THE GENERAL APTITUDE TEST BATTERY AS A USEFUL INSTRUMENT IN ENROLLING VOCATIONAL STUDENTS AT HASKELL INSTITUTE IN THE APPROPRIATE VOCATIONAL PROGRAM

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by

George E. Martin

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Harry J. Walter
Approved for Major Department

Approved for Graduate Council

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CHAPTER I

INTRODUCTION

Haskell Institute, Lawrence, Kansas, offers post high school training in twenty-four vocations and a complete business course.

Haskell Institute is a United States Government school for Indians, operated under the administration of the Bureau of Indian Affairs, Department of the Interior. Haskell is a cosmopolitan educational institution which enrolls students annually from approximately ninety tribes and thirty states. During the past twenty years, 126 tribes and thirty-six states have been represented in the enrollment.

> The requirements for admission are: (1) at least one-fourth degree Indian blood; (2) approval of area and agency officials; (3) high school graduation; (4) training is open to students from any jurisdiction in the United States which qualifies students for boarding school enrollment; (5) high school transcript must indicate ability, aptitude, and proper prerequisites to pursue vocational choice.[1]

For many years the Vocational Department at Haskell has been concerned with the problems of enrolling its students in the various vocations. Recently the problems

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[1]U. S. Department of Interior, Bureau of Indian Affairs, Haskell Institute Catalog (Haskell Press, 1964), p. 21.

have become more acute due to the phasing-out of the high school program which was completed in the spring of 1965.

I. THE PROBLEM

Statement of the problem. The purpose of this study was to determine whether the General Aptitude Test Battery is a useful instrument in enrolling vocational students at Haskell Institute in the appropriate vocational program.

Statement of the need. Before the phasing-out of the high school program at Haskell Institute, the students could enroll in various vocational shops prior to their final decision upon entering post-high school training. Non-Haskell high school graduates made three choices in order of preference on their application for enrollment into the post graduate program. They were then enrolled in the vocation of their first choice and informed of the possibility of the shop's being closed due to early enrollment of other students also desiring to enter Haskell. In the event their first choice was filled, they were placed in the vocation of their second choice, and if it was filled they were then assigned to their third choice.

This method is now the procedure for enrollment at Haskell. This necessitates the prospective student to enroll early to insure his first choice of vocational training.

It was the aim of this study to suggest a method for enrollment which will more accurately and realistically place the students in the various vocations in the Vocational Technical-Training offered at Haskell Institute.

II. LIMITATIONS

For this study the research was limited to the eleven vocations in the Trade-Technical terminal training of the Vocational Department at Haskell Institute. The research was limited to the population comprised of the 275 students who took the GATB and completed four semesters of work in a vocation during the academic years of 1964-1967. The research was limited to the graduating classes of 1966 and 1967 in particular and to the enrollment procedure in general.

III. DEFINITIONS OF TERMS USED

GATB. The General Aptitude Test Battery is the testing instrument used in this study.

Haskell Institute. Haskell Institute was founded in 1884 and is one of the oldest government boarding schools for Indians in the United States. All offerings at Haskell are terminal in nature and require four semesters to qualify for graduation.

Population. The population was the 275 students in the eleven vocations of the Vocational Department at Haskell Institute who completed four semesters in a vocation and had taken the General Aptitude Test Battery. The statistical information in this study was based upon this group.

OAP. Each Occupational Aptitude Pattern consists of the most significant aptitudes together with cutting scores on these aptitudes established as minimum scores for the occupation or groups of occupations having similar aptitude requirements. The norm structure includes various combinations of the nine aptitudes measured by the GATB, B-1002, which were isolated on the basis of factor analysis studies involving fifty-nine different tests and nine experimental groups totaling 2,156 individuals. As of January 1962, there were norms for thirty-six Occupational Aptitude Pattern Structures.

Cut-Off Score. The occupational-field norms are utilized to establish cut-off scores for each aptitude which plays a significant part in each field. The cut-off scores for a given aptitude for a given occupation are those below which one-third of the occupational group in question were found to fall.

CHAPTER II

RELATED RESEARCH

Contents of GATB. Since this writer's problem was so prominently connected with the GATB, it was pertinent to research it in detail concerning the descriptions and definitions of tests and aptitudes contained in it. The following information was taken from the GATB Manual.[2]

I. DEFINITIONS OF GATB TESTS

GATB. General Aptitude Test Battery, popularly known as GATB, of which the original edition was published in 1947, and revised in 1952, by the United States Employment Service.

GATB, B-1001. The first edition of the GATB which by a process of factor analysis composed of eleven paper-and-pencil tests and four apparatus tests were selected from over One Hundred tests as the best measures of ten factors or abilities. (Fifteen tests measuring ten aptitudes.)

GATB, B-1002. The revised edition of the GATB which by a process of factor analysis was composed of twelve tests selected because they are good measures of nine aptitudes found to be important for successful performance in a wide variety of occupations. Of the twelve tests, eight are paper-and-pencil tests and four are apparatus tests.

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[2]U. S. Department of Labor, Bureau of Employment Security, Guide to the Use of the General Aptitude Test Battery; Development, Section III (Washington: Government Printing Office, October, 1962), pp. 13-15.

II. DESCRIPTIONS OF TESTS IN THE GATB, B-1002

Part 1. Name Comparison. This test 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. Measures Clerical Perception.

Part 2. Computation. This test consists of a number of arithmetic exercises requiring the addition, subtraction, multiplication, or division of whole numbers. Measures Numerical Aptitude.

Part 3. Three-Dimensional Space. This test consists of a series of exercises containing a stimulus figure and four drawings of three-dimensional objects. The stimulus figure is pictured as a flat piece of metal which is to be either bent, or rolled, or both. Lines indicate where the stimulus figure is to be bent. The examinee indicates which one of the four drawings of three-dimensional objects can be made from the stimulus figure. Measures Intelligence and Spatial Aptitude.

Part 4. Vocabulary. This test consists of sets of four words. The examinee indicates which two words have either the same or opposite meanings. Measures Intelligence and Verbal Aptitude.

Part 5. Tool Matching. This test 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. Measures Form Perception.

Part 6. Arithmetic Reason. This test consists of a number of arithmetic problems expressed verbally. Measures Intelligence and Numerical Aptitude.

Part 7. Form Matching. This test consists of two groups of variously shaped line drawings. The examinee indicates which figure in the second group is exactly the same size and shape as each figure in the first or stimulus group. Measures Form Perception.

Part 8. Mark Making. This test consists of a series of squares in which the examinee is to make three pencil marks, working as rapidly as possible. The marks to make are short lines, two vertical and the third a horizontal line beneath them. Measures Motor Coordination.

