hypothesis of no difference in means is rejected at beyond the .001 level. Test
performance on aptitude N is a real source of variation between these two major fields. This variation favored the Marketing major field.

In Sample 2 the means of aptitude S were significantly different only in the comparisons involving the Industrial Arts majors. A \( t \) value of 2.74 was obtained for the difference in the means of aptitude S in a comparison of the means of the Industrial Arts major field and the Accounting major field. The hypothesis of no difference in means is rejected at beyond the 1 per cent level. Test performance on aptitude S is a real source of variation between these two fields in this sample. This variation favored the Industrial Arts majors.

A \( t \) value of 4.82 was obtained for the difference in means of aptitude S in a comparison of the Industrial Arts major field with the Business Education major field. The null hypothesis is rejected at greater than the .001 level. Test performance on aptitude S may be considered as a real source of variation between these two fields. This variation is in favor of the Industrial Arts major field.

A \( t \) value of 5.89 which is significant at greater than the .001 level was obtained for the comparison of the Industrial Arts majors and the Elementary Education majors on aptitude S. The null hypothesis is rejected and test performance on aptitude S is a real source of variation
between these two fields. This variation favored the Industrial Arts majors.

A comparison of the means of aptitude S for the Industrial Arts major field and the Marketing major field revealed a t value of 3.96. The hypothesis of no difference in means is rejected at beyond the .001 level. These scores were not drawn from a common normal population of scores. Test performance on aptitude S can differentiate between these two major fields in this sample. This variation is in favor of the Industrial Arts majors.

In Sample 2 no significant differences were obtained in the means of aptitude P in a comparison of any two of the major fields. These aptitude scores were drawn from a common normal population of aptitude scores. Test performance on aptitude P is not a real source of differentiation between any two of the major fields of study in this sample.

In Sample 2 a t value of 5.42 was obtained for the difference in means of aptitude Q in comparing the Accounting major field and the Industrial Arts major field. The hypothesis of no difference in means is rejected at greater than the .001 level. These aptitude scores were not drawn from the same population of aptitude scores. Test performance on aptitude Q is a real source of variation between these two major fields. This variation favors the Accounting major field.
No significant $t$ values were obtained in a comparison of the Accounting majors with the Elementary Education majors and the Marketing majors. Test performance on aptitude $Q$ is not a real source of variation between the Accounting majors and these two major fields in this sample.

A $t$ value of 3.39 was obtained for the difference in means of aptitude $Q$ in a comparison of the Business Education majors with the Accounting majors. The null hypothesis is rejected at beyond the .001 level. These scores were not drawn from a common normal population of aptitude scores. Test performance on aptitude $Q$ is a real source of variation between the Business Education majors and the Accounting majors in this sample. This variation favors the Business Education majors.

A $t$ value of 9.92 was obtained for the difference in means of aptitude $Q$ in a comparison of the Business Education majors and the Industrial Arts majors. The hypothesis of no difference in means is rejected at beyond the .001 level. These aptitude scores were not drawn from the same population of aptitude scores. Test performance on aptitude $Q$ is a real source of variation between these two major fields. This variation favors the Business Education majors.

A $t$ value of 4.07 was obtained for the difference in means of aptitude $Q$ in a comparison of the Business
Education major field and the Marketing major field. The
null hypothesis is rejected at greater than the .001 level.
These aptitude scores were not drawn from the same popula-
tion of aptitude scores. Test performance on aptitude Q is
a real source of variation between these two major fields.
This variation favors the Business Education major field.

No significant t value was evident for the difference
in means of aptitude Q in a comparison of the Business Edu-
cation major field and the Elementary Education major field.
Test performance on aptitude Q is not a real source of dif-
ferentiation between these two major fields.

A t value of 6.22 was obtained for the difference in
means of aptitude Q in a comparison of the Elementary Educa-
tion majors and the Industrial Arts majors. The hypothesis
of no difference in means is rejected at greater than the
.001 level. These aptitude scores were not drawn from the
same population of aptitude scores. It may be concluded
with high confidence that test performance on aptitude Q
is a real source of variation between the Elementary Educa-
tion majors and the Industrial Arts majors in this sample.
This variation favors the Elementary Education majors.

No significant difference in the means of aptitude Q
was evident in a comparison of the Elementary Education
major field and the Marketing major field. These aptitude
scores were drawn from the same population of aptitude
scores. Test performance on aptitude Q is not a real source of differentiation between these two major fields.

A t value of 4.74 was obtained for the difference in means of aptitude Q in a comparison of the Marketing major field with the Industrial Arts major field. The hypothesis of no difference in means is rejected at beyond the .001 level. Test performance on aptitude Q is a real source of variation between these two fields. This variation is in favor of the Marketing major field.

| Test of Significance of Difference Between Sample 1 and Sample 2 Means of Aptitudes |

The t test was used to determine the significance of the difference between Sample 1 and Sample 2 means of aptitudes. Each major field in Sample 1 was compared with the identical major field in Sample 2. If differences in the means of aptitudes were not significant one would be justified in combining these data for further statistical analyses.

No significant difference was obtained for the means of the aptitudes between Sample 1 and Sample 2 of the Accounting majors. The null hypothesis is tenable and these aptitude scores were drawn from the same population of aptitude scores. Test performance on all aptitudes is not a real source of variation between two Accounting samples in this study.
A $t$ value of 2.208 was obtained for aptitude C in Sample 1 and Sample 2 means of the Business Education major field. This value is significant at better than the 5 per cent level and the hypothesis of no difference is rejected. Test performance on aptitude C is a real source of variation between Business Education majors in Sample 1 and Sample 2 in this study.

A comparison of the Business Education majors in Sample 1 and Sample 2 revealed a $t$ value of 2.158 for the means on aptitude S. The null hypothesis is rejected at greater than the 5 per cent level. Test performance on aptitude S is a real source of variation between Sample 1 and Sample 2 Business Education majors in this research.

No significant differences were evident between aptitude means in Sample 1 and Sample 2 for the Elementary Education major field on all aptitudes. These aptitude scores were drawn from the same population of aptitude scores. Test performance on all aptitudes is not a real source of variation between Elementary Education majors in this study.

No significant differences were obtained on aptitude means in Sample 1 and Sample 2 for the Industrial Arts major field. The hypothesis of no difference in the means of the aptitudes is tenable. Test performance on all the
aptitudes is not a real source of variation between the Industrial Arts majors in Sample 1 and Sample 2.

