AN ANALYSIS OF THE RELATIONSHIP OF THE SCORES MADE BY STUDENTS ON APTITUDES "G" AND "V" AND PARTS "H" AND "I" OF THE GENERAL APTITUDE TEST BATTERY AND THE ACADEMIC GRADES MADE IN INDUSTRIAL ARTS

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INTRODUCTION

Statement of the Problem

This was a study to analyze the converted scores made on Aptitudes "G" (intelligence) and "V" (verbal) and the raw scores made on Part "H" (three-dimensional space) and Part "I" of the General Aptitude Test Battery by students enrolled in beginning industrial arts courses, advanced industrial arts courses, and beginning English at North Texas State College, Denton, Texas, and the academic grades made by these same students in order to determine what relationship exists between both the converted scores and raw scores made on the foregoing parts of the GATB[1] and academic grades. The study seeks to answer the following questions:

1. What is the relationship between the converted scores made by students on Aptitude "G" (intelligence) of the GATB and the academic grades made by these same students in beginning industrial arts courses, advanced industrial arts courses, and beginning English?

2. What is the relationship between the raw scores made by students on Part "H" (three-dimensional space) of

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[1]GATB refers to the General Aptitude Test Battery

the GATB and the academic grades made by these same students in beginning industrial arts courses, advanced industrial arts courses, and beginning English?

3. What is the relationship between the raw scores made by students on Part "I" (arithmetic reason) of the GATB and the academic grades made by these same students in beginning industrial arts courses, advanced industrial arts courses, and beginning English?

4. What is the relationship between the converted scores made by students on Aptitude "V" (verbal) of the GATB and the academic grades made by these same students in beginning industrial arts courses, advanced industrial arts courses, and beginning English?

5. Are the coefficients of correlation of the grades made in beginning industrial arts courses, advanced industrial arts courses, beginning English, and the converted scores made on Aptitude "G" (intelligence), and Aptitude "V" (verbal), and the raw scores made on Part "H" (three-dimensional space), and Part "I" (arithmetic reason), of the GATB by these same students significant at the .01, .05, or .10 levels?

6. Is there any significant relationship between the converted scores made on Aptitude "G" (intelligence), and Aptitude "V" (verbal) and the raw scores made on Part "I" (arithmetic reason, and Part "H" (three-dimensional space),

of the GATB by eighty-three students enrolled in beginning drawing versus the scores made by thirty-eight students enrolled in advanced industrial arts courses?

7. Does there appear to be any difference between the relationship found to exist between the converted scores made by students on the GATB and the academic grades made by these students in beginning industrial arts courses, advanced industrial arts courses, and beginning English?

8. Is there any apparent difference between the relationship found to exist between the raw scores, which have been reported as meaningless, amde by students on the GATB, and the academic grades made by these same students in beginning industrial arts, advanced industrial arts, and beginning English?

The Selection of Aptitudes "G" and "V" and Parts "H" and "I" of the General Aptitude Test Battery

There are ten aptitudes measured by the General Aptitude Test Battery and the complete battery is composed of fifteen parts. Aptitudes "G" and "V" and Parts "H" and "I" were arbitrarily selected for this study. This study is one of a series of investigations being made which involves the ten aptitudes and fifteen parts to ascertain their use for counseling and guidance purposes at North Texas State College, Denton, Texas, under the direction of the Department of Industrial Arts and the Director of Student Guidance.

Limitations of the Problem

This study was limited to a statistical treatment of the academic grades made in beginning industrial arts courses, advanced industrial arts courses, beginning English, and the converted scores made on Aptitudes "G" (intelligence) and "V" (verbal) and the raw scores made on Parts "H" (three-dimensional space) and "I" (arithmetic reason) of the GATB by 148 students enrolled in the Industrial Arts Department at North Texas State College, Denton, Texas. The grades and scores used in this study were made by the students enrolled in the Industrial Arts Department at North Texas State College, Denton, Texas, during the fall and spring semesters of the 1950-51 school year.

Source of Data

Data for the study were obtained from scores made on the General Aptitude Test Battery administered to 148 students enrolled in industrial arts and from the permanent records of these same students filed in the Registrar's Office at North Texas State College, Denton, Texas. Other data and information were obtained from professional magazines, books, and pamphlets.

Definition of Terms

In the study certain terms were used in analyzing the data and were defined as follows:

Correlation is the examination of the relationship of one ability to another in the same individual.[2]

Aptitude is the ability in a certail field or area of performance.[3]

Academic Grades have been defined as a rating or evaluation of a pupil's achievement often expressed on a letter scale.[4] The system used by North Texas State College for indicating and recording a student's grades are as follows:

A--indicates a numerical average of 90-100

B--indicates a numerical average of 80-89

C--indicates a numerical average of 70-79

D--indicates a numerical average of 60-69

F--indicates failure.[5]

A Test, in the general sense, is any instrument used in the measurement of any educational or mental ability. In a specific sense, a test is an instrument used by the pupil and ordinarily involving the use of pencil and paper.[6]

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[2]William J. Micheels and M. Ray Karnes, Measuring Educational Achievement, first edition, p. 113.

[3]Harry A. Greene, Albert N. Jorgensen, and J. Raymond Gerberich, Measurement and Evaluation in the Secondary School, p. 638.

[4]Carter V. Good, Dictionary of Education.

[5]North Texas State College, Bulletin, No. 212, North Texas State College, Denton, Texas, 1950, pp. 47-48.

[6]Greene, Jorgensen, and Gerberich, op. cit., p. 650.

Test Record Card is the instrument on which the GATB information is recorded.[7]

An Individual Aptitude Test Profile is determined by finding the total of each of the raw score columns recorded on the test record card.

Occupational Aptitude Pattern refers to the combination or pattern of aptitudes that is required to perform satisfactorily the major tasks of the occupations identified with each pattern.[8]

An Aptitude Test is a test of specific intelligence, that is, intelligence as operated in a certain field or area of performance, which may be used for prognostic purposes.[9]

Standard Deviation or SD is the measure of variability customarily employed in research.[10]

In this study GATB will be used as an abbreviation of the General Aptitude Test Battery.

Origin and Scope of Test Used in the Study

For many years, research has been lacking in the field of vocational guidance and public employment work.

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[7]Department of Labor, United States Employment Service, Guide to the Use of the General Aptitude Test Battery, B-1001, Part 1, Washington, D. C., January, 1947, p. 10.

[8]Ibid., p. 11.

[9]Greene, Jorgensen, and Gerberich, op. cit., p. 638.

[10]Henry E. Garrett, Statistics in Psychology and Education, p. 58.

Such research was, and still is, needed to develop better tests designed to help the examinee as well as the examiner in the choice of an occupation.

In 1934, the United States Employment Service instituted the Occupational Research Program. This program was in the area of cooperative research and was of an experimental nature. The program of research in vocational aptitude testing, however, originated in the Employment Stabilization Research Institute of the University of Minnesota. After more than ten years of research in the area of the characteristics of workers and in test development, the General Aptitude Test Battery was developed.[11]

The GATB is a product of the Occupational Analysis and Industrial Service Division, which has been engaged in job and worker analysis for over twenty years. During this period of research a large number of batteries of test have been developed for the prediction of success in specific occupations or small groups of related occupations. These batteries of test were, in most instances, standardized against a criterion of occupational success such as production records and the Wherry-Doolittle Test Selection Method was also employed to determine the validity of the combinations of tests.

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[11]Donald E. Super, Appraising Vocational Fitness by Means of Psychological Test, p. 359.

The batteries of test were devised for use in the selection process where attention is focused upon the specific job opening and its requirements. The objective is to select the best qualified individual from all the available applicants. The employment counselor, on the other hand, focuses attention on the individual and is often interested in testing to explore the possibilities of various kinds of work for that person.[12]

The GATB consists of fifteen tests which have been found through factor analysis to measure ten aptitudes which appear to contribute to occupational success in many jobs. To date, norms have been developed for twenty fields of work representing approximately 2,000 occupations. These norms have been expressed as "occupational aptitude patterns." The occupational aptitude patterns have been related to the Part IV classification code structure of the Dictionary of Occupational Titles.[13] The patterns were established after an analysis of the test scores of samples of successfully employed workers in each field indicated that certain occupations required similiar minimum amounts of the same combinations of aptitudes. Each pattern consists of minimum scores

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[12]Beatrice J. Dvorak, "The New USES General Aptitude Test Battery," Journal of Applied Psychology, XXXI (1947), 372.

[13]Division of Occupational Analysis, United States Employment Service, Dictionary of Occupational Titles, United States Government Printing Office, Washington, 1944.

required for the most significant aptitudes necessary for probable success in each group of occupations covered by the pattern. The minimum aptitude scores are expressed in terms of standard scores with the figure 100 as the general population average and with a standard deviation of twenty.[14]

Eleven of the fifteen tests are paper-and-pencil tests, and four are apparatus tests. Each of the tests has been designated by a letter, as Part A, Part B, and concludes with Part P. These fifteen following parts are purported to measure ten aptitudes. The letter preceding each aptitude indicates the letter used to identify the aptitude.

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. H Marking: Consists of a series of large capital H's. The examinee draws a short vertical line through the bar of each H without touching the sides, working rapidly to draw as many lines as possible in the time allowed.

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

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[14]State Testing Staff, Ohio State Employment Service, "A General Aptitude Test Battery Study with High-School Seniors," Educational and Psychological Measurement, IX (1949), 281-287.

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 the five geometrical figures is made by rearrangement of the parts of the stimulus figures.

Part G. Speed: Consists of a series of large rectangles. The examinee taps with 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 stimulus figures and four drawings of three-dimensional objects. The stimulus figure is pictured as a flat piece of metal which is to be bent or rolled, or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which of the four drawings correspond to the stimulus figure.

Part I. Arithmetic Reasoning: 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 the same or the opposite meaning.

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. These 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 figures in the second group are exactly the same size and shape as each figure in the first or stimulus group.

Part M. Place: The equipment used in this test and for Part N consists of a rectangular wooden board (peg-board) divided into two sections, each containing forty-eight holes. The upper section contains forty-eight cylindrical wooden pegs. The examinee removes the wooden pegs from the holes in the upper part 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 or more times, with the examinee working rapidly to move as many pegs as possible during the time allowed for each performance.

Part N. Turn: The equipment used in Part M is used in this test. In this case the lower section contains the forty-eight 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 pegs to the hole from which they were taken. The examinee works rapidly as possible in order to turn as many of the forty-eight cylindrical pegs as possible in the time allowed. This performance is repeated two or more times.

Part O. Assemble: The equipment used for this test consists of a small rectangular board (finger dexterity board) containing fifty holes, and a supply of small metal rivets and washers. The examinee takes a small metal rivet from a hole in the upper part of the board and at the same time removes a small metal washer from a vertical rod with the other hand; the examinee puts the washer on the rivet and inserts the assembled part in 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 as possible during the time allowed.

Part P. Disassemble: The equipment used for this test is the same as that described in Part O. The examinee removes the small metal rivet from a hole in the lower part of the board; slides 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.[15]

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[15]Department of Labor, op. cit., pp. 1-3.