Part 9. Place. The equipment used for this test and for Part 10 consists of a rectangular wooden board (Pegboard) divided into two sections, each section containing 48 holes. The upper section contains 48 cylindrical wooden pegs. The examinee removes the wooden pegs from the holes in the upper part of the board and inserts them in the corresponding holes in the lower part of the board, moving two pegs simultaneously, one in each hand. This performance is done three times, with the examinee working rapidly to move as many of the pegs as possible during the time allowed for each of the three trials. Measures Manual Dexterity.

Part 10. Turn. The equipment described under Part 9 is also used for this test. For Part 10 the lower section of the board contains the 48 cylindrical pegs. The examinee removes a wooden peg from a hole, turns the peg over so that the opposite end is up, and returns the peg to the hole from which it was taken, using only his preferred hand. The examinee works rapidly to turn and replace as many of the 48 cylindrical pegs as possible during the time allowed. Three trials are given for this performance. Measures Manual Dexterity.

Part 11. Assemble. The equipment used for this test and for Part 12 consists of a small rectangular board (Finger Dexterity Board) containing 50 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 with his preferred hand and at the same time removes a small metal washer from a vertical rod with the other hand; examinee puts the washer on the rivet, and inserts the assembled piece into the corresponding hole in the lower part of the board using only his preferred hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.

Part 12. Disassemble. The equipment used for this test is the same as that described for Part 11. The examinee removes the small rivet of the assembly from

a hole in the lower part of the board, slides the washer to the bottom of the board, puts the washer on the rod with one hand and the rivet into the corresponding hole in the upper part of the board with the other (preferred) hand. The examinee works rapidly to move and replace as many rivets and washers as possible during the time allowed. Measures Finger Dexterity.

III. DEFINITIONS OF APTITUDES MEASURED IN THE GATB, B-1002

Aptitude 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. Measured by parts; Three-Dimensional Space, Vocabulary, and Arithmetic Reasoning.

Aptitude V. Verbal Aptitude. The ability to understand the meaning of words and to use them effectively. The ability to comprehend language, to understand meanings of whole sentences and paragraphs. Measured by Vocabulary.

Aptitude N. Numerical Aptitude. Ability to perform arithmetic operations quickly and accurately. Measured by Computation and Arithmetic Reason.

Aptitude S. Spatial Aptitude. Ability to think visually of geometric forms and to comprehend the two-dimensional representation of three-dimensional objects. The ability to recognize the relationships resulting from the movement of objects in space. Measured by Three-Dimensional Space.

Aptitude P. Form Perception. Ability to perceive pertinent detail in objects or in pictorial or graphic material. Ability to make visual comparisons and discriminations and see slight differences in shapes and shadings of figures and widths and length of lines. Measured by Tool Matching and Form Matching.

Aptitude Q. Clerical Perception. Ability to perceive pertinent detail in verbal or tabular material. Ability to observe differences in copy, to proofread

words and numbers, and to avoid perceptual errors in arithmetic computation. Measured by Name Comparison.

Aptitude K. Motor Coordination. Ability to coordinate eyes and hands or fingers rapidly and accurately in making precise movements with speed. Ability to make a movement response accurately and swiftly. Measured by Mark Making.

Aptitude F. Finger Dexterity. Ability to move the fingers, and manipulate small objects with the fingers, rapidly and accurately. Measured by Assemble and Disassemble.

Aptitude M. Manual Dexterity. Ability to move the hands easily and skillfully. Ability to work with the hands in placing and turning motions. Measured by Place and Turn.

General Aptitude Test Battery. Prior to the development of the GATB, separate tests had to be devised to measure the various abilities that appeared related to success in the different occupations. Every time the study of a different occupation was launched, new tests would be constructed if the job analysis indicated that a particular ability seemed to be important and the existing supply of USES tests did not already contain such a test.

The GATB, since 1945, has been employed as the standard experimental battery in every aptitude study that has been undertaken for the development of occupational norms. In referring to this acceptance of the GATB, Dvorak wrote:

> The new USES General Aptitude Test Battery is a combination of tests which measures a number of important aptitudes; and it supplies information regarding the individual's possibilities for successfully learning

job performances in a great many occupations grouped together into fields of work.

This battery is a product of the Occupation Analysis and Industrial Services Division, which has been engaged in job and worker analysis for more than a decade. During this time a large number of batteries of tests have been developed for the prediction of success in specific occupations or small groups of related occupations. These batteries were in most instances standardized against a criterion of occupational success such as production records and the Wherry-Doolittle Test Selection Method was employed to determine the combination of tests having maximum validity. The batteries were devised for use in the selection process where attention is focused upon the specific job opening and its requirements and the objective is to select the best qualified individual from the available applicants. The employment counselor, on the other hand, focuses his attention on the individual and is often interested in testing to explore the possibilities of various kinds of work for that person.[3]

In a different writing concerning the General Aptitude Test Battery, Dvorak stated:

The basic assumption underlying the GATB is that a large variety of tests can be boiled down to several factors and that a large variety of occupations can also be clustered into groups according to similarities in the abilities required. This makes it feasible to test all of a person's vocational abilities in one sitting and to interpret his scores in terms of a wide range of occupations.

The aptitude scores derived from the GATB were standardized on a general working population of adults and the occupational norms were developed from studies of persons already in the occupation or about ready to enter the occupation. The results of maturation studies conducted of high school students have shown that there

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[3]Beatrice J. Dvorak, "The New USES General Aptitude Test Battery," The Vocational Guidance Journal, 26:42-44, October, 1947.

is an increase in GATB aptitude scores each year from the ninth grade through the twelfth grade, but that the effects of maturation from grade 11 to grade 12 are small. The average age of the grade 11 individuals in the studies was 16.4. Hence the GATB is applicable to employment applicants who are at least 16 years of age and to students who have completed at least the tenth grade.

The battery is useful in counseling of persons who are new entrants into the labor market or who are about ready to enter the labor market, those who are considering an occupational change to some field of work in which they have had no previous experience and those who are considering vocational training.[4]

Level of ability necessary for administering the General Aptitude Test Battery. Dvorak, Droege and Seiler have collaborated on a study on the ability level necessary for successful administration of the General Aptitude Test Battery. In regard to this area they stated:

> If the Flesh Method or other methods of determining reading difficulty of the GATB are applied, the reading level is found to be about six years. That is, an individual with this much education should be able to take the entire GATB without modification. In addition, the GATB was standardized on individuals with six or more years of education. For these reasons, six years of education was the original cut-off for administering the GATB. Problems with using such a cut-off for administering the GATB are: (1) the reported number of years of education is not always the same as actual years of education; (2) six years of education in one school is not the same as six years at another school; and (3) six years of education ten years ago is not the same as six years of education now.