A significant t value of 5.891 was obtained for aptitude N in Sample 1 and Sample 2 for the Marketing majors. The null hypothesis is rejected at better than the .001 level. It may be concluded with high confidence that the aptitude scores did not come from the same population of aptitude scores and test performance on aptitude N is a real source of variation between Sample 1 and Sample 2 of the Marketing major field.

Standard Deviations

Data reported for standard deviations relative to major-course grade point averages indicate the smallest SD for the Elementary Education majors in Sample 1 (SD = .379). The largest SD is attributed to the Business Education major field in Sample (SD = .472). In Sample 2 the Accounting major field has the largest spread with an SD of .450 while the Industrial Arts major field has the least spread with an SD of .380.

Data relative to the standard deviations of the all-course grade point averages indicate the largest SD for the Business Education majors in Sample 1 (SD = .472). The smallest SD in Sample 1 is reported for the Marketing major field (SD = .230). In Sample 2 the sigmas range from a high
of .488 for the Accounting majors to a low of .288 for the Industrial Arts majors.

A summary of the standard deviations for all aptitudes for all major fields of study in Sample 1 is presented in Table XXXI.

**TABLE XXXI**

**SUMMARY OF STANDARD DEVIATIONS FOR ALL APTITUDES FOR ALL MAJOR FIELDS IN S-1**

<table>
<thead>
<tr>
<th>Major Fields</th>
<th>Aptitudes</th>
<th>G</th>
<th>V</th>
<th>N</th>
<th>S</th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td></td>
<td>14.0</td>
<td>13.3</td>
<td>11.6</td>
<td>19.4</td>
<td>17.1</td>
<td>16.0</td>
</tr>
<tr>
<td>Business Education</td>
<td></td>
<td>13.0</td>
<td>11.3</td>
<td>13.4</td>
<td>16.6</td>
<td>16.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Elementary Education</td>
<td></td>
<td>14.7</td>
<td>11.5</td>
<td>15.9</td>
<td>17.4</td>
<td>18.2</td>
<td>13.9</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td></td>
<td>13.4</td>
<td>13.5</td>
<td>13.0</td>
<td>14.7</td>
<td>20.8</td>
<td>15.6</td>
</tr>
<tr>
<td>Marketing</td>
<td></td>
<td>15.6</td>
<td>12.8</td>
<td>12.8</td>
<td>18.2</td>
<td>15.2</td>
<td>12.8</td>
</tr>
</tbody>
</table>

If one wishes to judge whether two or more groups yield a difference in variability which is large enough to warrant concluding that the population variabilities differ, the null hypothesis is set up that no difference exists in the population variances. A visual comparison of distributions may be sufficient to detect heterogeneity but statistical methods
may be used to test the hypothesis that the variances of the parent sub-populations are the same. Bartlett's test of homogeneity of variance was used to test the significance of the differences in standard deviations among the major fields of study. No significant differences were obtained in Sample 1. These aptitude scores were drawn from populations whose variances were the same.

A summary of the standard deviations for all aptitudes for all major fields in Sample 2 is presented in Table XXXII.

<table>
<thead>
<tr>
<th>Major Fields</th>
<th>Aptitudes</th>
<th>C</th>
<th>V</th>
<th>N</th>
<th>S</th>
<th>F</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td></td>
<td>15.5</td>
<td>18.0</td>
<td>10.8</td>
<td>15.4</td>
<td>25.0</td>
<td>14.1</td>
</tr>
<tr>
<td>Business Education</td>
<td></td>
<td>13.0</td>
<td>14.4</td>
<td>10.8</td>
<td>15.5</td>
<td>19.0</td>
<td>15.9</td>
</tr>
<tr>
<td>Elementary Education</td>
<td></td>
<td>14.2</td>
<td>16.6</td>
<td>14.3</td>
<td>14.8</td>
<td>17.3</td>
<td>14.3</td>
</tr>
<tr>
<td>Industrial Arts</td>
<td></td>
<td>13.0</td>
<td>13.0</td>
<td>15.0</td>
<td>15.8</td>
<td>14.0</td>
<td>11.2</td>
</tr>
<tr>
<td>Marketing</td>
<td></td>
<td>11.8</td>
<td>14.1</td>
<td>10.1</td>
<td>16.2</td>
<td>17.5</td>
<td>13.6</td>
</tr>
</tbody>
</table>

The homogeneity test revealed a chi square value of 12.21 for aptitude N in Sample 2 which is significant at
better than the 2 per cent level. The null hypothesis is rejected and these aptitude scores were not drawn from populations whose variances were the same.

A chi square value of 16.33 was obtained for aptitude P in Sample 2. The hypothesis of no difference in standard deviations is rejected at greater than the 1 per cent level. These aptitude scores were not drawn from populations whose variances were the same. The remainder of the standard deviations in Sample 2 did not indicate heterogeneity.

Coefficients of Correlation

Coefficients of correlation between aptitudes and major-grade point averages were calculated for Sample 1. Data for the Accounting major field indicate significant correlations for aptitude V \( (r = .349) \) and aptitude Q \( (r = .322) \). The hypothesis of no correlation between these aptitudes and major-course grade point average is rejected at greater than the .05 level.

Significant correlations were obtained in the Business Education major field between aptitudes and major-course grade point averages for aptitude G \( (r = .340) \) and aptitude S \( (r = .322) \). The hypothesis of no relationship between these aptitudes and major-course grade point average is rejected at greater than the .05 level.

Significant correlations were obtained in the Elementary Education major field between aptitudes and major-course
grade point averages for aptitude G ($r = .319$) and aptitude N ($r = .343$). These values are significantly different from zero at greater than the 5 per cent level. The hypothesis of no relationship between these aptitudes and major-course grade point average is rejected in this sample.

Data for the Marketing major field indicate significant correlations for aptitude G ($r = .348$), aptitude V ($r = .406$), and aptitude N ($r = .455$). The correlation between aptitude G and major-course grade point average is significantly different from zero at better than the .05 level. The correlation between aptitude V and major-course grade point average is significant at greater than the .01 level. The correlation for aptitude N is significantly different from zero at better than the 1 per cent level. The hypothesis of no relationship between these aptitudes and major-course grade point average is rejected in this sample.