Ten aptitude scores are obtained from the above fifteen parts and indicate the following aptitudes.

G - Intelligence: General learning ability. The ability to "catch on" or understand instructions and underlying principles; the ability to reason and make judgments. Closely related to doing well in school. [Factor "G" is made up of three parts of the GATB which are as follows: Part H (Three-Dimensional Space), Part I (Arithmetic Reason), and Part J (Vocabulary).][16]

V - Verbal Aptitude: The ability to understand the meaning of words and ideas associated with them, and to use them effectively. The ability to comprehend language, to understand relationships between words and to understand meanings of whole sentences and paragraphs. The ability to present information or ideas clearly.

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

S - Spatial Aptitude: Ability to perceive forms in space and understand relationships of plane and solid objects. May be used in such tasks as blueprint reading and solving geometry problems. Frequently described as the ability to "visualize" objects of two or three dimensions, or to think visually of geometric forms.

P - Form Perception: Ability to perceive pertinent detail in objects or in pictorial or graphic materials. Ability to make visual comparisons and discriminations and see slight differences in shapes and shading of figures and widths and lengths of lines.

Q - Clerical Perception: Ability to perceive pertinent detail in verbal or tabular materials. Ability to observe differences in copy, to proof-read words and numbers, and to avoid perceptual errors in arithmetic computation.

A - Aiming or Eye-Hand Coordination: Ability to coordinate eyes and hands or figures accurately so as to make precise movements with speed. Ability to control rapid movements of the hands in accordance with what the eyes see.

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[16] Ibid., p. 5.

T - Motor Speed: Ability to make hand movements, such as tapping, rapidly. Ability to make a movement respond swiftly and quickly. Probably related to reaction time.

F - Finger Dexterity: Ability to move the fingers, and manipulate small objects with the fingers, rapidly or accurately.

M - Manual Dexterity: Ability to move the hands easily and skillfully. Ability to work with the hands in the placing and turning motions.[17]

The GATB, according to the State Testing Staff of the Ohio State Employment Service, appears to be quite applicable for use with high school seniors.[18] It is possible to obtain information about an individual's aptitude for 2,000 occupations in a little more than two hours of testing with the use of the GATB. The GATB, however, seems to have certain limitations. One limitation of the test is that it does not measure such important traits as artistic aptitude, musical aptitude, eye-hand-foot coordination, and others. A second limitation of the test is that it does not include all the jobs existing in the United States today.[19] The Department of Labor reported that the GATB has three main limitations. These limitations are:

1. Not all the aptitudes that must be considered in counseling are measured by this test.

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[17] Ibid., p. 4.

[18] State Testing Staff, Ohio State Employment Service, "A General Aptitude Test Battery Study With High School Seniors," Educational and Psychological Measurement, IX (1949), 262.

2. Only preliminary Occupational Aptitude Patterns and a limited number of the Part IV classifications are included.

3. Only a small number of the many occupations identified in the Dictionary of Occupational Titles, which may be related to aptitudes measured by the GATB, have been listed.[20]

The Test and Its Administration

The test is divided into two specific types: (1) paper and pencil tests; and (2) apparatus tests. The directions for the administration of each type are as follows:

(1) PAPER AND PENCIL TESTS--As each test is to be administered, prior to reading the specific test instructions, the examiner should make certain that all examinees have turned to the proper page of the test booklet. The instructions to examinees should be delivered in a conversational tone and in a manner that emphasizes all of the important points. Most of these instructions are read verbatim from the instructions appearing in the guide as the examinee reads from instructions appearing in the test booklet. At times the examinee is asked to look at sample exercises. The only point at which the examiner will explain the performance for any specific test in his own words is when it is necessary to assist an examinee in completing the practice exercises.[21]

Practice exercises are provided so that each examinee will comprehend how each of the problems are to be worked, and how answers are to be indicated. Speed and accuracy are very important in these tests. Therefore, the examiner should avoid giving the impression that one test is more important than the other.[22]

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[20]Department of Labor, op. cit., p. 17.

[21]Ibid., Part II, p. 1.

[22]Ibid., p. 2.

(2) APPARATUS TESTS--The directions for administering the apparatus tests must be rigidly followed. For each apparatus test the administrator should provide an explanation and demonstration of the task to be done, and a practice trial. It is advisable for the examiner to know from memory the instructions that are to be read to the examinees, but under no circumstances should these instructions be recited from memory when the tests are administered. Each time the tests are administered the instructions should be read to insure that they are identical for each group.[23]

Performance on some of the apparatus tests is different for right-handed and left-handed examinees. At the beginning of each apparatus test session the examiner should find out if any of the people are left-handed, and if so, the apparatus test equipment should be set up accordingly.[24]

The administration of the test takes about two and one-quarter hours. The raw scores are transferred to the test record card and converted by the use of a conversion table. The converted scores are added in order to get the aptitude scores for each of the ten aptitudes measured.[25]

Formulae Used in the Study

In order to analyze the data in the study, certain formulae were used. They are as follows:

The most common measure of variability is standard deviation. It is calculated from the mean by use of the following formula:[26]

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[23] Ibid., pp. 27-28.

[24] Ibid., p. 27.

[25] Super, op. cit., p. 260.

[26] Garrett, op. cit., p. 59.

$$\text{Signa} = (\sigma) = \left(\sqrt{\frac{\Sigma fd^2}{N}} - c^2\right) \times i$$

Where d = deviations of intervals from the mean

f = frequency of scores in each class interval

N = number of scores

c = correction applied to guessed mean

i = class interval in steps

The Pearson Product-Moment Method of determining the coefficient of correlation was used to establish the degree of relationship between the variables. The formula is:[27]

$$r = \frac{\frac{\Sigma X'Y'}{N} - c_x c_y}{\sigma x \sigma y}$$

$X'Y'$ = the sum of the products of the deviations of each measure from the central tendency of the X and Y axes

c_x = correction on the X axes

c_y = correction on the Y axes

σx = Standard deviation of the distribution on the X axes

σy = Standard deviation of the distribution on the Y axes

After the standard deviation and the coefficient of correlation were calculated for the academic grades and the occupational aptitude scores, the results were tested to determine the significance of correlation. The following formula was used:[28]

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[27] Ibid., p. 278. [28] Ibid., pp. 289-299.

$$t = \frac{r\sqrt{N-2}}{\sqrt{1-r^2}}$$

r = the obtained coefficient

N = the number of cases

The mean of the scores and academic grades used in the study was computed by the use of the following formula;[29]

$$M = GA + \left(\frac{fx'}{N} \quad X \text{ int.}\right)$$

GA = guessed average

N = the number of cases

int. = class interval in steps

fx' = the sum of the fx's

In the formula for finding the coefficient of correlation, Cx and Cy are corrections of the mean on the X and Y axes. They are determined through the use of the following formula:[30]

$$Cx = \frac{fx'}{N}$$

$$Cy = \frac{fy'}{N}$$

N = the number of cases

fx' = the sum of the deviations on the X axes

fy' = the sum of the deviations on the Y axes

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[29]Micheels and Karnes, op. cit., pp. 429-430.

[30]Ibid., p. 429.

In determining the relationship between the scores made on Factor "G", Part "H", Part "I", and Aptitude "J" of the GATB by students enrolled in beginning drawing and by students enrolled in advanced industrial arts courses, Formula 29 was used. The formula is:[31]

$$\sigma D \text{ or } \sigma M_1 - M_2 = \sqrt{\sigma M_1 + \sigma M_2}$$

D = the standard error of the difference between the means

$M = \frac{\sigma}{\sqrt{N-1}}$ = the standard error of the mean when N is less than fifty

$M = \frac{\sigma}{\sqrt{N}}$ = the standard error of the mean when N is more than fifty

M_1 = the first mean

M_2 = the second mean

Recent and Related Studies

W. L. Wallace of the Psychological Corporation of New York, New York, made a study in order to ascertain the value of the test used in the University of Michigan freshman testing program for the differential prediction of course grades and grade averages during the freshman year. The battery of tests selected was for the dual purpose of counseling and placement. The data used in this study were the results of the freshman testing battery and the first year grades made by students entering the University of Michigan in the

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[31] Garrett, op. cit., p. 287.

fall of 1947. The battery of tests was composed of six examinations. Three of these tests are commercially published and nationally used, and three of the tests were designed locally to meet specific needs at Michigan University.

In this investigation of the value of a battery of aptitude and achievement tests for the prediction of university freshmen grades, test scores were correlated with grades and course averages in a variety of freshmen courses. The individual correlations were small, but the differential prediction power was in favor of the instruments selected or designed to indicate aptitude in particular areas. The Iowa Foreign Language Examination proved to be the best single predictor not only in foreign language courses but also in several other individual courses and in over-all scholarship.[32]

A tendency was noted that the correlations were relatively high or low with reference to separate courses rather than to the different tests. It was hypothesized that this might be the result of differences among courses in inter-sectional standardization, reliability of grading, or in the use of objective examinations.

The multiple coefficient of correlation between the average grade for the first semester and a combination of eight test variables from the battery was .554. This correlation was low for practical applications of test

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[32]W. L. Wallace, "The Prediction of Grades in Specific College Courses," Journal of Educational Research, XLIV (April, 1951), 587-508.

results but reasonably high in view of the limitations of the reliability of grades and the environmental and non-intellective factors which enter into the acquisition of grades. Beta coefficients involved in this multiple correlation process revealed the greater importance of the Iowa Foreign Language, Social Studies Vocabulary, Cooperative English Reading, and the Mathematics Placement Test. The contributions of the other tests in the battery with reference to the prediction of grades fell considerably lower.

Evidence from the study by Wallace indicates overlapping of some of the tests used in the battery and suggests that such an extensive array of examinations is somewhat unnecessary. It was found that over-all and individual course prediction could be made with nearly the same accuracy with a more abbreviated battery of tests. The smallness of the correlations found throughout is a caution against placing too much weight on an individual's test scores for use in guidance, selection, or placement.[33]

During the 1947-48 school year, the United States Employment Service's General Aptitude Test Battery was given to a group of 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 State Department of Education. The primary purpose of

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[33] Ibid.

this study was to investigate the distribution of aptitudes and occupational aptitude patterns in a high school senior group. It was believed that such a study would reveal information regarding the use of the GATB with respect to its use in guidance and placement on the secondary level.

The test record cards of all the 439 seniors in this study were numerically coded with the following items: individual identification, sex, school, high school course, and age. This information, plus the individual's ten aptitude scores and the Occupational Aptitude Patterns in which he qualified, were punched on IBM cards.

The 439 seniors were selected from five different schools. The all-school all-aptitude mean was found to be 110 and the all-school all-aptitude standard deviation was sixteen. This mean is one-half a standard deviation higher than the mean of the population upon which the GATB is based. The standard deviation of sixteen for the high school students was also to be expected since the education of the high school group was more similiar than the education of the general population which ranged from six years through college graduation.

The study revealed little variability in the mean of the aptitude scores or in standard deviations among the schools when the mean of the aptitude scores of each school were compared with the all-school, all-aptitude mean.