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[4]Beatrice J. Dvorak, "The General Aptitude Test Battery," The Personnel and Guidance Journal, 35:145-54, November, 1956.

A second method formerly used in the Employment Service to determine ability to take the GATB was highly subjective. The counselor determined whether the individual could take the GATB on the basis of his ability to complete the USES Interest Checklist on a self-application form, and his ability to respond adequately to the counselor's questions. Because these standards were so subjective, the counselor often had difficulty deciding whether the individual should be scheduled to take all of the GATB or only those parts not requiring basic literary skills.

Research was initiated in 1964 to develop an objective screening device to determine ability to take the tests of the GATB. The specific objective of the research was to develop a device that would have the following characteristics: (1) simple to administer and score; (2) short--ten minutes or less; (3) provide objective scores; and (4) differentiate between those who can and those who cannot take tests of the GATB in its present format.

The sample for the research was obtained by eight State Employment Services. (Alabama, California, Georgia, Louisiana, Michigan, Mississippi, Pennsylvania and Texas). The sample consisted of 827 individuals having eight or fewer years of education. They were administered the entire GATB and scores were obtained on each aptitude. Scores on practice items for the tests were also obtained for use as experimental predictors of ability to take the tests and obtain valid scores. Analysis of the data indicated that effective screening could be developed through use of a device consisting of practice items on the vocabulary and three-dimensional space tests of the GATB.

Of the twelve tests, eight require no reading or arithmetic ability and provide measures of Spatial Aptitude, Form Perception, Motor Coordination, Finger Dexterity and Manual Dexterity. The other four tests, which are used in measuring General Learning Ability, Verbal Aptitude, Numerical Aptitude and Clerical Perception, require reading or arithmetic ability. The educationally deficient individual may be at a disadvantage on all these tests, but particularly on those that require reading or arithmetic ability.

This brings us to the objectives of the USES test research to help the educationally deficient. The

objectives are: (1) determination of who has the ability to take the GATB, (2) development of a non-reading edition of the GATB appropriate for use with those who cannot take the reading edition, and (3) validation of tests against success in literary training, specific vocation training and occupations.[5]

Indian education. It is appropriate to discuss the educational background of the majority of students who enroll at Haskell. Most of them come directly from reservation schools and are frequently on a level below the educational par of students educated in public schools. This deficiency is being alleviated somewhat for the present younger Indians. This situation was described by Thompson:

> The educational level for younger Indians is rising. For example, the adults under forty-five have achieved an educational level of the eighth grade. Indians today are trying to catch up educationally, and the Bureau efforts are directed toward accelerating educational development. Goals established to be reached by 1970 are: high school completion for ninety percent of high school age youth; college for fifty percent of the high school graduates; and vocational and technical education beyond high school for fifty percent of the high school graduates.
>
> Special accelerated, upgraded programs--telescoped into five, six, or eight years--are offered for average Indian students who lacked educational opportunities in their earlier years. These special programs enroll approximately 6,000 students in nine schools.
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> More than 3,000 Indians were enrolled in colleges and universities in 1962-63. The average federal grant

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[5]B. J. Dvorak, Robert C. Droege, and Joseph Seiler, "New Directions in U. S. Employment Service Aptitude Test Research," The Personnel and Guidance Journal, 44:136-41, October, 1965.

was $590.00, which is being increased in 1964 in an attempt to reduce the college drop-out rate. The drop-out rate during 1963 was 19.9 percent. The total funds from all sources available specifically for Indian college students now exceeds $2,300,000.[6]

A study was undertaken by Rohrer to compare the intelligence of the average Indian child with that of the average white child, chronologically the same age. This was to determine whether a difference in average performance was present which could be attributed to a difference in race. Rohrer accomplished his study by using an Osage Indian group for whom the environmental conditions were similar enough to that of the group upon whom the tests were standardized to permit a valid comparison of the results. Both groups were attending public schools in Osage County, Oklahoma. The conclusions drawn by Rohrer from his project were:

1. The mean intelligence quotient of the younger group of 125 children of different degrees of Osage Indian blood, as measured by the Goodenough Test, was found to be 103.8. The mean intelligence quotient of the older group of 110 children of different degrees of Osage Indian blood, as measured by the Otis Test of Mental Ability, was found to be 100.05.

2. There was no correlation between the degree of Osage blood and test intelligence, as measured by the tests used in this study.

3. The intelligence quotient, as measured by the above tests, of the average child of any degree of

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[6]Helen Thompson, "Education of American Indians," Education Digest, 29:48-50, May, 1964.

Osage blood is not significantly different from that of the average white child, upon whom the tests were standardized.

4. The Osage group is socially, educationally and economically on a par with the average white population in the United States. The fact that the test intelligence of the Osage group is not inferior to that of the white population suggests that the general inferiority of American Indians in test intelligence is not due to ethnological but to cultural factors. This of course assumes that no important selective factors have been operating within the Osage group such as to render them different biologically from any other Indian group.[7]

Multiple cut-off. In regard to the multiple cut-off method, Dvorak presented the following advantages:

The U. S. Employment Service of the U. S. Department of Labor uses the multiple cut-off method for occupational norms on test batteries. A minimum or critical score is established on each significant aptitude. No total weighted score is obtained; a qualifying test score is achieved only by attaining at least the minimum score on each of the significant aptitudes. In order to determine the significant aptitudes, we analyze the data in four ways: (1) we correlate all the aptitude scores on the General Aptitude Test Battery with the criterion; (2) we compute the mean scores for all the aptitudes and compare them with the means for all the general working population; (3) we compute the standard deviations for all the aptitude score distributions and compare them with the standard deviations for the general working population to get an indication of the range of talent; (4) we analyze the job analysis information qualitatively. The result of this analysis gives us the key required for the performance of the job. After the key abilities have been selected, the norms are established in terms of minimum scores for each of the significant aptitudes. These cutting scores are set at the

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[7]John N. Rohrer, "The Test Intelligence of Osage Indians," The Journal of Social Psychology, 16:99-105, 1942.

point which will provide maximum differentiation between the good and the poor workers or trainees.[8]

Reliability of grade-point averages. In Clark's study of the reliability of grade-point averages, his main purpose was to:

> . . . compare two methods of determining the reliability of all grades made by students during one term. The desired coefficient of reliability should indicate the extent to which a student grade-point average is free of error. This coefficient should be high when all grades have been carefully determined and are based on general impressions, on a few short tests and when the instructors vary greatly in their distributions of grades.[9]

One of the methods used in his study for determining the reliability of a term average was to compute the correlations between the first and second term averages and then accept the coefficient obtained as indicating the reliability of a one-term average.