Coefficients of correlation were calculated between aptitudes and major-course grade point averages in Sample 2. A significant correlation was obtained in the Accounting field for aptitude G ($r = .503$), aptitude V ($r = .372$) and aptitude N ($r = .538$). The correlation for aptitude G and aptitude N is significant at the .001 level. The correlation for aptitude V is significantly different from zero at better than the 1 per cent level. The hypothesis of no
relationship between these aptitude and major-course grade point average is rejected in this sample.

A significant correlation was obtained in the Elementary Education major field for aptitude G ($r = .539$), aptitude V ($r = .610$), and aptitude N ($r = .571$). These three correlations are significantly different from zero at the .001 level and the hypothesis of no relationship between these aptitudes and major-course grade point average is rejected for this sample.

Data revealed significant correlations between major-course grade point average and aptitude G ($r = .324$) and aptitude N ($r = .342$) for the Industrial Arts major field. The hypothesis of no relationship was rejected at better than the 5 per cent level for this sample.

A significant correlation was obtained in the Marketing major field for aptitude G ($r = .391$), aptitude N ($r = .417$), and aptitude A ($r = .380$). These three values were significantly different from zero at better than the 1 per cent level. The hypothesis of no correlation is rejected for these aptitudes and major-course grade point average in this sample.

A significant correlation was obtained in the Business Education major field for aptitude G ($r = .539$), aptitude V ($r = .577$) and aptitude N ($r = .401$). The correlations for aptitude G and aptitude V are significantly different
from zero at the .001 level. The correlation for aptitude \( W \) is significant at better than the .01 level. The hypothesis of no relationship between these aptitudes and major-course grade point average is rejected for this sample.

Coefficients of correlation between aptitudes and all-course grade point averages were calculated for Sample 1. A significant correlation was obtained between aptitude \( Q \) and all-course grade point average for the Accounting major field. The coefficient of correlation of .381 was significantly different from zero at the .01 level. The hypothesis of no relationship between this aptitude and all-course grade point average is rejected in this sample.

Data for the Business Education major field reveal a significant correlation between aptitude \( G \) and all-course grade point average of .340. This value is significantly different from zero at greater than the 5 per cent level. The hypothesis of no correlation between this aptitude and the all-course grade point average is rejected in this sample.

No significant correlations are reported between aptitudes and all-course grade point average in the Elementary Education major field in Sample 1.

A significant correlation between aptitude \( V \) and all-course grade point average \( (r = .346) \) for the Industrial Arts major field is reported. The hypothesis of no correlation is rejected at greater than the .05 level.
A significant correlation was obtained in the Marketing major field for aptitude G ($r = .560$), aptitude $V$ ($r = .402$), and aptitude $N$ ($r = .509$). The correlations for aptitude $G$ and aptitude $N$ were significantly different from zero at the .001 level. The correlation for aptitude $V$ is significant at greater than the 1 per cent level. The hypothesis of no correlation between these three aptitudes and all-course grade point average is rejected in this sample.

Coefficients of correlation were computed between aptitudes and all-course grade point averages in Sample 2. Data reveal significant correlations in the Accounting major field between all-course grade point average and aptitude $G$ ($r = .486$) and aptitude $V$ ($r = .415$). The correlation between aptitude $G$ and all-course grade point average is significantly different from zero at the .001 level. The correlation between aptitude $V$ and all-course grade point average is significant at greater than the .01 level. The hypothesis of no correlation between these aptitudes and all-course grade point average is rejected in this sample.

Significant correlations were obtained in the Business Education major field for aptitude $G$ ($r = .520$), aptitude $V$ ($r = .492$), and aptitude $N$ ($r = .429$). Correlations for aptitude $G$ and $V$ were significant at the .001 level. Correlation between aptitude $N$ and all-course grade point average is significantly different from zero at the 1 per cent level.
The hypothesis of no relationships between these aptitudes and all-course grade point average is rejected for this sample.

A significant correlation was obtained for aptitude G ($r = .357$), aptitude V ($r = .408$) and aptitude N ($r = .465$). The correlation for aptitude G is significantly different from zero at greater than the 5 per cent level. The correlations for aptitude V and aptitude N are significant at greater than the 1 per cent level. The hypothesis of no correlation between these aptitudes and all-course grade point average is rejected for this sample.

Data for Industrial Arts major field indicate significant correlations for aptitude G ($r = .370$) and aptitude N ($r = .348$). These correlations are significant at the .01 level. The hypothesis of no relationship between these aptitudes and all-course grade point average is rejected in this sample.

The Marketing major field data indicate a significant correlation ($r = .357$) between aptitude G and all-course grade point average. The hypothesis of no relationship between aptitude G and all-course grade point average is rejected at greater than the 5 per cent level.

These correlations tend to be depressed since the data were gathered from samples which included only those college students who were successful in completing a required course of study leading to a degree. In comparing the results
of the relationship between aptitudes and grades obtained in this study with related studies it may be concluded that these results are similar to others reported in literature. Aptitude G, aptitude V and aptitude N tend to have a positive relationship with grades in college.

Significance of Difference Between Correlations from Sample to Sample

Critical ratios were computed to determine if significant differences existed in the correlations from Sample 1 to Sample 2.

A comparison of the Accounting major field in Sample 1 and Sample 2 indicated a critical ratio of 1.90 which approaches significance at the .05 level for the correlations between aptitude G and major-course grade point averages. The hypothesis of no difference in correlations from sample to sample is rejected. These two samples did not come from equally correlated populations.

A comparison of the Accounting major field in Sample 1 and Sample 2 indicated a critical ratio of 2.10 for the correlations between aptitude N and major-course grade point average. The hypothesis of no difference between correlations is rejected at greater than the .05 level. These two samples were not drawn from populations whose correlations were equal.
The remaining correlations between aptitudes and major-course grade point averages were not significantly different from sample to sample for the Accounting major field of study.

A critical ratio of 1.98 was obtained for the correlations between aptitude V and major-course grade point average from sample to sample of the Business Education major field. The hypothesis of no difference in correlations from sample to sample is rejected at better than the 5 per cent level. The remainder of the correlations did not differ significantly from sample to sample for the Business Education major field of study.

Coefficients of correlation between aptitudes and major-course grade point averages were not significantly different from sample to sample for the Elementary Education major field of study. The hypothesis of no difference is tenable.