Senior students enrolled in industrial arts and technical courses had S(spatial) as their highest mean aptitude.[34]

Robert L. Thorndike, Teacher's College, Columbia University, conducted a study to try to answer the following questions: (1) How accurately can intelligence at the time of college entrance be predicted from tests given at various earlier ages? (2) With what weight should two or more tests given at different times during a child's school career be combined to give the most accurate prediction of intelligence at the time of college entrance?

The procedure used in this investigation was to determine the extent of correlation between a terminal test given at the end of the secondary school work (The College Entrance Examination Board Scholastic Aptitude Test) and an intelligence test given at various intervals prior to the terminal test. All available test data were assembled for about 5,000 pupils who had taken the terminal test and for whom earlier test data were available. Over 13,000 test records were analyzed in addition to the terminal test. These records tended to be concentrated in the secondary school years, and data from tests in the elementary school grades were relatively meager. Data were obtained, however, from over 600 tests administered ten or more years prior to the terminal test.

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[34]State Testing Staff, Ohio State Employment Service, "A General Aptitude Test Battery Study With High School Seniors," Educational and Psychological Measurement, IX (1949), 281-289.

The data indicated that the drop in the accuracy of prediction as one goes from one test to another test given the same year as the terminal test to one given two, four, six, or even eight years earlier is small, irregular, and possibly does not exist. It can be assumed with fair assurance that the time interval is not a significant factor in determining the accuracy of prediction for secondary school test grades.

The results of the study by Thorndike have several significant implications for educational practice. They imply that in so far as the factor of intelligence is concerned, a student can be given as accurate guidance concerning his future educational plans at the beginning of his high school course as he can at the end of the course. The findings also indicate that if a high school plans to give an intelligence test for the purpose of educational guidance in that school, the test should be given early in the high school period.

The results of an intelligence test given at the beginning of a student's high school career can be expected to be as accurate for prognosis as those from later tests and will be available for use for a longer period of time. If more than one test has been given to a pupil during his high school career, the first prediction of his college intelligence is obtained from a simple average of the two scores. The results of the study also implies that tests

scores in the primary grades and in high school should not be used for long-range forecasting, but should be supplemented by later tests.[35]

Early in 1940, the Graduate Faculty of the College of Education, University of Minnesota, passed a regulation requiring that a battery of tests be administered to all students registered in the Graduate School with a view to taking an advanced degree with a major in education. The battery of tests which was selected and given to 788 students in 1940 and 1941 contained the following tests:

(1) Miller's Analogies--Form G, for graduate students, a fifty minute test designed by W. S. Miller, Professor of Educational Psychology, University of Minnesota, to measure general academic aptitude.

(2) Educational Information and Application--A seventy minute test constructed to measure general informational background in education and ability to make applications of educational theory and describe situations.

(3) Cooperative Survey Test in Mathematics--Form P, A test designed to measure achievement in high school mathematics.

(4) Cooperative English--Form OM, a test designed to measure knowledge of English usage, mechanics of composition and vocabulary.

The relationship between the success in graduate courses in the College of Education and scores made on the four aptitude tests are indicated by the following coefficients of correlation:

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[35]Robert L. Thorndike, "The Prediction of Intelligence at College Entrance from Earlier Tests," The Journal of Educational Psychology, XXXVIII (March, 1947), 129-148.

Miller's Analogies 48

Education 60

Cooperative Mathematics, Form P 33

Cooperative English, Form OM 43

The test scores are sufficiently indicative of success in graduate courses to warrant their use not only as measures of general ability but also of extreme strength or weakness in the field of English and mathematics. The chief value of the test is that it makes possible the identification of superior students immediately upon their entrance into the graduate school, thus enabling the staff members to give appropriate counsel and encouragement.[36]

In a study by Joseph Jackson, the commercial students of grade 12-B of Fordson High School, Dearborn, Michigan, were given the Minnesota Vocational Test for Clerical Workers in an attempt to evaluate the aptitude factors of the test as related to success of the students in the school program. The students were given two tests as follows:

(1) Number Concepts--A test designed to measure accuracy in number checking. The student observes two numbers and indicates whether they are alike or different.

(2) Name Concepts--A test designed to measure accuracy in name checking. The student observes two names and indicates whether they are the same or different.

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[36] Graduate Testing Staff, School of Education, University of Minnesota, "Predicting the Success of Graduate Students in a College of Education," School and Society, September 5, 1942, pp. 192-193.

On the basis of the author's norms, the commercial students attained or surpassed the author's median achievement of clerical workers in twenty-nine per cent of the cases on Test 1 (Number Concepts), and in twenty-five per cent of the cases on Test 2 (Name Concepts). A study of clerical concomitants such as filing, typing, bookkeeping, shorthand, office practice and over-all academic average in light of the scores made on the Minnesota Vocational Test for Clerical Workers failed to show any significant relationships.[37]

In the Robert S. Hunter High School, Turtle Creek, Pennsylvania, an aptitude test for the machine shop was given to sophomore and junior vocational machine shop students in Turtle Creek High School to be used in the selection of pupils for the vocational training in the high school machine shop. The battery of tests included two types: (1) standard aptitude test purporting to measure mechanical ability, and (2) a shop performance test which measures a pupil's ability to perform certain machine shop operations.

The age distribution of the sophomore group ranged from fourteen to eighteen years of age, giving an average age for forty-nine pupils of fifteen and four-tenths years. The age distribution of the junior group ranged from fifteen to nineteen years of age, giving an average of sixteen and

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[37]Joseph Jackson, "Analysis of the Minnesota Vocational Test for Clerical Workers in a High School Situation," Journal of Social Psychology, XXX (August, 1949), 152.

two-tenths for thirty-one pupils. Three tests were used in the study. They are as follows:

(1) The MacQuarrie Test for Mechanical Ability is intended to furnish a first rough indication of aptitudes for acquiring manipulative power.

(2) The Minnesota Paper Form-Board Test furnishes an indication of ability to discriminate geometrical patterns in two dimensions.

(3) The Crawford-Bennett Point-Motion Test measures ability to comprehend and visualize how mechanisms operate in a large factor in the various phases of mechanical engineering.

The raw scores were calculated as efficiency scores and the mean and sigma values of the distribution were computed. The correlations of the test scores with criterion were as follows:

Number		Criterion Scores
75	Minnesota Paper-Form-Board Test.....	.453
77	MacQuarrie Test for Mechanical Ability..	.371
75	Crawford-Bennett Point Motion Test.....	.272

The use of such tests in the selection of applicants for high school vocational work may be well considered. Happy adjustment in a vocation is of primary importance to the individual.[38]

Since patterns have not been developed for many of the professional jobs and other fields of work requiring college

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[38] Robert S. Hunter, "Aptitude Test for the Machine Shop," Industrial Arts and Vocational Education, XLV (February, 1945), 58-63.

training, it was felt advisable to expand the number of fields covered by testing college students with the GATB. Through a cooperative arrangement this project materialized so that in the spring of 1948 the GATB was given to 479 seniors at the University of Utah. In addition to the scores obtained from the 479 seniors, aptitude scores were also obtained from forty-nine second-year students in the College of Medicine and 101 sophomores in the College of Pharmacy. The two paper-and-pencil booklets were given to all students selected for the study to yield a battery of eight aptitude scores plus scores on the latter series Test E, which is frequently omitted when the GATB is given to employment office counselees. For practical reasons the aptitudes derived from the apparatus tests were obtained only for the medical students tested in the study.

By testing 479 seniors, 101 pharmacy sophomores, and 49 medical students with paper-and-pencil booklets of the GATB, it was possible to develop an occupational aptitude pattern for predicting college success regardless of the fields of specialization and also to develop occupational aptitude patterns for seven academic areas in a university; namely, biological sciences, business, education, engineering, social sciences, medicine, and pharmacy. The aptitudes in each final battery were chosen by means of a multiple evaluation of the aptitude data, and a cutoff score was set

on each selected aptitude to form an occupational aptitude pattern for the battery.[39]

Sammye Louise Routt conducted a study in 1950 to determine the relationship between the occupational aptitude scores made on the GATB and the academic grades made by students enrolled in beginning and advanced clerical courses in the School of Business Administration at North Texas State College, Denton, Texas. Data for the study were obtained from the results of the GATB administered to 155 students and the permanent records of the students.

Scattergrams and correlation tables were constructed for the scores and academic grades made in each of the different courses. The means of the scores and academic grades were computed in each case. In each situation the standard deviation was determined by treating the means of the scores and grades statistically. The coefficient of correlation was computed by using the Pearson-Product Moment Method. Significance of "r" was determined by Formula 53 and Table 29 in Garrett's Statistics in Psychology and Education.

Some correlation was found to exist between the aptitude scores and the academic grades. The relationship was low and

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[39]GATB Senior Project Staff, University of Utah, et. al., "General Aptitude Test Battery Patterns for College Areas," Occupations, XXIX (April, 1951), 518-525.

insignificant in the majority of the cases. The data formed the basis for the following conclusions:

1. No significant relationship was found between the academic grades made by students enrolled in beginning typing courses and the scores made on Aptitudes "V", "Q", and "F" by the same students.

2. Some relationship was found to exist between the academic grades and scores made on Aptitude "T" by students enrolled in beginning typing courses.

3. There was no significant relationship between the academic grades and scores made on Aptitudes "Q" and "F" by students enrolled in beginning shorthand courses.

4. Some relationship was found to exist between the academic grades and the scores made on Aptitudes "V" and "T" by students enrolled in beginning shorthand.

5. There was no significant relationship between the academic grades and the scores made on Aptitudes "V", "Q", and by students enrolled in advanced typing courses; however, a significant relationship was found to exist between the academic grades and scores made of Aptitude "F" by these same students.

6. No relationship of any significance was found to exist between academic grades and scores made on Aptitudes "Q" and "T" by students enrolled in advanced shorthand courses.

7. Some relationship was found to exist between the scores made on Aptitudes "V" and "F" and the academic grades made by the same students.

8. The data indicated that there was no relationship between the academic grades made and scores made on the four Aptitudes by students enrolled in secretarial practice.

9. There was no significant relationship between the scores made by students enrolled in beginning courses and students enrolled in advanced courses on Aptitudes "Q", "T", and "F".

10. The data indicated that a significant relationship did exist between the scores made on Aptitude "V" by students enrolled in beginning and advanced courses.[40]

The results of the recent research presented indicate that in most cases the correlations were high between various aptitude test scores and training received in various courses. Students with training in a certain field made higher scores on corresponding parts of the test denoting a high aptitude in that particular field. The results of some of these studies indicate that it is possible to predict, with some degree of accuracy, the success of students at the graduate level by the use of batteries of tests but sound a warning against trying to predict the success of students at the beginning of their college career.

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[40]Sammye Louise Routt, "A Study to Determine the Relationship of the Occupational Aptitude Scores and 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 Theses No. 2045, North Texas State College, School of Business Administration, (August, 1951), 55-57.