A second method used in his study for determining the reliability used only the first term grades. A ratio of two standard deviations as a useful estimate of the reliability was accepted. The ratio used was the standard deviation of all student grade-point averages weighted according to

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[8]B. J. Dvorak, "Advantages of the Multiple Cut-Off Method," Personnel Psychology, 9:45-47, 1956.

[9]Edward L. Clark, "Reliability of Grade-Point Averages," The Journal of Educational Research, 57:428-30, April, 1964.

the number of hours taken, and divided by the standard deviation of all grades made by the class. The procedure for this method follows the common practice of stating credits in terms of hours and not in terms of courses:

> As the variability of student averages approaches the variability of all grades, reliability as determined by this second method approaches a maximum.
>
> A minor criticism of using the correlation between the first and second term averages as the coefficient of reliability of a term average is that the correlation is based only on those who finish both terms. Omitted from consideration is a certain percentage of deviant students who finish only one term of work.
>
> From this study it was concluded that the ratio of the weighted standard deviation of student averages to the standard deviations of all grades, using the credit hour as the unit, can be taken as an indication of the reliability of individual grade-point averages. This method is recommended where considerations of using all the subjects and of making early determinations of reliability are important.
>
> A minor conclusion is that faculties which decide to reduce their grading system to a very few steps may expect a decrease in the reliability of student averages.[10]

The reliability of letter grades as presented in a study by Bendig related that:

> 1. The reliability of the final letter grades in the course was .80.
>
> 2. When test scores were used rather than letter grades the reliability was increased to .83.

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[10] Ibid., p. 429.

3. Converting achievement test scores into letter grades does not result in an appreciable loss in reliability.

4. The conversion of quantitative test scores to letter grades lowered the reliability from .83 to .80. Such a slight drop in reliability does not seem to substantiate an objection to the use of a five-category letter grade evaluation system on the basis of increased unreliability of measurement.[11]

Predicting vocational success. Kitson stated on the subject of predicting vocational success:

> Optimistic psychologists sometimes declare that we shall be able to predict vocational success "when vocational tests are more highly developed." On this point, William James made a pertinent observation sixty years ago: "It is safe to say that individual histories and biographies will never be written in advance no matter how 'evolved' psychology may become."[12]

In a study made at the University of Utah, Jex reported that the first-quarter grade point average had been repeatedly shown to be a good predictor of subsequent scholastic success at the university.[13] To strengthen his point, a correlation of .81 between first-quarter grades and cumulative grades at the end of the two years of college was reported.

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[11] A. W. Bendig, "The Reliability of Letter Grades," Educational and Psychological Measurement, 13:311-21, 1953.

[12] Harry D. Kitson, "Can We Predict Vocational Success," The Vocational Guidance Journal, 26:539-41, May 1948.

[13] Frank Jex, "Predicting Scholastic Achievement at the University of Utah, 1945-1949" (unpublished Ph.D. dissertation, The University of Utah, Salt Lake City, Utah, 1952), p. 53.

There is evidence that the abilities important in job performance after the end of the learning period are frequently different from those of the learning period. Investigations of the predictive value of tests for trainability and job proficiency show that shifts in aptitude requirements may take place. For example, Brown and Ghiselli correlated pairs of validity coefficients obtained from a number of studies where both job proficiency and trainability criteria had been used in validating the same kinds of tests for similar jobs.[14] Correlations between validity coefficients using the two criteria were low. This was surprisingly true even for clerical jobs where verbal, numeral, perceptual, and reasoning abilities could be expected to be important during and after learning.

Evidence of a more direct nature of the relationship of early performance to eventual achievement was found in Kornhauser's study of billing-machine operators for whom the shift could be expected to be small.[15] Even so, his

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[14]C. W. Brown and E. E. Ghiselli, "The Relationship Between the Predictive Power of Aptitude Tests for Trainability and for Job Proficiency," Journal of Applied Psychology, 36:370-72, December, 1952.

[15]A. W. Kornhauser, "A Statistical Study of a Group of Specialized Office Workers," Journal of Personnel Research, 2:103-23, 1923.

correlations were not high, especially early parts of the learning.

Patterson's general conclusions regarding the types of tests which are predictive of success in institutional training may be compared with the results of the survey by Ghiselli and Brown concerning the validity of tests for training in auto mechanics.[16] Their results indicated that tests of mechanical principles yielded the highest validities (average .39) while intelligence tests were next (average .37) followed by arithmetic tests (average .34) and tests of spatial relations (average .32).[17]

It appears that if and when public and private vocational and trade schools desire to select those students most likely to succeed, it should be possible to do so with a great degree of success.

Sharp and Pickett made the following observations concerning the GATB as a device for predicting success in college:

> The General Aptitude Test Battery (GATB) has been used widely by the State Security Offices since its

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[16] C. H. Patterson, "Predicting Success in Trade and Vocational School Courses: Review of the Literature," Educational and Psychological Measurement, 16:352-400, 1965.

[17] C. W. Brown and E. E. Ghiselli, "Validity of Tests for Auto Mechanics," Journal of Applied Psychology, 35:23-24, February, 1951.

publication in 1947 by the United States Employment Service. The GATE is being used in various situations as a predictive instrument in industry and for educational purposes. The use of the battery has been shown by Dvorak to benefit the employer in terms of lower turnover, higher production and lower training costs.

Many correlations between various aptitude scores and GPA were significantly greater than zero but none exceed .50. The following conclusions seem pertinent:

1. Certain aptitudes from the complete battery of the GATB are fair predictors of success in college.

2. The achievement and cut-off scores for our Ss were lower than those used nationally where the test was given toward the end of college training. The lower achievement of our Ss suggests training influences GATB test scores.

3. There was no advantage in using gpa from selected courses in a chosen field over the total cumulative gpa.

4. Students who were successful in engineering course work (gpa above 2.10) scored significantly higher in G, V, N, S, and P aptitudes and lower (not significantly) in the M aptitude than students who fell below 2.10.

5. The most important aptitudes and cut-off scores were identified for one prediction of success in the area investigated.

6. The aptitude scores of the GATB showed a positive relationship with general college success.

7. Eight of the nine aptitudes when correlated with gpa reached significance.

8. The multiple cut-off method recommended by Dvorak provided a fair predictive device.[18]

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[18]H. C. Sharp and L. M. Pickett, "The General Aptitude Test Battery as a Predictor of College Success," Educational and Psychological Measurement, 19:617-23, 1959.