Coefficients of correlation between aptitudes and major-course grade point averages were not significantly different from sample to sample for the Industrial Arts and Marketing major fields of study. The hypothesis of no difference in correlations is tenable. These correlations came from an equally correlated population.

Critical ratios for correlations between aptitudes and all-course grade point averages were not significant from sample to sample for the Accounting major field, the
Elementary Education major field, the Business Education major field and the Marketing major field. The hypothesis of no difference in correlations from sample to sample is tenable.

A critical ratio of 2.59 was obtained for the correlations of aptitude C and all-course grade point averages for the Industrial Arts major field which is significant at greater than the .01 level. The hypothesis of no difference in correlations from sample to sample is rejected. These samples did not come from equally correlated populations.

Significance of Correlations Within Each Sample

A chi square technique was used to test the significance of the difference among the correlations within each sample.

No significant chi square values were obtained for the correlations between aptitudes and major-course grade point averages in Sample 1. The hypothesis of no difference in correlations is tenable. These correlations may be regarded as coming from equally correlated populations.

A significant chi square value of 10.748 was obtained for the correlations between aptitude V and major-course grade point average in Sample 2. This value is significant at better than the .05 level. The hypothesis of no difference in correlations is rejected. These correlations did not come from equally correlated populations.
The remainder of the correlations between aptitudes and major-course grade point averages in Sample 2 were not significantly different. The hypothesis of no difference in correlations is tenable. These correlations may be regarded as coming from equally correlated populations.

A chi square value of 14.050 was obtained for the correlations between aptitude V and all-course grade point average in Sample 1. The hypothesis of no difference in correlations is rejected at greater than the 1 per cent level. These correlations did not come from equally correlated populations.

The remainder of the correlations between aptitudes and all-course grade point averages in Sample 1 were not significantly different. These correlations may be regarded as coming from equally correlated populations.

No significant chi square values were obtained for the correlations between aptitudes and all-course grade point averages in Sample 2. These correlations may be regarded as coming from equally correlated populations.

Critical Aptitude Scores

The data reveal a small number of significant differences between standard deviations for aptitudes in this study which may be interpreted as a consistency within the samples. This small number of significantly different standard deviations
and the large number of significantly different aptitude means tend to warrant the establishment of aptitude critical scores.

Aptitude critical scores based on the use of 1 sigma below the mean as a cut-off point for all aptitudes is presented in Table XXXIII.

**TABLE XXXIII**

CRITICAL APPTITUDE SCORES FOR ALL MAJOR FIELDS IN S-1

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Accounting</th>
<th>Business Education</th>
<th>Elementary Education</th>
<th>Industrial Arts</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>116.0</td>
<td>106.0</td>
<td>101.3</td>
<td>105.6</td>
<td>108.4</td>
</tr>
<tr>
<td>V</td>
<td>101.7</td>
<td>98.7</td>
<td>101.5</td>
<td>91.5</td>
<td>96.2</td>
</tr>
<tr>
<td>H</td>
<td>122.4</td>
<td>110.6</td>
<td>93.1</td>
<td>99.0</td>
<td>96.2</td>
</tr>
<tr>
<td>S</td>
<td>101.6</td>
<td>93.4</td>
<td>100.6</td>
<td>116.3</td>
<td>102.8</td>
</tr>
<tr>
<td>P</td>
<td>103.9</td>
<td>105.0</td>
<td>104.8</td>
<td>99.2</td>
<td>86.4</td>
</tr>
<tr>
<td>C</td>
<td>98.0</td>
<td>103.0</td>
<td>106.1</td>
<td>86.4</td>
<td>94.2</td>
</tr>
</tbody>
</table>

Critical aptitude scores for all major fields in Sample 3 based on the use of one sigma below the mean as a cut-off point are presented in Table XXXIV.
TABLE XXXIV

CRITICAL APTITUDE SCORES FOR ALL MAJOR
FIELDS IN 6-2

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Accounting</th>
<th>Business Education</th>
<th>Elementary Education</th>
<th>Industrial Arts</th>
<th>Marketing</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>117.2</td>
<td>112.0</td>
<td>99.8</td>
<td>108.6</td>
<td>111.2</td>
</tr>
<tr>
<td>V</td>
<td>97.0</td>
<td>99.6</td>
<td>93.4</td>
<td>91.0</td>
<td>96.9</td>
</tr>
<tr>
<td>N</td>
<td>125.2</td>
<td>114.2</td>
<td>97.7</td>
<td>99.0</td>
<td>113.9</td>
</tr>
<tr>
<td>S</td>
<td>107.6</td>
<td>101.5</td>
<td>98.2</td>
<td>116.2</td>
<td>102.8</td>
</tr>
<tr>
<td>P</td>
<td>93.0</td>
<td>105.0</td>
<td>104.7</td>
<td>99.0</td>
<td>102.5</td>
</tr>
<tr>
<td>Q</td>
<td>98.9</td>
<td>107.1</td>
<td>100.7</td>
<td>85.8</td>
<td>97.4</td>
</tr>
</tbody>
</table>

Critical Aptitude scores for Grade Point Average Intervals

Critical aptitude scores for grade point average intervals were established for all major fields. This method of obtaining critical scores follows the example set by the United States Employment Service for the establishment of cut-off scores for vocational selection. Intervals were based on a grade point average of 1.0 to 1.9 (C- to C+) and 2.0 to 3.0 (B- to A). The critical aptitude score represents a point above which are contained 85 per cent of the samples. Lowest scores for each aptitude are also indicated. Data for the two samples were combined for the critical
scores of both major-course and all-course grade point average intervals with the exception of aptitudes G and 5 for the Business Education majors and aptitude Q for the Marketing majors. Means for these three aptitudes were found to be significantly different between samples when the t test was applied. Table XXXV presents the critical aptitude scores for aptitudes 5, V and 7 and the low scores for the major-course and all-course grade point average interval of 3.0 to 2.0 based on using 85 per cent as a cut-off point. The low score represents the lowest aptitude figure made by an individual in this grade point average interval for all major fields.