CHAPTER II

THE RELATIONSHIP BETWEEN THE CONVERTED SCORES MADE ON APTITUDE "G" (INTELLIGENCE) OF THE GENERAL APTITUDE TEST BATTERY AND THE ACADEMIC GRADES MADE BY STUDENTS ENROLLED IN BEGINNING INDUSTRIAL ARTS COURSES, ADVANCED INDUSTRIAL ARTS COURSES, AND BEGINNING ENGLISH COURSES

Figures 1 through 5, inclusive, present the data which show the correlation of the paired academic grades made by students in beginning industrial arts courses, advanced industrial arts courses, and beginning English. The Figures 1 through 5 are arranged in order to show the relationship between the converted scores made on Aptitude "G" and the academic grades made in courses which include beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, and courses in beginning English.

The Relationship Between the Converted Scores Made on Aptitude "G" (Intelligence) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Six Students Enrolled in Beginning Woodwork

In Figure 1 the distribution of the academic grades made by thirty-six students enrolled in beginning woodwork and the converted scores made by these same thirty-six

students on Aptitude "G" of the Genral Aptitude Test Battery are shown. The mean of the academic grades made by the thirty-six students when converted to numerical figures was found to be 83.8. The standard deviation of this group of scores was 8.1. The mean of the converted scores made on Aptitude "G" by the same thirty-six students was 116.4, and the standard deviation was 13.1. The coefficient of correlation of the academic grades and aptitude scores made by

	75-84	85-94	95-104	105-114	115-124	125-134	135-144	145-154	fy
90-99				3		2	1	1	7
80-89		1	4	5	8	1	1		20
70-79		1			5	2			8
60-69			1						1
50-59									
fx		2	4	9	13	5	2	1	

My = 83.8 σy = 8.1 Mx = 116.4 σx = 13.1 r = .0017

Fig. 1--Scattergram and correlation table showing the paired academic grades made in beginning woodwork and the converted scores made on Aptitude "G" (intelligence) of the General Aptitude Test Battery by thirty-six students.

these students when treated by the Pearson-Product Moment Method was .0017. When tested for significance by Formula 53[1] and Table 29,[2] the coefficient of correlation of .0017 was found to be insignificant at the .01, .05, or .10 levels.

An examination of Figure 1 also shows that three students who made an academic grade of "A" in beginning woodwork made a converted score on Aptitude "G" which was in the class interval which ranged from 105 to 114. One student who made an academic grade of "D" made a converted score on Aptitude "G" which was in the class interval which ranged from 105 to 115. Of the eight students who made an academic grade of "C" in beginning woodwork, one student made a converted score on Aptitude "G" which was in the class interval which ranged from 85 to 94. Five of these same students made converted scores which were in the interval which ranged from 105 to 114; and two of these students made converted scores which were in the interval which ranged from 125 to 134. The majority of the thirty-six students enrolled in beginning woodwork made an academic grade of "B". Eight of the students who made an academic grade of "B" in beginning woodwork also made a converted score on Aptitude "G" which was in the class interval which ranged from 115 to 124. Five of the students who made academic grades of "B" also made a

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[1]Garrett, op. cit., p. 289.

[2]Ibid., p. 190.

converted score which was in the class interval which ranged from 105 to 114. An examination of the data in Figure 1 indicates some consistency between the converted scores made on Aptitude "G" of the GATB and the academic grades made by thirty-six students enrolled in beginning woodwork.

The Relationship Between the Converted Scores Made on Aptitude "G" (Intelligence) of the General Aptitude Test Battery and the Academic Grades Made by Fifty-Four Students Enrolled in Beginning Metal Work

The distribution of the academic grades made in beginning metal work and the converted scores made on Aptitude "G" of the GATB by fifty-four students are shown in Figure 2. When the academic grades of this group were converted to numerical figures, the mean of the scores was 81.5. The standard deviation of this group was 8.7. The mean of the converted scores made by the fifty-four students on Aptitude "G" of the GATB was 116 and the standard deviation was 12.6. The coefficient of correlation of the academic grades and converted scores made on Aptitude "G" by fifty-four students enrolled in beginning metal work was found to be .003. The coefficient of correlation of .003 was found to be insignificant at the .01, .05, and 10 levels.

The range of the converted scores made on Aptitude "G" by the fifty-four students was from 85 to 154. The range of the academic grades made in beginning metal work by fifty-four students was from 60 to 99 or from "D" through "A".

	75-84	85-94	95-104	105-114	115-124	125-134	135-144	145-154	fy
90-99		1		3			2	1	7
80-89			2	9	12	3	1		27
70-79			3	3	3	5			14
60-69		1	2	2		1			6
50-59									
fx		2	7	17	15	9	3	1	

My = 81.5 σy = 8.7 Mx = 116 σx = 12.6 r = .003

Fig. 2--Scattergram and correlation table showing the paired academic grades made in beginning metal work and the converted scores made on Aptitude "G" (intelligence) of the General Aptitude Test Battery by fifty-four students.

Seven of the fifty-four students tested on Aptitude "G" made academic grades of "A". One of the students who made an academic grade of "A" made a converted score on Aptitude "G" which fell in the class interval which ranged from 85 to 94, and one student who made a grade of "A" made a converted score on Aptitude "G" which was in the class interval which ranged from 145 to 154. The majority of the fifty-four students made academic grades of "B". Two of these students made converted scores on Aptitude "G" which fell in the class interval which ranged from 95 to 104, and one student in this group made a converted score which was in the interval which ranged from 135 to 144.

The Relationship Between the Converted Scores Made on Aptitude "G" (Intelligence) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Three Students Enrolled in Beginning Drawing

Data concerning the academic grades made by eighty-three students enrolled in beginning drawing and the converted scores made by these same students on Aptitude "G" of the GATB are presented in Figure 3. The academic grades were converted to numerical figures, and the mean of the scores was found to be 78.6. The standard deviation of these scores was 11.1. The mean of the converted scores made on Aptitude "G" by the eighty-three students enrolled in beginning drawing was 116.9, and the standard deviation was 13.9. The coefficient of correlation of the two groups of scores was .003. The coefficient of correlation of .003 was found to be of no significance at the .01, .05, or .10 levels.

Figure 3 shows that eleven of the eighty-three students enrolled in beginning drawing made academic grades which ranged from 90 to 100. One of these students made a converted score on Aptitude "G" which fell in the class interval which ranged from 84 to 94 and four of the students who made an academic grade of "A" made converted scores on Aptitude "G" which were in the interval which ranged from 135 to 144. Twenty-seven of the students enrolled in beginning drawing made academic grades of "C". Twelve of the students in this group made a converted score on Aptitude "G" which ranged from 115 to 124.

	75-84	85-94	95-104	105-114	115-124	125-134	135-144	145-154	fy
90-99		1		2	1	3	4		11
80-89			3	6	13	6	2	1	31
70-79		1	4	4	12	5	1		27
60-69			2	1	2	1			6
50-59	1		1	2	3	1			8
fx	1	2	10	15	31	16	7	1	

My = 78.6 σy = 11.1 Mx = 116.9 σx = 13.9 r = .003

Fig. 3--Scattergram and correlation table showing the paired academic grades made in beginning drawing and the converted scores made on Aptitude "G" (intelligence) of the General Aptitude Test Battery by eighty-six students.

The Relationship Between the Converted Scores Made on Aptitude "G" (Intelligence) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

The distribution of the academic grades made by thirty-eight students enrolled in advanced industrial arts courses and the converted scores made by these same students on Aptitude "G" of the GATB are presented in Figure 4. The mean of the academic grades made by the thirty-eight students enrolled in advanced industrial arts courses was 85. The standard deviation of this group of scores was 10.7. The mean of the converted scores made on Aptitude "G" by the

thirty-eight students was 121.1, and the standard deviation of this group of scores was 14. The coefficient of correlation of these two sets of scores was -.008. This coefficient of correlation was found to be of no significance at .01, .05, and .10 levels.

	75-84	85-94	95-104	105-114	115-124	125-134	135-144	145-154	fy
90-99		1	2	2	3	2	4		14
80-89			1	4	2	8	1		16
70-79				3				1	4
60-69			1		1				2
50-59						1	1		2
fx		1	4	9	6	11	6	1	

My = 85 σy = 10.7 Mx = 121.1 σx = 14 r = -.008

Fig. 4--Scattergram and Correlation Table showing the paired academic grades made in advanced industrial arts and the converted scores made on Aptitude "G" (intelligence) of the General Aptitude Test Battery by thirty-eight students.

The range of the converted scores made on Aptitude "G" by the thirty-eight students enrolled in advanced industrial arts courses was from 85 to 154. The range on the academic grades made by these same students was from 50 to 100 or from the letter grade "F" through "A". Further study of the

data in Figure 4 shows that one of the fourteen students who made an academic grade of "A" in advanced industrial arts courses made a converted score on Aptitude "G" which was in the class interval which ranged from 85 to 94. The highest converted score made on Aptitude "G" by this group of students was made by one of the four students who made an academic grade of "C". This converted score was in the class interval which ranged from 145 to 154. Only two of the thirty-eight students in this group made an academic grade of "D". One of these students made a converted score on Aptitude "G" which fell in the range from 135 to 144.

The Relationship Between the Converted Scores Made on Aptitude "G" (Intelligence) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Six Industrial Arts Students Enrolled in Beginning English

The data concerning the paired academic grades made in beginning English and the converted scores made on Aptitude "G" of the GATB by eighty-six industrial arts students are shown in Figure 5. When the academic grades made in beginning English by this group were converted to numerical figures, the mean of the group of scores was found to be 58.9, and the standard deviation of this group of scores made in beginning English was 15. The mean of the group of converted scores made by the eighty-six students on Aptitude "G" of the GATB was 116.3, and the standard deviation was 13.

The scores and academic grades were found to have a coefficient of correlation of .003. This coefficient of correlation was found to be of no significance at the .01, .05, or .10 levels.

	75-84	85-94	95-104	105-114	115-124	125-134	135-144	145-154	fy
90-99					1				1
80-89		1			2	1			4
70-79		2	2	3	7	6	2		22
60-69			2	12	11	11	2		38
50-59	1	2	3	8	4	3			21
fx	1	5	7	23	25	21	4		

My = 58.9 σy = 15 Mx = 116.3 σx = 13 r = .003

Fig. 5--Scattergram and correlation table showing the paired academic grades made in beginning English and the converted scores made on Aptitude "G" (intelligence) of the General Aptitude Test Battery by eighty-six industrial arts students.

Only one of the eighty-six industrial arts students enrolled in beginning English made an academic grade of "A" and this student also made a converted score on Aptitude "G" which fell in the class interval which ranged from 115 to 124. The majority of the industrial arts students enrolled in beginning English made an academic grade of "D". Two of the

students in this group made converted scores on Aptitude "G" which were in the interval which ranged from 135 to 144. Twenty-one of the eighty-six students made an academic grade in beginning English of "F". Of this group, one student made a converted score on Aptitude "G" that fell in the interval which ranged from 75 to 84.