IV. RELATIONSHIP OF THE PROPOSED STUDY TO THE RESEARCH

The literature reviewed indicates significantly that the General Aptitude Test Battery is among the most reliable of testing devices to insure correct placement in vocational training. Although admittedly many Haskell Indian students may have a deficiency in their educational background, the GATB does not discriminate against such a background to the extent that the battery would have to be adjusted or given in part to the students.

CHAPTER III

DESIGN OF THE STUDY

I. INTRODUCTION

The design of this study was intended to provide a measure of the degree of relationship between (1) the vocational GPA and the GATB scores; (2) the number and percentage of the population who did and who did not meet the minimum aptitude scores of the OAP for their particular vocation; and (3) to provide some factual weakness in the enrollment procedure for Haskell Institute.

Information concerning each student's grades, test scores and enrollment was obtained from their permanent cumulative records at Haskell Institute.

The data obtained from the statistical computations of the coefficients of correlation were analyzed and inferences concerning the predictive value of the relationship of the vocational GPA, GATB scores and student placement were designated according to the size of the coefficients.

II. SUBJECTS

The subjects in this study were 275 students enrolled in the eleven vocations of the Trade-Technical terminal training at Haskell Institute, during the school terms of

the graduating classes of 1966 and 1967, who had GATB scores and who had successfully completed four semesters of training in a vocation (See Appendix Tables I through XI).

III. INSTRUMENTATION

In the study one of the stated purposes was to determine if the population were properly placed according to their vocational aptitudes and to the relationship of their GPA and aptitude scores of the GATB. To do this, the degree of the relationship between the variables was measured by employing the formula developed by Pearson, called the Pearson Product-Moment Coefficient of Correlation.[19]

This method of computing the correlations between the GPA and each aptitude score of an OAP takes into consideration all pairs of scores for the students within the designated population. As implied in the Pearson Product-Moment Coefficient of Correlation formula, the greater the tendency for these scores to be similar toward a positive 1.00 correlation, the greater the degree of relationship between the variables.

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[19]Merle W. Tate, Statistics in Education and Psychology (New York: The Macmillan Company, 1965), p. 129.

This study was also intended to determine the percentage of the students who did and who did not meet the minimum cut-off scores of the OAP of their vocation. This was determined by counting the number of students who did and who did not meet the minimum cutting scores.

IV. PROCEDURE

Data were obtained from the permanent cumulative records at Haskell Institute. An alphabetical listing for each of the eleven vocations was compiled for each member of the population included in this study.

All data collected for this study were recorded on data sheets. These are constructed with vertical columns which include the following information for each of the population: (1) a two-digit number assigned to each student for identification purposes, (2) student's name, (3) four columns--one for each of the four semester grades, (4) an average numerical grade for the four semester grades, (5) nine columns--one each for the nine aptitude scores: general learning ability, verbal, numerical, spatial, form perception, clerical perception, motor coordination, finger dexterity and manual dexterity.

In each vocation the minimum cut-off score was provided in the applicable aptitudes so that a student's

score can be readily identified as to whether he met the minimum scores of the vocation.

For a purpose of this study, all GPA's were computed by assigning the appropriate numerical value to each grade. The following system was used: 3.50-4.00, a letter grade of A, four points; 2.50-3.49, a letter grade of B, three points; 1.50-2.49, a letter grade of C, two points; 0.50-1.49, a letter grade of D, one point; 0.00-.49, a letter grade of F, zero grade points. To get the four semester GPA, the applicable numerical values were assigned. Addition of the values and division of the sum by four rendered the four semester GPA.

After the data were compiled and recorded on data sheets, a copy of such was made to include all the original information except the names of the students included in this study. This provided data which were used without revealing the identity of the individual, his academic record or his test scores (See Tables I-XI).

The data sheets as described in the previous paragraphs were used to develop various tables. These tables were used to compute the percentage of students who met and did not meet the minimum cut-off scores of the OAP of their vocation (See Table XLVI) and the coefficient of correlation between GPA and aptitude scores (See Table XLV).

In computing Table XLVI, the percentage of students who met and who did not meet the minimum scores of the OAP was obtained by using these variables: (1) taking the number of students who met requirements and dividing by the number in the sample, and (2) taking the number of students who did not meet the requirements and dividing by the number in the sample.

Coefficients of correlation in Tables XLV and XLVI were obtained by using the following variables for all vocations: (1) GPA and (2) aptitude scores in each of the three aptitudes in an OAP of a vocation.

Tables XII through XLIV were constructed for each aptitude using the following variables: (1) range of aptitude scores, (2) GPA, (3) coefficient of correlation between GPA and aptitude scores, and (4) minimum cut-off scores of an OAP.

V. ANALYSIS OF DATA

Each of the eleven vocations at Haskell except Technical Drafting has an OAP. (Haskell has designed an OAP for this vocation to fit its own needs and course of study.) Each OAP has at least three aptitudes and a minimum cut-off score in each, which a student must obtain if he is to reach any degree of success in a vocation. Each of the thirty-six

OAP's contains a multitude of vocations which need these relative natural abilities.

After the student data were compiled for each vocation in the proper tables and the percentages and the coefficient of correlations obtained, the results were analyzed to determine (1) the relationship which exists between GPA and aptitude scores and (2) the percentage of the students who did not meet and the students who did meet the minimum cut-off scores of the OAP in their vocation. Inferences were made according to the relative size of the percentages, coefficients of the correlations, and the proper placement of students.

CHAPTER IV

RESULTS OF THE STUDY

I. INTRODUCTION

One of the stated purposes of this study was to determine whether all of the population was properly enrolled in the period of time for the 1966 and 1967 graduating classes. This was determined by the following objectives: (1) what percentage of the students enrolled in the different vocations equaled or surpassed the minimum GATB-OAP cut-off scores and (2) what percentage of the population in the different vocations did not equal or were below the minimum GATB-OAP cut-off scores.

A second purpose of the study was to determine whether a positive coefficient of correlation of .40 or greater exists between the two-year vocational GPA and all of the aptitudes in an occupational pattern of the eleven vocations. A third purpose of the study was to determine whether the GATB is a valid test for the students at Haskell Institute.

II. PRESENTATION OF DATA

Hoel states that in order for two variables to possess a positive correlation they must have certain

qualities. High values of X must be associated with high values of Y and low values of X must be associated with low values of Y. The more closely two variables are related the more closely the computed coefficient of correlation will approach a positive one.[20] A negative correlation shows an inverse relationship.