TABLE XXXV

CRITICAL APTITUDE SCORES AND LOW SCORES FOR MAJOR-COURSE AND ALL-COURSE GRADE POINT AVERAGE INTERVAL OF 2.0—3.0 BASED ON USING 85 PER CENT AS A CUT-OFF POINT t

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Course Average</th>
<th>All-Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>85%</td>
<td>Low</td>
</tr>
<tr>
<td>Acct.</td>
<td>122</td>
<td>102</td>
</tr>
<tr>
<td>3.Ed.</td>
<td>110</td>
<td>97</td>
</tr>
<tr>
<td>(3-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.Ed.</td>
<td>125</td>
<td>117</td>
</tr>
<tr>
<td>(3-2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>El.Ed.</td>
<td>102</td>
<td>82</td>
</tr>
<tr>
<td>L. A.</td>
<td>109</td>
<td>97</td>
</tr>
<tr>
<td>Arkt.</td>
<td>115</td>
<td>107</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table XXV—Continued

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Field</th>
<th>Critical Scores and Low Scores</th>
<th>Major-Course Average</th>
<th>All-Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>85%</td>
<td>Low</td>
</tr>
<tr>
<td>V</td>
<td>Acct.</td>
<td>107</td>
<td>92</td>
<td>110</td>
</tr>
<tr>
<td>V</td>
<td>B.Ed.</td>
<td>107</td>
<td>92</td>
<td>107</td>
</tr>
<tr>
<td>V</td>
<td>El.Ed.</td>
<td>102</td>
<td>97</td>
<td>115</td>
</tr>
<tr>
<td>V</td>
<td>I. A.</td>
<td>92</td>
<td>82</td>
<td>127</td>
</tr>
<tr>
<td>V</td>
<td>Mrkt.</td>
<td>105</td>
<td>92</td>
<td>95</td>
</tr>
<tr>
<td>N</td>
<td>Acct.</td>
<td>122</td>
<td>112</td>
<td>130</td>
</tr>
<tr>
<td>N</td>
<td>B.Ed.</td>
<td>110</td>
<td>102</td>
<td>155</td>
</tr>
<tr>
<td>N</td>
<td>El.Ed.</td>
<td>102</td>
<td>92</td>
<td>95</td>
</tr>
<tr>
<td>N</td>
<td>I. A.</td>
<td>105</td>
<td>87</td>
<td>115</td>
</tr>
<tr>
<td>N</td>
<td>Mrkt.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>(S-1&lt;sup&gt;b&lt;/sup&gt;)</td>
<td>120</td>
<td>117</td>
<td>130</td>
</tr>
<tr>
<td>N</td>
<td>(S-2)</td>
<td>110</td>
<td>107</td>
<td>110</td>
</tr>
</tbody>
</table>

The critical aptitude score represents a figure above which are contained 85 per cent of the individuals who made grade point averages in this category.

These major field abbreviations represent Accounting, Business Education, Elementary Education, Industrial Arts and Marketing.

Means for S-1 and S-2 of the Business Education major field were significantly different and these data were treated separately.

Means for S-1 and S-2 of the Marketing major field were significantly different and these data were treated separately.

Table XXXVI presents the critical aptitude scores for aptitudes S, P and Q and the low scores for the major-course and all-course grade point average interval of 2.0—3.0 based on using 85 per cent as a cut-off point. The low score represents the lowest aptitude figure made by an individual.
in this grade point average interval for each of the major fields.

**TABLE XXXVI**

CRITICAL APTITUDE SCORES AND LOW SCORES FOR MAJOR-COURSE AND ALL-COURSE GRADE POINT AVERAGE INTERVAL OF 2.0--3.0 BASED ON USING 85 PER CENT AS A CUT-OFF POINT

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Field</th>
<th>Critical Scores and Low Scores</th>
<th>Major-Course Average</th>
<th>All-Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Acct.</td>
<td>107</td>
<td>97</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>B. Ed.</td>
<td>97</td>
<td>97</td>
<td>85%</td>
</tr>
<tr>
<td></td>
<td>(S-1)*</td>
<td>95</td>
<td>82</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>B. Ed.</td>
<td>110</td>
<td>92</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>(S-2)</td>
<td>97</td>
<td>92</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>El. Ed.</td>
<td>112</td>
<td>92</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td>110</td>
<td>92</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>Mrkt.</td>
<td>97</td>
<td>82</td>
<td>110</td>
</tr>
</tbody>
</table>

| P        | Acct.       | 97                             | 84                   | 100                |
|          | B. Ed.      | 105                            | 97                   | 107                |
|          | El. Ed.     | 105                            | 92                   | 112                |
|          | I. A.       | 97                             | 92                   | 112                |
|          | Mrkt.       | 105                            | 92                   | 120                |

| Q        | Acct.       | 97                             | 87                   | 102                |
|          | B. Ed.      | 107                            | 97                   | 107                |
|          | El. Ed.     | 102                            | 92                   | 105                |
|          | I. A.       | 92                             | 82                   | 117                |
|          | Mrkt.       | 105                            | 97                   | 97                 |

*The critical aptitude score represents a figure above which are contained 85 per cent of the individuals who made grade point averages in this category.

b. These major field abbreviations indicate Accounting, Business Education, Elementary Education, Industrial Arts and Marketing.

c. Means for S-1 and S-2 of the Business Education major field were significantly different and these data were treated separately.
Table XXXVII presents the critical aptitude scores for aptitudes G, V and N and the low scores for the major-course and all-course grade point average interval of 1.0 to 1.9 based on using 85 per cent as a cut-off point. The low score represents the lowest aptitude figure made by an individual in this grade point average interval for each major field.

**TABLE XXXVII**

**CRITICAL APITUDE SCORES AND LOW SCORES FOR MAJOR-COURSE AND ALL-COURSE GRADE POINT AVERAGE INTERVAL OF 1.0--1.9 BASED ON USING 85 PER CENT AS A CUT-OFF POINT**

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Field</th>
<th>Critical Scores and Low Scores</th>
<th>Major-Course Average</th>
<th>All-Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Acct.</td>
<td>112</td>
<td>102</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>100</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>(5-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>107</td>
<td>102</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>(5-2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td>97</td>
<td>92</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td>102</td>
<td>92</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>Arkt.</td>
<td>107</td>
<td>97</td>
<td>107</td>
</tr>
<tr>
<td></td>
<td>Acct.</td>
<td>92</td>
<td>97</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>97</td>
<td>87</td>
<td>107</td>
</tr>
<tr>
<td></td>
<td>(5-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>92</td>
<td>82</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>(5-2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td>92</td>
<td>82</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td>102</td>
<td>82</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>Arkt.</td>
<td>122</td>
<td>87</td>
<td>122</td>
</tr>
<tr>
<td></td>
<td>Acct.</td>
<td>110</td>
<td>87</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>92</td>
<td>82</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>(5-1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>107</td>
<td>92</td>
<td>107</td>
</tr>
<tr>
<td></td>
<td>(5-2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td>97</td>
<td>92</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td>110</td>
<td>97</td>
<td>110</td>
</tr>
</tbody>
</table>
The aptitude critical score represents a point above which are contained 85 per cent of the individuals who made grade point averages in this category.