The academic grades made in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, and beginning English, when treated statistically, revealed little relationship with the converted scores made on Aptitude "G" of the GATB. None of the coefficients of correlation were found to be significant at the .01, .05, or .10 levels when tested by Table 29 and Formula 53 in Garrett's Statistics in Psychology and Education.[3]

In Chapter II data have been presented concerning the academic grades and the converted scores made on Aptitude "G" of the GATB by students enrolled in beginning industrial arts courses, advanced industrial arts courses, and beginning English. In Chapter III data concerning the academic grades made by students in these same courses and the raw scores made by these students on Part "H" of the GATB will be presented.

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[3]Ibid., pp. 190, 289.

CHAPTER III

THE RELATIONSHIP BETWEEN THE RAW SCORES MADE ON PART "H" (THREE-DIMENSIONAL SPACE) OF THE GENERAL APTITUDE TEST BATTERY AND THE ACADEMIC GRADES MADE BY STUDENTS ENROLLED IN BEGINNING INDUSTRIAL ARTS COURSES, ADVANCED INDUSTRIAL ARTS COURSES, AND BEGINNING ENGLISH

This part of the study was concerned with determining the relationship between the raw scores made on Part "H" (three-dimensional space) of the GATB and the academic grades made by the same students enrolled in beginning industrial arts courses, advanced industrial arts courses, and beginning English. Figures 6 through 10 are scattergrams and correlation tables which present data showing the relationship between the paired academic grades made in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, beginning English, and the raw scores made by these same students on Part "H" of the GATB. The mean and standard deviations were computed for the raw scores and academic grades. The means and standard deviations were treated in the same manner as in the preceding chapter.

The Relationship Between the Raw Scores Made on Part "H" (Three-Dimensional Space) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Six Students Enrolled in Beginning Woodwork

The distribution of the academic grades made by thirty-six students enrolled in beginning woodwork and the raw scores made by these same students on Part "H" of the GATB are shown in Figure 6. The mean of the academic grades, after conversion to numerical figures, was found to be 83.8 and the standard deviation of this group of scores was 8.1. The mean of the raw scores made on Part "H" by the thirty-six students enrolled in beginning woodwork was 116.4, and the standard deviation was 4.56. The coefficient of correlation of the academic grades made in beginning woodwork and the raw scores made on Part "H" by the thirty-six students when treated with the Pearson-Product Moment Method was -.0016. The coefficient of correlation of -.0016 was found to be of no significance at the .01, .05, and .10 levels when tested by Formula 53 and Table 29 in Garrett's Statistics in Psychology and Education.[1]

An examination of the data in Figure 6 shows that the range of the academic grades made in beginning woodwork was from 50 to 100 and that of the raw scores made on Part "H"

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[1] Ibid.

was from 8 to 51. The student who made the lowest raw score on Part "H" made an academic grade of "B" in beginning woodwork. Two students made raw scores on Part "H" which

	8-11	12-15	16-19	20-23	24-27	28-31	fy
90-99		1	1	3	1	1	7
80-89	1	1	6	4	8		20
70-79			3	1	3	1	8
60-69							
50-59							
fx	1	2	10	9	12	2	

My = 83.8 σy = 8.1 Mx = 21.4 σx = 4.56 r = -.0016

Fig. 6--Scattergram and correlation table showing the paired academic grades made in beginning woodwork and the raw scores made on Part "H" (three-dimensional space) of the General Aptitude Test Battery by thirty-six students.

ranged from 28 to 31. One of the thirty-six students made an academic grade of "D" in beginning woodwork, and this same student made a raw score on Part "H" which ranged from 20 to 23. An examination of the data in Figure 6 also indicates the inconsistency of the academic grades made in beginning woodwork and the raw scores made by the same students on Part "H" of the GATB.

The Relationship Between the Raw Scores Made on Part "H" (Three-Dimensional Space) of the General Aptitude Test Battery and the Academic Grades Made by Fifty-Four Students Enrolled in Beginning Metal Work

Figure 7 presents data concerning the academic grades made by fifty-four students enrolled in beginning metal work and the raw scores made by these same students on Part "H" of the GATB. The academic grades were converted to numerical figures, and the mean of the scores was 81.5. The standard deviation of these scores was 8.7. The mean of the raw scores the fifty-four students made on Part "H" was 20.8, and the standard deviation was 3.7. A coefficient of correlation of

	8-11	12-15	16-19	20-23	24-27	28-31	fy
90-99		1	2	1	2	1	7
80-89	1	2	3	11	9	1	27
70-79	1		7	1	5		14
60-69			5	1			6
50-59							
fx	2	3	17	14	16	2	

My = 81.5 σy = 8.7 Mx = 20.8 σx = 3.7 r = .07

Fig. 7--Scattergram and correlation table showing the paired academic grades made in beginning metal work and the raw scores made on Part "H" (three-dimensional space) of the General Aptitude Test Battery by fifty-four students.

.07 was found after the raw scores and grades were treated statistically. The coefficient of correlation of .07 was found to be of no significance at the .01, .05, or the .10 levels.

The range of the academic grades made in beginning metal work by the fifty-four students was from 60 to 100 or from "D" through "A". In this group, one student made a score on Part "H" which was in the class interval which ranged from 12 to 15. Twenty-seven of the fifty-four students made an academic grade of "B" in beginning metal work. Eleven of the students in this group made a raw score on Part "H" falling in the interval which ranged from 20 to 23. Six of the students enrolled in beginning metal work made academic grades of "D", and five of these students made raw scores on Part "H" which fell within the class interval which ranged from 16 to 19.

The Relationship Between the Raw Scores Made on Part "H" (Three-Dimensional Space) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Three Students Enrolled in Beginning Drawing

In Figure 8 the distribution of the academic grades made by eighty-three students enrolled in beginning drawing and the raw scores made by these same students on Part "H" of the GATB are shown. The academic grades of this group of students were converted to numerical figures, and the mean of

	8-11	12-15	16-19	20-23	24-27	28-31	fy
90-99			2	3	5	1	11
80-89		1	3	15	8	5	32
70-79		2	9	3	11	1	26
60-69	1	1	2	2			
50-59		1	3	3	1		8
fx	1	5	19	26	25	7	

My = 78.6 σy = 11.1 Mx = 21.6 σx = 4.4 r = .09

Fig. 8--Scattergram and correlation table showing the paired academic grades and the raw scores made on Part "H" (three-diminsional space) of the General Aptitude Test Battery by eighty-three students in beginning drawing.

the scores was found to be 78.6. The standard deviation of this group of scores was 11.1. The mean of the raw scores made on Part "H" by the eighty-three students enrolled in beginning drawing was found to be 21.6, and the standard deviation was 4.4. The coefficient of correlation of the academic grades made by these students and the raw scores made on Part "H" when treated in the same manner as previous data was .09. This coefficient of correlation was found to be insignificant at the .01, .05, and .10 levels.

The range of the scores made on Part "H" was from 8 to 31. The range of the academic grades made in beginning drawing by the eighty-three students was from 50 to 100 or from the letter grade of "F" through "A". One of the students who made an academic grade of "A" made a raw score on Part "H" which fell in the class interval that ranged from 28 to 31. The student who made the lowest raw score on Part "H" made an academic grade of "D" in beginning drawing. One of the students who made an academic grade of "F" made a raw score on Part "H" which was in the class interval which ranged from 24 to 27.

The Relationship Between the Raw Scores Made on Part "H" (Three-Dimensional Space) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

In Figure 9 the distribution of the academic grades made by thirty-eight students enrolled in advanced industrial arts courses and the raw scores made by these same students on Part "H" of the GATB are shown. The academic grades of this group were converted to numerical figures, and the mean of the scores was found to be 85. The standard deviation of this group of scores was 10.7. The mean of the raw scores made by the thirty-eight students on Part "H" was found to be 21.7, and the standard deviation was 5.8. The coefficient of correlation of the academic grades and the raw scores made by these students on Part "H" was found to be .02. The coefficient of correlation of .02 was found to be of no significance at the .01, .05, or .10 levels.

	8-11	12-15	16-19	20-23	24-27	28-31	fy
90-99		1		4	6	3	14
80-89			2	6	5	3	16
70-79			1	1	2		4
60-69			1	1			2
50-59				1		1	2
fx		1	4	13	13	7	

My = 85 σy = 10.7 Mx = 21.7 σx = 5.8 r = .02

Fig. 9--Scattergram and correlation table showing the paired academic grades made in advanced industrial arts courses and the raw scores made on Part "H" (three-dimensional space) of the General Aptitude Test Battery by thirty-eight students.

Further study of Figure 9 shows that one of the fourteen students who made an academic grade of "A" in advanced industrial arts courses made a raw score on Part "H" which was in the interval which ranged from 12 to 15. One of the students with an academic grade of "D" made a raw score on Part "H" which fell in the class interval which ranged from 28 to 31. These two examples indicate the inconsistency of the academic grades made in advanced industrial arts courses and the raw scores made by the same students on Part "H" of the GATB.

The Relationship Between the Raw Scores Made on Part "H" (Three-Dimensional Space) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Six Industrial Arts Students Enrolled in Beginning English

In Figure 10 the data concerning the academic grades made by eighty-six industrial arts students enrolled in beginning English and the raw scores made on Part "H" of the GATB by these same students are shown. A mean score of 58.9 was obtained when the academic grades made by the eighty-six students enrolled in beginning English were converted to numerical figures and treated statistically. The standard deviation of this group of scores was 15. The mean of the raw scores made by the eighty-six students tested on Part "H" of the GATB was 22.01 and the standard deviation was 4.26. When treated statistically, these two groups of scores showed a coefficient of correlation of -.02. The coefficient of correlation of -.02 was found to be insignificant at the .01, .05, and .10 levels.

The range of the raw scores made on Part "H" by the eighty-six industrial arts students was from 12 to 31. The range of the academic grades was from 60 to 99 or from the letter grade of "D" through "A". Only one of the eighty-six industrial arts students enrolled in beginning English made an academic grade of "A" and this student made a raw score on Part "H" which fell in the class interval which ranged

from 24 to 27. Seven of the students making academic grades of "D" made raw scores on Part "H" which were in the interval which ranged from 24 to 27.

	8-11	12-15	16-19	20-23	24-27	28-31	fy
90-99					1		1
80-89		1		2		1	4
70-79		1	5	12	3	1	22
60-69		1	8	8	16	5	31
50-59		4	3	7	7		21
fx		7	16	29	27	7	

My = 58.9 σy = 15 Mx = 22.01 σx = 4.26 r = -.02

Fig. 10--Scattergram and correlation table showing the paired academic grades made in beginning English and the raw scores made on Part "H" (three-dimensional space) of the General Aptitude Test Battery by eighty-six industrial arts students.

The academic grades made in beginning woodwork, beginning metal work, advanced industrial arts courses, and beginning English after statistical treatment revealed little relationship with the raw scores made by these same students on Part "H" of the GATB. The academic grades and scores made on Part "H" by students in each of the different courses were treated with the Pearson-Product Moment Method and the

following coefficients of correlation were found: (1) beginning woodwork, r = -.0016; (2) beginning metal work, r = .07; (3) beginning drawing, r = .09; (4) advanced industrial arts courses, r = .02; (5) beginning English, r = -.02. None of the coefficients of correlation were found to be significant at the .01, .05, and .10 levels.