Noll states that in using the Pearson Product-Moment Coefficient of Correlation, a correlation of .50 or even less is often quite useful though a higher is more desirable. He states that for most standardized tests such correlations are usually considered acceptable if they are in the neighborhood of .40. Usually any correlation may be taken as some indication of validity when the factors affecting the relationships are taken into account.[21]

A review of the graduates of the Vocational Department at Haskell Institute during the school terms of 1966 and 1967 showed that 275 students met the criteria for inclusion in this study.

Table XLVI shows the eleven vocations, the total student members in each, the number and percentage of

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[20]Paul G. Hoel, Introduction to Mathematical Statistics (New York: John Wiley and Sons, 1954), pp. 117-122.

[21]Victor H. Noll, Introduction to Educational Measurements (Boston: Houghton Mifflin, 1957), pp. 45-51.

students who met the criteria, and the number and percentage who did not meet the criteria and letter grades. (This tabulation supports objectives two and three regarding the percentage of the population who did and who did not meet the minimum cut-off scores.)

An examination of Table XLVII reveals the coefficients of correlation between each aptitude within an OAP in a vocation of the eleven vocations and the GPA.

III. STATISTICAL ANALYSIS

There are numerous vocations within an OAP. Each OAP has a combination of a minimum of three aptitudes. An individual must attain a minimum score in each of the aptitudes within his OAP if he is to achieve a relative degree of success in his vocation. These minimum scores which an individual must attain are called minimum cut-off scores.

The population consists of 275 students in the eleven vocations over the two-year period (See Table XLVI). Within the population, 152 or 55.3 per cent met the minimum cut-off scores, 123 or 44.7 per cent did not meet the minimum cut-off scores of their vocation. The range of meeting requirements is from twelve of fifteen, or 80.0 per cent in Machinists to two of twenty or 10.0 per cent in Technical Drafting. The range of not meeting the requirements varies from eighteen of twenty or 90.0 per cent in Technical

Drafting to three of fifteen or 20.0 per cent in Machinists. This table also shows only eight of the 275 which is 2.9 per cent or 6.5 per cent of the 123 made less than a C, while 123 or 44.7 per cent of the 275 students did not meet the minimum OAP scores. This table further shows that out of the 275 students, eighteen or 6.5 per cent made A's, ninety-one or 33.1 per cent made B's, 158 or 57.5 per cent made C's, eight or 2.9 per cent made D's, and no student made an F.

Table XLVII presents data examining the second stated purpose: Did a positive coefficient of correlation of .40 or greater exist between the two-year vocational GPA and each of the aptitudes in an OAP of the eleven vocations? Table XLVII shows ten aptitudes with a negative correlation, eighteen aptitudes with very little or no significant correlation, and only five aptitudes with the acceptable degree of significant correlation.

Tables XII through XLIV show the range of aptitude scores and GPA's for each of the thirty-three aptitudes involved in the eleven vocations of this study. Only in the following aptitudes: Masonry, G, N, M; Refrigeration/Sheet-Metal G; Technical Drafting N; Welding S, M; are the students found making the highest scores also making the highest GPA's.

Table XLVIII excludes eighteen students with GPA's of 3.50-4.00 because they had earned an A grade. The statistical value of this table shows how many students other than those eighteen students had the potential yet did not excel or achieve a 3.50-4.00 GPA in their vocation. This table also shows the predictive value of the G (Intelligence) aptitude score for college success. Electronics, with a minimum G score of 105, was higher than the junior college requirement, and Technical Drafting with a minimum of 115 G score (Haskell's own prescribed requirement) is higher than the minimum four-year college requirement. Further information (based on the 257 students not receiving an A grade) indicated at least 125 students were capable of doing junior college work, fifty-one students were capable of doing four-year college work, and eleven students were capable of doing graduate and professional college work.

IV. SUMMARY OF THE RESULTS OF THE STUDY

The statistical results of the study were based upon the percentages of the population who did and who did not meet the minimum cut-off scores of the OAP in which their vocation was grouped.

These findings summarize the results: (1) the total population was not properly enrolled during the period of

time for the 1966-1967 graduating classes as presented in a specific objective of this study as the statistical measurements indicate 44.7 per cent of the students were not properly enrolled at their present aptitude ability level; (2) the statistical measurements indicate 55.3 per cent of the students were properly enrolled at their aptitude ability level; (3) there were only five of the thirty-three coefficients of correlation of a positive .40 or greater between the two-year vocational GPA and the aptitude scores of the GATB; and (4) one of the requirements for admission to Haskell Institute is that the applicant be a high school graduate or the equivalent. The reading difficulty of the GATB is at about a sixth grade level and, being a high school graduate, the applicant should be at least at this reading proficiency level. A study made by Rohrer indicates that there are no ethnological differences in test intelligence of the American Indian and other ethnic groups.[22] Inferences were drawn that the GATB is a valid test for students at Haskell Institute, Lawrence, Kansas.

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[22]John N. Rohrer, "The Test Intelligence of Osage Indians," The Journal of Social Psychology, 16:41, 1942.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. SUMMARY

The minimum OAP cut-off scores and average and above average GPA are not necessarily a guarantee of vocational success, but with all other factors being equal an individual meeting these qualifications as measured in the GATB should achieve vocational success.

The population was from varied environmental groupings and educational backgrounds. Most of them had had very few opportunities for any kind of part-time employment to develop vocational or occupational aptitudes other than those of an agricultural nature. Vocational course change or the need for change is brought on them because of these reasons: (1) lack of interest, (2) dislike, (3) lack of employment opportunities in their home area to which they can apply their skills, (4) not challenging enough, (5) personality conflict with the instructor, and (6) too difficult. Some students do not make vocational changes for various other reasons. Among these are: (1) want to remain with friends, (2) the courses are easy and the work is not too difficult, (3) the courses are too difficult, but do not want to admit it as this would be failure, (4) too late

for the "drop course" date and would lose a semester of schooling which would necessitate an additional semester, and (5) an opportunity to earn money practicing their vocation in an off-campus job. With all these reasons considered, the author feels that through proper vocational placement, testing and counseling, relatively few changes should have to be made.

Analytical statements or inferences which the author considers pertinent to the study in regard to the groupings within the population are presented in the following paragraph.