These major field abbreviations represent Accounting, Business Education, Elementary Education, Industrial arts, and Marketing.

Means for S-1 and S-2 of Business Education were significantly different and these data were treated separately.

Means for S-1 and S-2 of Marketing majors were significantly different and these data were treated separately.

Table XXXVIII presents the critical aptitude scores of aptitude S, P and Q and the low scores for the major-course and all-course grade point average interval of 1.0 to 1.9 based on using 85 per cent as a cut-off point. The low score represents the lowest aptitude figure made by an individual in this grade point average interval for each major field.

### TABLE XXXVIII

<table>
<thead>
<tr>
<th>Major Course Average</th>
<th>All-Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>35%</td>
<td>Low</td>
</tr>
<tr>
<td>Acct.</td>
<td>102</td>
</tr>
<tr>
<td>B.Ed. (S-1)</td>
<td>90</td>
</tr>
<tr>
<td>B.Ed. (S-2)</td>
<td>97</td>
</tr>
<tr>
<td>El.Ed.</td>
<td>95</td>
</tr>
<tr>
<td>I. A.</td>
<td>112</td>
</tr>
<tr>
<td>Erkt.</td>
<td>97</td>
</tr>
</tbody>
</table>
TABLE XXXVIII--Continued

<table>
<thead>
<tr>
<th>Aptitude</th>
<th>Major Field</th>
<th>Critical Scores and Low Scores</th>
<th>Major-Course Average</th>
<th>All-Course Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>35%</td>
<td>Low</td>
</tr>
<tr>
<td>P</td>
<td>Acct.</td>
<td>100</td>
<td>89</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>102</td>
<td>84</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td>105</td>
<td>92</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td>100</td>
<td>87</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>Arkt.</td>
<td>102</td>
<td>92</td>
<td>102</td>
</tr>
<tr>
<td>Q</td>
<td>Acct.</td>
<td>97</td>
<td>87</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>B.Ed.</td>
<td>100</td>
<td>82</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>El.Ed.</td>
<td>102</td>
<td>92</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>I. A.</td>
<td>87</td>
<td>82</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Arkt.</td>
<td>97</td>
<td>82</td>
<td>97</td>
</tr>
</tbody>
</table>

aThe aptitude critical score represents a figure above which are contained 85 per cent of the individuals who made grade point averages in this category.

bThese major field abbreviations indicate Accounting, Business Education, Elementary Education, Industrial Arts and Marketing.

cMeans for S-1 and S-2 of the Business Education major field differed significantly and these data were treated separately.

Summary

The purpose of this chapter was to interpret the relationship between aptitudes and major fields of study as revealed through the application of statistical techniques to the data.

The analysis of variance technique indicated significant differences among the means of aptitudes in Sample 1. With but one exception (aptitude P) these means of aptitudes
differed significantly among the major fields of study. In Sample 2 the means of aptitudes were all significantly different among the major fields of study. Test performance on these aptitudes does differentiate among the major fields of study.

The $t$ test of significance of difference between any two means of aptitudes revealed significant $t$ values in both samples. Only those comparisons which were found to be significantly different in both samples are reported. Thus if the difference in means in Sample 1 is significant then the difference will also be significant in Sample 2. Only the $t$ values will differ from sample to sample and a presentation of the differences in Sample 1 should enable one to assume like differences in Sample 2.

For aptitude G the Accounting major field mean differed significantly from the means of all other fields. These values favored the Accounting major field. Test performance on aptitude G does differentiate between the Accounting major field and the remaining major fields.

For aptitude G the Marketing major field mean differed significantly from that of the Elementary Education major field. This difference favored the Marketing major field. Test performance on aptitude G does differentiate between these two major fields.

The remaining comparisons of means of aptitude G were not significant.
For aptitude V the Accounting major field mean differed significantly from the mean of the Industrial Arts major field. Test performance does differentiate between these two major fields of study. This difference is in favor of the Accounting major field.

For aptitude V the Business Education major field mean differed significantly from the mean of the Industrial Arts major field. The $t$ value favored the Business Education major field. Test performance on aptitude V does differentiate these two fields.

For aptitude V in the mean of the Marketing major field there is a significant difference from that of the Industrial Arts major field. The $t$ value favored the Marketing major field. Test performance on aptitude V does differentiate the Marketing majors and the Industrial Arts majors.

The remaining comparisons of the means of any two major fields did not reveal significant $t$ values. Test performance on aptitude V does not differentiate between any two of the remaining major fields.

For aptitude N the mean of the Accounting major field differed significantly from the means of all other major fields. The $t$ values were all in favor of the Accounting major field. Test performance on aptitude N can differentiate between the Accounting major field and all other major fields.
For aptitude N the mean of the Business Education major field differed significantly from the means of the Elementary Education major field and the Industrial Arts major field. These \( t \) values favored the Business Education major field. Test performance on aptitude \( N \) is a source of variation between the Business Education majors and these two majors.

For aptitude \( N \) the mean of the Marketing major field differed significantly from the mean of the Industrial Arts major field. This difference favored the Marketing major field. Test performance on aptitude \( N \) is a source of variation between Marketing majors and Industrial Arts majors.

The remainder of the comparisons of means revealed no significant differences. Test performance on aptitude \( N \) is not a source of variation between any two of the remaining major fields.

For aptitude \( S \) the mean of the Industrial Arts major field differed significantly with the means of all other major fields. These differences favored the Industrial Arts major field. Test performance on aptitude \( S \) is a real source of variation between the Industrial Arts major fields and all other major fields.

The remainder of the comparisons of means of aptitude \( S \) did not indicate significant \( t \) values. Test performance on aptitude \( S \) is not a source of variation between any two of the remaining major fields.
For aptitude P the comparisons of the means did not reveal any significant t values. Test performance on aptitude P is not a real source of variation between any two of the major fields of study.