In Chapter III the data concerning the grades made in beginning industrial arts courses, advanced industrial arts courses, beginning English, and the raw scores made by the same students on Part "H" of the GATB are shown. The data concerning the academic grades made in the same courses and the raw scores made on Part "I" of the GATB will be presented in Chapter IV.

CHAPTER IV

THE RELATIONSHIP BETWEEN THE RAW SCORES MADE ON PART "I" (ARITHMETIC REASON) OF THE GENERAL APTITUDE TEST BATTERY AND THE ACADEMIC GRADES MADE BY STUDENTS ENROLLED IN BEGINNING INDUSTRIAL ARTS COURSES, ADVANCED INDUSTRIAL ARTS COURSES, AND BEGINNING ENGLISH

This part of the study was concerned with the relationship between the academic grades made by students enrolled in beginning industrial arts courses, advanced industrial arts courses, beginning English, and the raw scores made by these same students on Part "I" (arithmetic reasoning) of the GATB. Figures 11 through 15 consist of scattergrams and correlation tables which present data concerning the paired academic grades made in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, beginning English, and the raw scores made by these same students on Part "I" of the GATB. The means and standard deviations were computed for the academic grades and the raw scores made on Part "I" by the students enrolled in each of the different courses. In order to determine the relationship between the academic grades and the raw scores made on

Part "I" by students enrolled in each of the different courses, the means and the standard deviations were treated to determine the coefficient of correlation with the Pearson-Product Moment Method. Significance of the coefficient of correlation was determined by Formula 53[1] and Table 29[2] in Garrett's Statistics in Psychology and Education.

The Relationship Between the Raw Scores Made on Part "I" (Arithmetic Reason) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Six Students Enrolled in Beginning Woodwork

In Figure 11 the distribution of the academic grades made by thirty-six students enrolled in beginning woodwork and the raw scores made by these same students on Part "I" of the GATB are shown. The mean of the academic grades when converted to numerical figures was 83.8. The standard deviation of this group of scores was 8.1. The mean of the raw scores made on Part "I" by the thirty-six students enrolled in beginning woodwork was 33.9, and the standard deviation was 6.4. The coefficient of correlation of the academic grades made in beginning woodwork and the raw scores made by these same students on Part "I" when treated statistically was .025. This coefficient of correlation was found to be of no significance at the .01, .05, and .10 levels.

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[1] Garrett, Statistics in Psychology and Education, p. 289.

[2] Ibid., p. 190.

	9-15	16-22	23-29	30-36	37-43	44-51	fy
90-99				3	2	2	7
80-89		2	1	15	1	1	20
70-79	1			4	2	1	8
60-69							
50-59				1			1
fx	1	2	1	23	5	4	

My = 83.8 σy = 8.1 Mx = 33.9 σx = 6.4 r = .025

Fig. 11--Scattergram and correlation table showing the paired academic grades made in beginning woodwork and the raw scores made on Part "I" (arithmetic reason) of the General Aptitude Test Battery by thirty-six students.

Figure 11 shows that seven of the thirty-six students who made an academic grade of "A" in beginning woodwork made raw scores on Part "I" which were in the class interval which ranged from 30 to 51. The majority of the students made academic grades of "B". Fifteen of these students also made a raw score on Part "I" which fell in the class interval which ranged from 30 to 36. One of the thirty-six students made an academic grade of "D" in beginning woodwork and a raw score on Part "I" which was in the class interval which ranged from 30 to 36.

The Relationship Between the Raw Scores Made on Part "I" (Arithmetic Reason) of the General Aptitude Test Battery and the Academic Grades Made by Fifty-Four Students Enrolled in Beginning Metal Work

The data concerning the academic grades made by fifty-four students enrolled in beginning metal work and the raw scores made on Part "I" of the GATB by these same students are shown in Figure 12. When the academic grades made by

	9-15	16-22	23-29	30-36	37-43	44-51	fy
90-99		1		3		3	7
80-89			3	15	8	1	27
70-79		1	2	4	5	2	14
60-69		1	3	1	1		6
50-59							
fx		3	8	23	14	6	

My = 81.5 σy = 8.7 Mx = 34.3 σx = 1.9 r = .12

Fig. 12--Scattergram and correlation table showing the paired academic grades made in beginning metal work and the raw scores made on Part "I" (arithmetic reason) of the General Aptitude Test Battery by fifty-four students.

this group were converted to numerical figures, the mean of the scores was found to be 81.5. The standard deviation of this group was 8.7. The mean of the raw scores made by the

fifty-four students tested on Part "I" of the GATB was 34.3, and the standard deviation was 1.9. These raw scores and academic grades were found to have a coefficient of correlation of .12 which was found to be of no significance at the .01, .05, and .10 levels when tested by Formula 53 and Table 29.

An examination of Figure 12 reveals that one of the seven students who made an academic grade of "A" also made a raw score on Part "I" which fell in the class interval which ranged from 16 to 22. One of the students who made an academic grade of "D" also made a raw score on Part "I" which fell in the interval that ranged from 16 to 22. Twenty-seven of the fifty-four students made an academic grade of "B". Fifteen of these students made raw scores on Part "I" which were in the interval which ranged from 30 to 36.

The Relationship Between the Raw Scores Made on Part "I" (Arithmetic Reason) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Three Students Enrolled in Beginning Drawing

Figure 13 presents data concerning the academic grades made by eighty-three students enrolled in beginning drawing and the raw scores made by these same students on Part "I" of the GATB. The academic grades were converted to numerical figures, and the mean of the scores was 78.6. The standard deviation of these scores was 11.1. The mean of the raw scores made by the eighty-three students enrolled in beginning drawing on Part "I" was 34.2, and the standard

deviation was 7.9. A coefficient of correlation of .024 was found when the academic grades made in beginning drawing by eighty-three students and the raw scores made on Part "I" by these same students were treated statistically. The coefficient of correlation of .024 was found to be insignificant at the .01, .05, or .10 levels.

	9-15	16-22	23-29	30-36	37-43	44-51	fy
90-99	1	1		2	5	2	11
80-89		1	1	18	7	4	31
70-79	1	2	4	12	6	2	27
60-69			1	2	3		6
50-59	1	1		4	1	1	8
fx	3	5	6	38	22	9	

My = 78.6 σy = 11.1 Mx = 34.2 σx = 7.9 r = .024

Fig. 13--Scattergram and correlation table showing the paired academic grades made in beginning drawing and the raw scores made on Part "I" (arithmetic reason) of the General Aptitude Test Battery by eighty-three students.

Figure 13 shows that one of the eleven students who made an academic grade of "A made a raw score on Part "I" which fell in the class interval which ranged from 9 to 15. One of the eight students who made an academic grade of "F" also

made a raw score on Part "I" which ranged from 9 to 15. Thirty-one of the eighty-three students enrolled in beginning drawing made academic grades of "B". Eighteen of these students made scores on Part "I" which fell in the class interval which ranged from 30 to 36.

The Relationship Between the Raw Scores Made on Part "I" (Arithmetic Reason) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

In Figure 14 the data concerning the academic grades made by thirty-eight students enrolled in advanced industrial arts courses and the raw scores made on Part "I" of the GATB are presented. The mean of the academic grades made by the thirty-eight students was 10.7. The mean of the raw scores made on Part "I" by the thirty-eight students enrolled in advanced industrial arts courses was 35.7. The standard deviation of the scores was 7.49. The coefficient of correlation of the academic grades and raw scores made by this group was .003. This coefficient of correlation was found to be of no significance at the .01, .05, and .10 levels.

The range of the raw scores made on Part "I" by the thirty-eight students enrolled in advanced industrial arts courses was from 16 to 51. The range of the academic grades made by these students was from 50 to 100 or from the letter

grades "F" through "A". One of the fourteen students who made an academic grade of "A" also made a raw score on Part "I" which fell in the class interval which ranged from 16 to 22 while three of the fourteen students made scores on Part "I" which fell in the class interval which ranged from 44 to 51. Seven of the sixteen students who made academic grades of "B" made raw scores on Part "I" which was in the class interval which ranged from 30 to 36. The two students who made academic grades of "F" in advanced industrial arts courses made raw scores on Part "I" which ranged from 37 to 43.

	9-15	16-22	23-29	30-36	37-43	44-51	fy
90-99		1	1	6	3	3	14
80-89		1	1	7	4	3	16
70-79			1	2		1	4
60-69			1	1			2
50-59					2		2
fx		2	4	16	9	7	

My = 85 σy = 10.7 Mx = 35.7 σx = 7.49 r = .003

Fig. 14--Scattergram and correlation table showing the paired academic grades made in advanced industrial arts and the raw scores made on Part "I" (arithmetic reason) of the General Aptitude Test Battery by thirty-eight students.

The Relationship Between the Raw Scores Made on Part "I" (Arithmetic Reason) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Six Industrial Arts Students Enrolled in Beginning English

The correlation between the academic grades made by eighty-six industrial arts students enrolled in beginning English and the raw scores made by these same students on Part "I" of the GATB is shown in Figure 15. When the academic grades of this group were converted to numerical figures, the mean of the scores was found to be 58.9.

	9-15	16-22	23-29	30-36	37-43	44-51	fy
90-99				1			1
80-89		1		3			4
70-79	1	1	3	8	7	2	22
60-69		2	5	20	6	5	38
50-59	2	2	2	11	3	1	21
fx	3	6	10	43	16	8	

My = 58.9 σy = 15 Mx = 33.1 σx = 6.78 r = .00003

Fig. 15--Scattergram and correlation table showing the paired academic grades made in beginning English and the raw scores made on Part "I" (arithmetic reason) of the General Aptitude Test Battery by eighty-six students.

The standard deviation of this group was 15. The mean of the raw scores made by the eighty-six students on Part "I" of the GATB was found to be 33.1, and the standard deviation was 6.78. The raw scores and academic grades were found to have a coefficient of correlation of .00003. This coefficient of correlation was found to be of no significance at the .01, .05, or .10 levels when tested.

An examination of Figure 15 shows that only one of the eighty-six students made an academic grade of "A". This student made a raw score on Part "I" which was in the class interval which ranged from 30 to 36. Most of the eighty-six students made an academic grade of "D". Twenty of these students made raw scores on Part "I" which were in the class interval which ranged from 30 to 36. Of the twenty-one students who made an academic grade of "F", two students made raw scores on Part "I" which were in the class interval which ranged from 9 to 15 and one of the twenty students made a score which fell in the class interval which ranged from 44 to 51.

The academic grades made in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, beginning English and the raw scores made by these same students on Part "I" of the GATB revealed very little relationship when treated statistically with the Pearson-Product Moment Method. None of the coefficients of correlation were of any significance at the .01, .05, or .10

levels when tested by Formula 53 and Table 29 of Garrett's Statistics in Psychology and Education.