It was noted that 123 or 44.7 per cent of the population did not attain the minimum OAP cut-off scores, while 6.5 per cent made A's, 33.1 per cent made B's, 57.5 per cent made C's, 2.9 per cent made D's, and no one received an F. Only eight or 2.9 per cent of the 275 in the population made D's or failed to make a 2.00 GPA, while 55.3 per cent met the minimum OAP cut-off scores. Since there were only eight or 2.9 per cent not making a GPA of 2.00, eighteen or 6.5 per cent making a GPA of 3.50 or higher, and with 125 or 45.4 per cent of the population attaining the G score of 100 or greater with the predictive value of completing a junior college education or higher, there is an indication of weakness and/or inadequacies existent in in the system employed. These findings could perhaps

explain why there was not more of the population with .40 or greater coefficients of correlation between the GPA and aptitude scores.

II. CONCLUSIONS

While there are many factors which influence accurate and realistic placement of students in the proper vocations, it seems that the problem at Haskell could be eased a great deal by the administering of the GATB prior to enrollment in order to anticipate those problems which arise from students who choose a particular vocation with no special aptitude for trainability in that particular area as well as problems arising for students who are not able to take training in the shop for which they are best qualified in learning because that particular shop has been filled.

A clear-cut policy on requirements for admission to each vocation would in most instances eliminate these areas of difficulty. The present "first-come-first-served" policy resulting in the dissatisfaction and the improper placement of students dictates the application of these conclusions drawn from this study: (1) GPA is the most reliable single predictor of college and vocational achievement; (2) the minimum cut-off score of each aptitude in a given OAP pattern is sufficient for vocational achievement; (3) the 1966 and 1967 graduates of Haskell were representative

of other graduating classes of Haskell; and (4) a .40 coefficient of correlation should indicate an acceptable degree of relationship between the variables which were compared.

III. RECOMMENDATIONS FOR ENROLLMENT

Based upon the research of this study, these suggestions and recommendations for enrollment procedure at Haskell Institute are proposed: (1) accept all students who meet the qualifications until dormitory space is no longer available; (2) have a week of orientation, testing and enrollment for all new and incoming students prior to the beginning of the school year; (3) administer the GATB prior to enrollment, using the minimum OAP cut-off scores as a guide for enrollment; (4) suggest an interest test in addition to the GATB scores prior to enrollment of students; (5) provide a four-week period for the acceptance of new vocational students and vocational changes regardless of how many changes by any one student after he has been tested and counseled; (6) accept a student in a vocation with a weakness only if he is willing to enroll and satisfactorily complete a related course the first semester while in attendance of that particular vocation; (7) should a vocational change become desirable, a student's high school transcript, OAP cut-off scores, and interest test scores should all be

considered; and (8) vocational shops would be closed only by capacity of students with ability not upon numbers of early enrollees.

IV. RECOMMENDATIONS FOR FURTHER STUDY

The following recommendations are suggested for further and more advanced research concerning this study.

An investigation could be conducted by employing the questionnaire method to determine:

1. In what occupation is each student included in this study presently employed?
2. Is the student employed in an occupation for which he was originally trained?
3. What is his present rank or level in the employment structure of his company?
4. List his starting salary. What is his present salary?
5. Where is the student employed? In what class City? Is he in his home community?

The results of the questionnaires could then be tabulated to supply the following data:

1. Is his present employment indicative of his choice of vocation?
2. Did the GATB scores indicate success and has he achieved success?

3. Did the GATB scores indicate success and has he failed to achieve success?
4. Did the GATB scores indicate he would not achieve success but he is achieving success?
5. Did the GATB scores indicate he would not achieve success and he is not achieving success?

Further study is recommended to determine why more of the GATB scores were not reflected in the given letter grades. How can these differences be reconciled?

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APPENDIX A

TABLE I

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE AUTO MECHANIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G*	V	N	S*	P	Q	K	F*	M
1.	2.00	112	88	119	130	117	107	126	118	124
2.	2.25	80	80	53	114	67	80	101	105	129
3.	2.25	107	96	107	114	103	105	107	81	107
4.	3.00	102	90	99	124	128	112	126	122	127
5.	3.50	96	68	111	114	111	113	124	133	152
6.	2.00	100	94	96	124	87	114	130	104	140
7.	2.00	90	86	95	74	100	98	101	79	107
8.	2.00	98	80	98	133	89	87	107	97	137
9.	2.50	98	86	81	114	99	103	91	92	118
10.	3.00	105	96	97	104	120	104	101	110	126
11.	2.25	75	80	62	114	107	87	120	87	91
12.	2.25	74	78	62	124	93	94	113	97	135
13.	3.00	118	109	109	124	113	91	101	113	145
14.	2.50	117	98	113	130	82	105	99	70	117
15.	2.50	105	88	107	124	119	109	120	58	115
16.	2.50	92	86	88	117	98	93	115	53	97
17.	2.00	87	78	78	117	107	90	99	91	130
18.	2.50	94	84	104	133	127	120	105	53	84
19.	3.00	118	98	115	133	107	118	120	72	97
20.	2.50	107	98	97	120	139	118	113	73	109
21.	2.75	107	84	91	130	101	103	142	97	137
22.	2.00	118	96	99	133	91	104	120	86	99
23.	3.00	97	90	99	104	126	115	99	93	114
24.	3.75	100	84	107	124	113	99	117	108	113
25.	2.25	100	84	95	124	85	87	99	81	91
26.	3.50	109	92	107	133	131	105	124	103	129
27.	2.50	107	88	105	19	131	114	109	91	88
28.	4.00	88	90	90	107	102	103	97	91	102
29.	2.25	73	82	67	97	107	94	120	86	85
30.	2.00	82	86	85	114	122	118	109	98	102
31.	2.00	112	90	113	124	104	97	93	85	93
32.	2.75	79	74	94	127	120	114	136	129	159
33.	3.00	106	94	111	124	121	118	115	133	136
34.	2.00	92	86	86	107	98	99	124	110	137
35.	3.50	109	98	109	127	94	98	99	108	120
36.	1.50	80	78	94	74	104	101	97	97	130
37.	3.00	100	96	115	71	75	94	91	93	118

TABLE I (continued)