For aptitude Q the mean of the Accounting major field differed significantly from the mean of the Industrial Arts major field. This variation favored the Accounting major field. Test performance on aptitude Q is a real source of variation between the Accounting majors and the Industrial Arts majors.

For aptitude Q the mean of the Business Education major field differed significantly from the means of the Accounting major field, the Industrial Arts major field and the Marketing major field. These differences all favored the Business Education major field. Test performance on aptitude Q is a real source of variation between the Business Education major field and these three major fields.

For aptitude Q the mean of the Elementary Education major field differed significantly from the mean of the Industrial Arts major field. This variation was in favor of the Elementary Education major field. Test performance on aptitude Q is a real source of differentiation between these two major fields.

For aptitude Q the mean of the Marketing major field differed significantly from the mean of the Industrial Arts
major field. This variation favored the Marketing major field. Test performance on aptitude Q is a real source of differentiation between the Marketing majors and the Industrial Arts majors.

The t technique was used to determine the difference in means of aptitudes comparing the same major field from sample to sample. Significant differences in the Business Education major field from sample to sample were exhibited for aptitudes G and S. These two samples of Business Education majors did not come from a common normal population.

A significant difference between the two samples of Marketing majors on aptitude N was indicated. These two samples did not come from a common normal population. Test performance on aptitude N is a source of differentiation between the two samples of Marketing majors.

The standard deviations were tested for homogeneity in both samples. No significant differences in standard deviations were evident in Sample 1. These subjects came from populations whose variances were equal.

A significant difference was obtained in the standard deviations of aptitudes N and P in Sample 2. These aptitude scores were drawn from a population of aptitude scores with unequal variances.

Correlations are reported for all aptitudes in both samples. Aptitudes were correlated with major-course grade
point average and all-course grade point average. These correlations tend to be depressed because of the homogeneity of the samples but aptitudes $G$, $V$ and $N$ tend to show a high relationship to grade point averages.

Critical ratios were computed to determine if significant differences existed in the correlations comparing the same major field from sample to sample. A significant difference in correlations between aptitude $G$ and major-course grade point average was obtained for the Accounting major field in the two samples. These correlations were not drawn from an equally correlated population.

A comparison of the Accounting majors from sample to sample indicated significant differences in the correlations of aptitude $N$ with major-course grade point averages. These samples did not come from a population whose correlations were equal.

A significant difference in the correlations of aptitude $V$ with major-course grade point average was indicated for the comparison of the two samples of Business Education majors. These correlations were not drawn from a population of equal correlations.

Significant differences in the correlations of aptitudes with major-course grade point averages were restricted to just these three cases.
Only one case of difference in correlations between aptitudes and all-course grade point averages was indicated. The two samples of Industrial Arts majors differed significantly in correlations between aptitude Q and all-course grade point average. These correlations were not drawn from an equally correlated population.

These two samples were checked independently to determine the significance of difference among correlations within each sample. No significant differences were evident in the correlations of aptitudes with major-course grade point averages in Sample 1. The relationship between aptitudes and major-course grade point averages is not different among the major fields in this sample.

A significant difference in the correlations of aptitude V with major-course grade point average was obtained in Sample 2. The relationship between aptitude V and major-course grade point average is different among the major fields in this sample.

The remaining correlations in Sample 2 were not significantly different among the major fields of study.

A significant difference in the correlations of aptitude V with all-course grade point average was obtained in Sample 1. The relationship between aptitude V and all-course grade point average is different among the major fields of study in this sample.
The remainder of the correlations of aptitudes with all-course grade point averages in Sample 1 were not significantly different.

Critical aptitude scores were established for all aptitudes and all major fields. These are presented in tabular form in the chapter. These scores are based on using as a cut-off point one sigma below the mean.

Critical aptitude scores relative to grade point average interval are also presented in tabular form. These scores were determined by using an arbitrary percentage (85 per cent) as a cut-off point for the grade point average intervals of 3.0--2.0 and 1.9--1.0.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to determine the relationship between aptitudes, as measured by the General Aptitude Test Battery, and five major fields of study at North Texas State College, Denton, Texas.

This research was limited to aptitude G (intelligence), aptitude V (verbal aptitude), aptitude N (numerical aptitude), aptitude S (spatial aptitude), aptitude P (form perception) and aptitude Q (clerical perception).

The major fields of study considered in this problem were Accounting, Business Education, Elementary Education, Industrial Arts and Marketing.

The criterion used in this research was the successful completion of a prescribed course of study leading to a bachelor's degree in one of the five major fields of study.

Programs of the graduation ceremonies at North Texas State College for the years 1951 to 1956 inclusive were obtained and these names checked against the student files in the Guidance Office to insure a sufficient sample of GATB results for each of the major fields. After availability of data was assured a sample of 228 subjects was drawn. This
sample was grouped into the five major fields as follows: (1) 42 in Accounting, (2) 50 in Business Education, (3) 44 in Elementary Education, (4) 50 in Industrial Arts and (5) 42 in Marketing.

Grade point averages for this sample were obtained from the Permanent Record files of the Registrar's Office.

Following the application of statistical techniques to the first sample, a second sample of 228 subjects was drawn. The number of subjects in the five major fields of study was the same for both samples. The procedures and statistical techniques used in this study were identical for both samples for purposes of comparison.

The hypotheses of this study are as follows:

1. It is possible to differentiate among the students in the major fields of study through significant differences in aptitude scores.

2. Academic aptitude critical scores for the selection of major fields of study can be established for each of the aptitudes to be considered.

3. There is a significant relationship between aptitude scores and grade point averages and this relationship may differ for the various major fields.

One of the sub-purposes of this research was to determine the effectiveness of the GATB in a college counseling situation. If these aptitudes were different for each of
the major fields then the college counselor would be able to predict more accurately students' chances in the five major fields of study.

The analysis of variance technique was used to determine the significance of differences in the means of the aptitudes for each of the major fields of study. The results of this statistic reveal significant differences among the means of the major fields on all aptitudes with the exception of aptitude P in Sample 1. The means of aptitude P were significantly different among the major fields at beyond the 5 per cent level in Sample 2.

These findings may be interpreted by the college counselor as indications of differences among the major fields in test performance on the GATB. The samples of successful students in this research appear to be differentiated according to their performance on the GATB.