In Chapter IV the data concerning the academic grades made in beginning industrial arts courses, advanced industrial arts courses, beginning English, and the raw scores made by these same students on Part "I" (arithmetic reason) of the GATB were presented. In Chapter V the academic grades made by students enrolled in the same courses and the converted scores made by these students on Aptitude "V" of the GATB will be presented.

CHAPTER V

THE RELATIONSHIP BETWEEN THE CONVERTED SCORES MADE ON APTITUDE "V" (VERBAL) OF THE GENERAL APTITUDE TEST BATTERY AND THE ACADEMIC GRADES MADE BY STUDENTS ENROLLED IN BEGINNING INDUSTRIAL ARTS COURSES, ADVANCED INDUSTRIAL ARTS COURSES, AND BEGINNING ENGLISH

In Chapter V the data concerning the relationship between students enrolled in beginning industrial arts courses, advanced industrial arts courses, beginning English and the converted scores made on Aptitude "V" (verbal) of the GATB by the same students are presented. Figures 16 through 20 consist of scattergrams and correlation tables which present data showing the paired academic grades made in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, beginning English and the converted scores made by these same students on Aptitude "V" of the GATB. The means and standard deviations were computed for the academic grades and converted scores made on Aptitude "V" by the students enrolled in each of the different courses. In order to determine the coefficient of correlation between

the academic grades and the converted scores made on Aptitude "V" (verbal), the means and standard deviations were treated with the Pearson-Product Moment Method. The significance of the coefficient of correlation was determined by Formula 53[1] and Table 29[2] in Garrett's Statistics in Psychology and Education.

The Relationship Between the Converted Scores Made on Aptitude "V" (Verbal) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Six Students Enrolled in Beginning Woodwork

The distribution of the academic grades made by thirty-six students enrolled in beginning woodwork and the converted scores made by these same students on Aptitude "V" of the GATB are shown in Figure 16. The mean of the academic grades when converted to numerical figures was 83.8. The standard deviation of this group of scores was 8.1. The mean of the converted scores made on Aptitude "V" by the thirty-six students enrolled in beginning woodwork was 61.3, and the standard deviation was 4.9. The coefficient of correlation of the academic grades and scores made by the thirty-six students was .007. When tested by Formula 53 and Table 29, the coefficient of correlation of .007 was found to be of no significance at the .01, .05, or .10 levels.

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[1] Garrett, Statistics in Psychology and Education, p. 289.

[2] Ibid., p. 190.

	46-50	51-55	56-60	61-65	66-70	71-75	fy
90-99		1	3		1	2	7
80-89		3	13	4			20
70-79		1	2	4	1		8
60-69							
50-59				1			1
fx		5	18	9	2	2	

My = 83.8 σy = 8.1 Mx = 61.3 σx = 4.9 r = .007

Fig. 16--Scattergram and correlation table showing the paired academic grades made in beginning woodwork and the converted scores made on Aptitude "V" (verbal) of the General Aptitude Test Battery by thirty-six students.

Further study of Figure 16 shows that the range of the academic grades made in beginning woodwork by students tested on Aptitude "V" was from 50 to 100. The range of the converted scores made on Aptitude "V" was from 51 to 75. Thirteen of the twenty students who made an academic grade of "B" made a converted score on Aptitude "V" which was in the class interval which ranged from 56 to 60. Only one of the thirty-six students made an academic grade of "F", and this student made a converted score on Aptitude "V" which fell in the class interval which ranged from 61 to 65.

The Relationship Between the Converted Scores Made on Aptitude "V" (Verbal) of the General Aptitude Test Battery and the Academic Grades Made by Fifty-Four Students Enrolled in Beginning Metal Work

In Figure 17 the distribution of the academic grades made by fifty-four students enrolled in beginning metal work and the converted scores made by these same students on Aptitude "V" of the GATB are shown. After conversion to numerical values, the mean of the scores on the academic grades was found to be 83.8. The standard deviation of this group of scores was found to be 8.1. The mean of the converted

	45-49	50-54	55-59	60-64	65-69	70-75	fy
90-99		2	1	1	2	1	7
80-89		1	11	14		1	27
70-79			9	4	1		14
60-69		1	1	3	1		6
50-59							
fx		4	22	22	4	2	

My = 83.8 σy = 8.1 Mx = 59.9 σx = 1.8 r = .12

Fig. 17--Scattergram and correlation table showing the paired academic grades made in beginning metal work and the converted scores made on Aptitude "V" (verbal) of the General Aptitude Test Battery by fifty-four students.

scores made on Aptitude "V" by the fifty-four students enrolled in beginning metal work was 59.9, and the standard deviation was 1.8. The coefficient of correlation of the converted scores made on Aptitude "V" and the academic grades made by the fifty-four students enrolled in beginning metal work when treated with the Pearson-Product Moment Method was found to be .12. The coefficient of correlation was found to be insignificant at the .01, .05, or .10 levels.

The range of the academic grades made by the fifty-four students enrolled in beginning metal work was from 60 to 100 or from "D" through "A". An examination of Figure 17 shows that one of the seven students who made an academic grade of "A" made a converted score on Aptitude "V" which was in the class interval which ranged from 50 to 59. Fourteen of the students who made academic grades of "B" made converted scores on Aptitude "V" which were in the class interval which ranged from 60 to 64. One student who made an academic grade of "D" also made a converted score on Aptitude "V" which fell in the class interval which ranged from 65 to 69.

The Relationship Between the Converted Scores Made on Aptitude "V" (Verbal) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Three Students Enrolled in Beginning Drawing

The data concerning the academic grades made by eighty-three students enrolled in beginning drawing and the converted scores made by these same students on Aptitude "V" of the

GATB are presented in Figure 18. The academic grades of this group of students were converted to numerical figures and the mean was 78.6. The standard deviation of this group was 11.1. The mean of the converted scores made by these students on Aptitude "V" was 60.2, and the standard deviation was 4.9. The academic grades made by these eighty-three students enrolled in beginning drawing and the converted scores made by these same students on Aptitude "V" were treated statistically. The coefficient of correlation was .03. The coefficient of correlation of .03 was found to be insignificant at the .01, .05, or .10 levels.

	46-50	51-55	56-60	61-65	66-70	71-75	fy
90-99	1	1	3	3		3	11
80-89		1	19	6	4	1	31
70-79		5	13	6	3		27
60-69			5	1			6
50-59		1	3	4			8
fx	1	8	43	20	7	4	

My = 78.6 σy = 11.1 Mx = 60.2 σx = 4.9 r = .03

Fig. 18--Scattergram and correlation table showing the paired academic grades made in beginning drawing and the converted scores made on Aptitude "V" (verbal) of the General Aptitude Test Battery by eighty-three students.

Further study of Figure 18 shows that forty-three of the eighty-three students enrolled in beginning drawing made converted scores on Aptitude "V" of the GATB which ranged from 56 to 60. One student, who made an academic grade of "A", made the lowest converted score that was made by the eighty-three students on Aptitude "V". Nineteen of the students who made academic grades of "B" made converted scores on Aptitude "V" which ranged from 56 to 60. Four of the eight students who made academic grades of "F" also made converted scores on Aptitude "V" which fell in the class interval which ranged from 61 to 65.

The Relationship Between the Converted Scores Made on Aptitude "V" (Verbal) of the General Aptitude Test Battery and the Academic Grades Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

The distribution of the academic grades made by thirty-eight students enrolled in advanced industrial arts courses and the converted scores made by these same students on Aptitude "V" of the GATB are shown in Figure 19. The mean of the academic grades, after conversion to numerical figures, was 85, and the standard deviation was 10.7. The mean of the converted scores made by this group of students on Aptitude "V" was 60.4, and the standard deviation was 3.2. The grades and scores made by the thirty-eight students enrolled in advanced industrial arts courses were treated statistically and a coefficient of correlation of -.04 was found.

The coefficient of correlation of -.04 was found to be of no significance at the .01, .05, or .10 levels.

	41-45	46-50	51-55	56-60	61-65	66-70	71-75	fy
90-99		1	4	1	4	4		14
80-89		1		7	7	1		16
70-79			1	2			1	4
60-69			1	1				2
50-59						2		2
fx		2	6	11	11	7	1	

My = 85 σy = 10.7 Mx = 60.4 σx = 3.2 r = -.04

Fig. 19--Scattergram and correlation table showing the paired academic grades made in advanced industrial arts courses and the converted scores made on Aptitude "V" (verbal) of the General Aptitude Test Battery by thirty-eight students.

An examination of Figure 19 shows that only one of the thirty-eight students made a converted score on Aptitude "V" which fell in the class interval which ranged from 71 to 75, and this student made an academic grade of "C". One of the fourteen students who made an academic grade of "A" also made a converted score on Aptitude "V" which fell in the interval which ranged from 46 to 50. The two students who

made academic grades of "F" both made converted scores on Aptitude "V" which fell in the class interval which ranged from 60 to 70.

The Relationship Between the Converted Scores Made on Aptitude "V" (Verbal) of the General Aptitude Test Battery and the Academic Grades Made by Eighty-Six Industrial Arts Students Enrolled in Beginning English

Figure 20 presents the data concerning the academic grades made in beginning English by eighty-six students enrolled in industrial arts and the converted scores made on Aptitude "V" of the GATB by these same students. When the academic grades were converted to numerical figures, the mean of the grades was found to be 58.9. The standard deviation of this group was 15. The mean of the converted scores made on Aptitude "V" by the eighty-six students was found to be 61, and the standard deviation was .55. The scores and grades were treated statistically, and a coefficient of correlation of .13 was found. This coefficient of correlation was found to be of no significance at the .01, .05, or .10 levels.

Figure 20 shows the range of the academic grades to be from "F" through "A" and the range of the converted scores made on Aptitude "V" to be from 50 to 74. Only three of the eighty-six students made converted scores on Aptitude "V" which fell in the class interval which ranged from 70 to 74, and all three of these students made an academic grade in

beginning English of "C". Eighteen of the eighty-six students who made an academic grade of "D" made a converted score on Aptitude "V" which fell in the class interval which ranged from 60 to 64. Six of the students who made an academic grade of "F" in beginning English also made a converted score on Aptitude "V" which was in the interval which ranged from 60 to 64.

	45-49	50-54	55-59	60-64	65-69	70-74	fy
90-99					1		1
80-89			1		3		4
70-79		3	3	10	3	3	22
60-69		2	12	18	6		38
50-59		4	11	6			21
fx		9	27	34	13	3	

My = 58.9 σy = 15 Mx = 61 σx = .55 r = .13

Fig. 20--Scattergram and correlation table showing the paired academic grades made by eighty-six industrial arts students enrolled in beginning English and the converted scores made on Aptitude "V" (verbal) of the General Aptitude Test Battery.

In Chapter V the data concerning the relationship between the academic grades made by students enrolled in beginning industrial arts courses, advanced industrial arts courses, beginning English, and the converted scores made by

these same students on Aptitude "V" of the GATB were presented. The coefficients of correlation were found to be low, and one coefficient had a negative value. When tested by Formula 53[3] and Table 29,[4] none of the coefficients of correlation proved to be significant at the .01, .05, and the .10 levels.

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[3] Ibid., p. 289.

[4] Ibid., p. 190.

CHAPTER VI

THE RELATIONSHIP BETWEEN THE CONVERTED SCORES MADE ON APTITUDES "G" AND "V" AND THE RAW SCORES MADE ON PARTS "H" AND "I" OF THE GENERAL APTITUDE TEST BATTERY BY EIGHTY-THREE STUDENTS ENROLLED IN BEGINNING DRAWING VERSUS THE SCORES MADE BY THIRTY-EIGHT STUDENTS ENROLLED IN ADVANCED INDUSTRIAL ARTS COURSES

One of the questions involved in this study was to determine the relationship between the converted scores made on Aptitudes "G" (intelligence) and "V" (verbal) and the raw scores made on Parts "H" (three-dimensional space) and "I" (arithmetic reason) of the GATB by students enrolled in beginning drawing courses versus the converted and raw scores made by thirty-eight students enrolled in advanced industrial arts courses. The relationship was determined by treating statistically the differences of the means of the scores made by the students in each course. In order to determine whether or not the differences of the means of the scores made by students on the various parts were significant, Formula 29[1] was used to compute the standard error of the

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[1]Garrett, op. cit., p. 198.

difference between the two means. The difference of the two means was then divided by the standard error to determine the critical ratio. The critical ratio was then tested by Table 29[2] to determine the significance at the .01, .05, and .10 levels.

The Relationship Between the Converted Scores Made on Aptitude "G" (Intelligence) of the General Aptitude Test Battery by Eighty-Three Students Enrolled in Beginning Drawing Versus the Scores Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

The mean of the converted scores made by the eighty-three students enrolled in beginning drawing on Aptitude "G" (intelligence) of the GATB was 116.85, and the standard deviation was 13.1. The mean of the converted scores made on Aptitude "G" by the thirty-eight students enrolled in advanced industrial arts courses was 121.1, and the standard deviation was 14. The difference in the two means was 4.25. The standard error of the means when treated with Formula 29[3] was found to be 2.71. By dividing the difference in the means by the standard error, a critical ratio of 1.94 was obtained. The critical ratio of 1.94 was found to be insignificant at the .01, and .05 levels, but proved to be significant at the .10 level.

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[2] Ibid., p. 190.

[3] Ibid., p. 207.

The Relationship Between the Raw Scores Made on Part "H" (Three-Dimensional Space) of the General Aptitude Test Battery by Eighty-Three Students Enrolled in Beginning Drawing Versus the Scores Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

A mean of 21.84 and a standard deviation of 4.4 was found when the raw scores made on Part "H" (three-dimensional space) of the GATB by eighty-three students enrolled in beginning drawing were treated statistically. The mean of the raw scores made on Part "H" by thirty-eight students enrolled in advanced industrial arts courses was found to be 21.71, and the standard deviation was 5.84. A standard error of 1.06 was found when the means and standard deviations were treated statistically. A critical ratio of .122 was found when the mean difference was divided by the standard error. This ratio was found to be insignificant at the .01, .05, and .10 levels.

The Relationship Between the Raw Scores Made on Part "I" (Arithmetic Reason) of the General Aptitude Test Battery by Eighty-Three Students Enrolled in Beginning Drawing Versus the Scores Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

The mean of the raw scores made on Part "I" (arithmetic reason) of the GATB by eighty-three students enrolled in beginning drawing was 34.32, and the standard deviation was 7.98.

The mean of the raw scores made on Part "I" by thirty-eight students enrolled in advanced industrial arts courses was 35.7, and the standard deviation was 7.49. When treated with Formula 29, the means and standard deviations revealed a standard error of 1.51. The critical ratio was found to be .913. After tests by Table 29[4] the critical ratio of .913 was found to be significant at the .10 level but proved to be insignificant at the .01 and .05 levels.

The Relationship Between the Converted Scores Made on Aptitude "V" (Verbal) of the General Aptitude Test Battery by Thirty-Eight Students Enrolled in Beginning Drawing Versus the Scores Made by Thirty-Eight Students Enrolled in Advanced Industrial Arts Courses

The mean of the converted scores made on Aptitude "V" (verbal) of the GATB by thirty-eight students enrolled in advanced industrial arts courses was found to be 60.36, and the standard deviation was 13.15. The mean of the converted scores made on Aptitude "V" by the eighty-three students enrolled in beginning drawing was 60.17, and the standard deviation was 4.9. The standard error of the difference in the means when computed by Formula 29 was found to be .73. A critical ratio of .26 was found by dividing the mean difference by the standard error. When tested by Table 29, the

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[4] Ibid., p. 190.

critical ratio of .26 was found to be of no significance at the .01, .05, or .10 levels.

The foregoing data indicate little relationship between the converted scores made on Aptitudes "G" (intelligence) and "V" (verbal) and the raw scores made on Parts "H" (three-dimensional space) and "I" (arithmetic reason) of the GATB by students enrolled in beginning drawing and students enrolled in advanced industrial arts courses. None of the critical ratios were found to be significant at the .01, or .05 levels. The relationship, however, between the converted scores made on Aptitude "G" and the raw scores made on Part "I" was found to be significant at the .10 level.

CHAPTER VII

SUMMARY

This was a study to determine the relationship between the academic grades made in beginning industrial arts courses, advanced industrial arts courses, and beginning English by students enrolled in the Industrial Arts Department at North Texas State College, Denton, Texas, and the converted scores made on Aptitudes "G" (intelligence) and "V" (verbal) and the raw scores made on Parts "H" (three-dimensional space) and "I" (arithmetic reason) of the GATB by these same students. The study also sought to find whether there was any significant relationship between the converted scores made on Aptitudes "G" (intelligence and "V" (verbal) and the raw scores made on Parts "H" (three-dimensional space) and "I" (arithmetic reason) of the GATB by students enrolled in beginning drawing and advanced industrial arts courses.

In Chapter II data were presented concerning the relationship between the academic grades made by students enrolled in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, and beginning English with the converted scores made by these same students on Aptitude "G" of the GATB. The coefficients of correlation were computed by the Pearson-Product

Moment Method. The coefficients of correlation in each case were low. When tested by Table 29[1] none of the coefficients were found to be significant at the .01, .05, or .10 levels.

In Chapter III the data concerning the academic grades made by students enrolled in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, beginning English, and the raw scores made by these same students on Part "H" of the GATB were presented. The coefficients of correlation found in each case were low, the largest being .09 and the smallest being -.02. None of the relationships were found to be significant at the .01, .05, or .10 levels.

The relationship between the academic grades made by students enrolled in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, beginning English, and the raw scores made by these same students on Part "I" of the GATB was discussed in Chapter IV. The coefficients of correlation found in each case are as follows: (1) beginning woodwork, $r = .025$; (2) beginning metal work, $r = .12$; (3) beginning drawing, $r = .0235$; (4) advanced industrial arts courses, $r = .003$; (5) beginning English, $r = .00003$. None of the coefficients of correlation were significant at the .01, .05, or .10 levels.

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[1]Garrett, op. cit., p. 190.

The academic grades made by students enrolled in beginning woodwork, beginning metal work, beginning drawing, advanced industrial arts courses, and beginning English and the converted scores made by these same students on Aptitude "V" of the GATB were treated in Chapter V to determine the relationship between the scores and grades. The academic grades and scores were placed in scattergrams in order to calculate the coefficients of correlation. No significant relationship was found to exist at the .01, .05, or .10 levels.

The converted scores made on Aptitudes "G" and "V" and the raw scores made on Parts "H" and "I" by students enrolled in beginning drawing courses and by students enrolled in advanced industrial arts courses were treated statistically to determine what, if any, relationship existed between the scores. The results were presented in Chapter VI. The difference of the means in each case was treated with Formula 29 to determine the standard error. The critical ratio was found by dividing the mean difference by the standard error. No significant relationship existed between the scores at the .01 and .05 levels. Some significant relationship was found to exist between the scores made on Factor "G" and Part "H" at the .10 level.

The results of the recent and related studies presented in this study indicate that, in most cases, the tests measured the aptitude for which they were constructed. The results also give warning against putting too much emphasis on test scores for prediction of grades in high school and beginning

college courses. In a study by Sammye Louise Routt which was made to determine the relationship between the scores made on Aptitudes "V", "Q", "T", and "F" of the GATB and the academic grades made by students enrolled in beginning typing, advanced typing, shorthand courses, and secretarial practice in the School of Business Administration, North Texas State College, Denton, Texas, it was found that the relationship between the scores made on the GATB and the academic grades was low and insignificant in the majority of the cases. The data presented in this study indicated no significant relationship between the academic grades made by industrial arts students enrolled in beginning industrial arts courses, advanced industrial arts courses, and beginning English at North Texas State College, Denton, Texas, and the converted scores made on Aptitudes "G" (intelligence) and "V" (verbal) and the raw scores made on Parts "H" (three-dimensional space) and "I" (arithmetic reason) of the GATB by these same students.

Conclusions

The following conclusions are based upon the results obtained when the data in this study was treated statistically:

1. No significant relationship was found to exist between the converted scores made on Aptitude "G" (intelligence) of the GATB and the academic grades made by students enrolled in beginning industrial arts courses, advanced industrial arts courses, and beginning English.

2. No significant relationship was found to exist between the raw scores made on Part "H" (three-dimensional space) of the GATB and the academic grades made in beginning industrial arts courses, advanced industrial arts courses, and beginning English.

3. No significant relationship was found to exist between the raw scores made on Part "I" (arithmetic reason) of the GATB and the academic grades made by students enrolled in beginning industrial arts courses, advanced industrial arts courses, and beginning English.

4. No significant relationship was found to exist between the converted scores made on Aptitude "V" of the GATB and the academic grades made by students enrolled in beginning industrial arts courses, advanced industrial arts courses, and beginning English.

5. No significant relationship was found to exist at the .01 and .05 levels between the converted scores made on Aptitudes "G" (intelligence) and "V" (verbal) and the raw scores which have been reported as meaningless made on Parts "H" (three-dimensional space) and "I" (arithmetic reason) of the GATB by students enrolled in beginning drawing and by students enrolled in advanced industrial arts courses.

6. A significant relationship was found to exist at the .10 level between the converted scores made on Aptitude "G" and the raw scores made on Part "I" of the GATB by students

enrolled in beginning drawing and students enrolled in advanced industrial arts courses.

7. Based upon the results of this study there appears to be no material difference between the converted scores and raw scores made upon the various tests when treated statistically to determine the relationship between the scores and academic grades.

Recommendations

1. A study should be made to determine the value of the GATB as to its use in the prediction of academic grades which a student will probably make in high school or college courses.

2. A similar study should be made in which the academic grades made by students enrolled in other departments and the occupational aptitude scores made by these same people on the GATB are studied to determine whether or not any relationship exists between the scores and academic grades.

3. A study should be made which would treat the raw scores made on all of the various parts of the GATB and academic grades made by the same students in order to determine if any significant relationship exists.

4. A study should be made which would include a treatment of paired scores made on the GATB and some other comparable test.

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