After these means were known to differ significantly among the major fields a method of comparing one mean with another was used. Each major field mean of the aptitudes was compared with all other major fields in order to determine if the means were significantly different. This technique should enable the counselor to determine which aptitudes were particularly relevant to successful students in each of the major fields of study. It is significant to note that in any comparison of two means in this study no
significant differences were evident in the means of aptitude P. This poses the question of the advantage of using this particular aptitude as an indicator of probable success in any of the major fields of study.

One of the aims in using two samples in this study was to avoid the possibility of accepting results which were unique. Would the results obtained for both samples be similar?

With this question in mind the t test was used to determine the significance of the difference between the means of the aptitudes from sample to sample. If these means were not significantly different then one might assume that further sampling would produce similar results. Significant t values were obtained for the means of aptitudes G and S in comparing the Business Education major field in both samples. A comparison of the Marketing major field in Sample 1 and Sample 2 indicated a significant t value for the means of aptitude N. These were the only significant differences obtained in a comparison of Sample 1 and Sample 2 means of aptitudes.

One might then be justified in assuming that the results obtained in this study are not unique. Also, with the exception of the significantly different means of aptitudes it is possible to combine data which are pertinent to aptitudes for further statistical manipulations.
Since it has been established that the means of the aptitudes differ significantly among the major fields, the next logical step is to assay the probabilities of differences in standard deviations of the aptitudes. Bartlett's test of homogeneity of variance was used for that purpose. In Sample 1 no significantly different variances were evident among the major fields of study. In Sample 2 the variances of aptitudes P and Q were significantly different.

These data tend to indicate that the responsibility for difference in aptitudes among the major fields of study rests with the means since the variances are relatively stable. This also tends to validate the establishment of the critical aptitude scores presented in Table XXXI and Table XXXII.

In order to determine the relationship between aptitudes and grades, coefficients of correlation were computed. Aptitudes were correlated with both major-course and all-course grade point averages. If grades and aptitudes are significantly related it would tend to indicate to a college counselor the importance of certain aptitudes to grades in the major fields of study.

Significant relationships were obtained between aptitudes and grade point averages. In general, the aptitudes G, V and N appear to have the most consistent relationship to grade point averages for these major fields of study.
Literature reported in Chapter II on relationships between aptitudes and grades tends to substantiate this observation. However, no apparently consistent pattern of relationships is exhibited by any of the major fields of study. This is borne out by the small number of significant differences in correlations within the samples. These data indicate that relationships are significant for aptitudes and grade point averages but these same relationships do not differ from major to major. Nor, as the data point out, do these correlations differ from sample to sample except in a small number of cases. This small number of significant differences in correlations from sample to sample lends further support to the acceptance of data which are not unique.

One must observe that these correlations tend to be depressed because of the homogeneity of the samples. This observation is offered as justification for the inclusion of Table XXXIII and Table XXXIV relative to critical aptitude scores for grade point average intervals. A small number of these critical scores appear inconsistent in that a higher score is indicated for the lower grade point average interval. The depressed correlations between aptitudes and grades for this homogeneous sample may be cited as an explanation for this discrepancy. The value of establishing critical scores lies in the fact that these data are relative to successful people only and they would have
practical pertinence to counseling situations which included students at random.

Conclusions

The conclusions of this study, based upon an interpretation of the data, are as follows:

1. The GATB can be used to supplement other measuring instruments in a college counseling situation.

2. On the basis of the aptitudes used in this study a differentiation among the major fields of study can be made.

3. Little discrimination among major fields on the basis of aptitudes can be attributed to aptitude P.

4. These data suggest that certain aptitudes are relevant to specific major fields of study.

5. The small number of significant differences in means of aptitudes from sample to sample implies that successive sampling would produce similar results.

6. The few significant differences in standard deviations tend to stress the importance of the differences in the means of aptitudes.

7. In general, there are significant relationships between grades and aptitudes G, V and N for the major fields used in this study.

8. Correlations between grades and aptitudes are depressed because of the homogeneity of the samples.

9. Correlations are not significantly different from
sample to sample except in a few cases. This supports the conclusion regarding the uniqueness of data.

10. Relationships between grades and aptitudes do not differ among the major fields.

11. Since the means of aptitudes differ significantly and the standard deviations of aptitudes do not differ significantly, the establishing of critical aptitude scores is justifiable.

12. In view of the homogeneity of the samples and the suppressed correlations, the critical aptitude scores relative to grade point average intervals can be useful in a college counseling situation.

Recommendations

On the basis of the preceding conclusions the following recommendations are made:

1. Additional studies should be made of the relationship of aptitudes to other major fields of study.

2. A study should be made to determine the effect of maturation and experience on the relationship of aptitudes to major fields of study.

3. A follow-up study should be made to determine the degree of success in occupations effected by these subjects.

4. Research should be made into the possibility of the effect of sex differences on the relationships between aptitudes and major fields of study.
BIBLIOGRAPHY

Books


Articles

Beamer, George C. and Rose, Tom, "The Use of the GATB and the AIA Test in Predicting Success in Courses in Accounting, in the 'Teachers' Clinic'," edited by Frank S. Kaulback, Jr., *Accounting Review*, XXX (July, 1955), 533-535.


-------------


"General Aptitude Test Battery Patterns for College Areas," Occupations, XXIX (April, 1951), 518-526.


Woellner, Robert C., "Interpretation of Test Results in Counseling," School Review, LIX (December, 1951), 515-517.

Unpublished Material


Jex, Frank Bird, "Predicting Scholastic Achievement at the University of Utah," unpublished doctoral dissertation, University of Utah, Salt Lake City, Utah, 1950.


Ralph, Sally, "The Prediction of Success in the College of Pharmacy at the University of Utah," unpublished master's thesis, School of Pharmacy, University of Utah, Salt Lake City, Utah, 1948.

Routt, Samuye Louise, "A Study to Determine the Relationship of the Academic Grades of Students Enrolled in Beginning and Advanced Typing and Shorthand Courses, and in Secretarial Practice in the School of Business Administration at North Texas State College, Denton, Texas," unpublished master's thesis, School of Business Administration, North Texas State College, Denton, Texas, 1951.

**Bulletins**

*Bulletin*, North Texas State College, Denton, Texas, Number 262 (February, 1955), 50.


**Public Documents**