Student	GPA	G*	V	N	S*	P	Q	K	F*	M
38.	2.75	105	100	97	120	101	103	120	131	130
39.	2.25	95	98	76	107	92	98	113	116	105
40.	4.00	87	78	90	110	112	101	86	64	94
41.	2.25	92	102	94	101	84	97	86	96	87
42.	2.00	90	80	84	104	95	80	84	84	118
43.	2.00	106	100	99	124	91	100	105	97	86
44.	4.00	100	90	90	130	116	90	120	120	97
45.	3.75	80	124	115	124	109	112	113	110	117
46.	2.50	87	92	90	91	98	103	115	115	127
47.	2.00	93	86	99	53	107	107	120	105	103
48.	2.50	92	72	89	150	108	99	122	99	109
49.	2.25	100	102	90	114	98	93	78	85	102
50.	4.00	89	88	90	110	103	120	86	90	118
51.	2.50	111	96	99	127	111	103	105	97	109
52.	2.00	100	82	105	110	120	115	93	79	93
53.	3.75	106	104	95	107	97	89	95	103	119
54.	2.50	96	96	76	124	108	105	109	65	109
55.	2.25	80	90	100	78	113	112	101	57	94
56.	2.00	102	92	107	110	109	103	113	64	110
57.	2.00	93	92	92	101	103	100	89	137	79
58.	2.50	99	96	108	127	115	89	109	129	143
59.	2.50	116	104	111	124	119	123	128	126	104
60.	2.25	104	98	86	133	113	99	109	117	115
61.	3.00	111	86	109	130	107	105	109	150	112
62.	2.00	98	90	94	124	116	110	120	125	105
63.	2.25	110	121	105	101	89	98	101	96	75
64.	3.25	109	96	95	120	96	105	103	123	123
65.	3.00	93	90	90	124	111	109	120	95	120
66.	2.25	93	88	90	117	99	100	93	63	101
67.	2.50	95	80	96	124	103	103	93	125	119
68.	2.50	107	96	102	130	92	108	120	115	120
69.	3.00	100	88	91	117	111	120	138	104	137
70.	2.00	109	92	86	150	102	86	97	99	120
71.	2.75	84	90	87	101	71	90	74	149	138
72.	2.75	113	98	103	140	127	99	101	114	102
73.	2.25	81	82	92	84	90	96	111	81	91
74.	1.50	84	86	108	78	94	104	82	66	97
75.	2.50	78	80	80	74	74	90	95	112	97
76.	3.25	94	98	94	97	120	113	115	106	114

*Minimum required cut-off scores for OAP Number Eleven: G-95, S-85, F-75.

TABLE II

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE CARPENTRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G	V	N*	S*	P	Q	K	F	M*
1.	2.50	107	88	103	124	109	97	62	113	111
2.	1.25	72	70	83	97	103	76	101	65	119
3.	2.25	75	74	71	114	100	80	109	111	131
4.	3.00	90	78	83	137	109	115	113	81	103
5.	2.75	110	86	116	101	107	98	72	67	89
6.	2.25	96	86	91	107	97	90	91	91	95
7.	2.00	92	78	78	127	94	100	111	82	120
8.	2.00	105	80	92	137	87	97	113	95	143
9.	3.25	110	86	117	120	111	105	117	110	116
10.	1.50	100	82	111	110	105	104	82	85	107
11.	3.25	106	96	94	140	126	112	111	120	137
12.	3.50	120	100	101	153	78	105	82	67	110
13.	2.00	103	92	105	104	74	87	101	79	107
14.	3.00	117	106	117	120	134	129	149	101	145
15.	2.00	100	88	115	107	112	105	115	97	112
16.	4.00	113	104	109	104	96	98	111	97	109
17.	2.75	117	94	122	110	111	119	138	113	145
18.	2.00	100	102	99	88	89	101	105	74	99
19.	3.50	120	100	120	12	100	104	82	89	125
20.	2.00	104	88	119	130	150	135	126	117	127
21.	4.00	106	108	105	114	99	109	101	129	144
22.	3.25	104	92	70	160	101	99	180	117	108

*Minimum required cut-off scores for OAP Number Twenty-five: N-80, S-90, M-80.

TABLE III

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE ELECTRICIAN STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G	V	N*	S*	P	Q	K	F*	M
1.	2.75	111	92	126	91	114	109	113	77	134
2.	2.50	91	82	90	127	119	109	105	120	131
3.	2.75	110	96	121	124	132	118	126	116	108
4.	2.00	109	104	99	110	89	96	101	58	95
5.	3.75	124	106	122	127	113	108	109	104	103
6.	3.00	83	86	92	84	98	47	99	104	92
7.	2.75	118	92	125	140	149	132	120	88	111
8.	2.75	110	92	109	137	130	107	113	104	117
9.	2.50	120	96	117	147	132	105	122	85	121
10.	3.00	97	74	103	124	114	103	126	95	161
11.	2.50	85	76	96	104	115	109	107	79	102
12.	3.50	93	90	96	104	89	86	105	102	106
13.	2.75	86	100	78	78	86	105	99	95	100
14.	2.50	102	92	99	120	113	99	128	124	135
15.	3.00	98	82	103	101	122	101	87	79	118
16.	2.50	107	94	101	124	110	104	120	96	107
17.	2.00	94	86	102	114	87	110	95	98	138
18.	2.00	101	100	92	120	119	100	91	90	114
19.	2.25	100	82	113	110	125	110	105	101	113

*Minimum required cut-off scores for OAP Number Twenty-four: N-85, S-95, F-80.

TABLE IV

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE ELECTRONIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G*	V	N	S*	P*	Q	K	F	M
1.	2.00	94	94	76	114	111	98	113	101	110
2.	3.50	110	98	127	107	105	118	109	144	139
3.	3.00	104	102	103	114	90	94	76	96	110
4.	2.25	103	86	101	130	115	118	118	69	92
5.	2.25	119	102	101	130	91	105	113	72	104
6.	2.75	106	98	99	117	103	99	101	96	96
7.	2.50	114	111	107	124	103	108	87	90	79
8.	3.25	119	94	119	140	135	114	122	100	106
9.	3.25	124	111	117	133	125	109	120	79	85
10.	2.25	116	115	111	120	117	112	113	116	118
11.	2.00	105	98	96	147	119	104	109	107	110
12.	2.75	112	115	103	124	108	94	107	109	104
13.	3.50	105	84	113	130	123	118	111	106	112
14.	3.75	105	102	115	104	115	117	142	101	113
15.	2.00	124	117	113	133	143	133	128	84	93
16.	2.75	117	102	123	130	127	126	120	113	147
17.	3.25	123	109	111	132	120	114	120	141	141
18.	2.25	113	88	129	127	137	117	124	99	90
19.	1.75	109	92	111	114	95	96	89	65	114
20.	1.75	92	108	87	104	107	112	126	97	91
21.	2.50	111	100	113	124	132	104	124	85	115
22.	2.75	128	123	121	133	153	125	134	122	133

*Minimum required cut-off scores for OAP Number Five: G-105, S-95, P-100.

TABLE V

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE MACHINIST STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G	V	N*	S*	P	Q	K	F	M*
1.	3.75	88	82	90	110	104	115	93	90	88
2.	2.75	92	86	64	124	129	105	105	106	103
3.	3.75	97	94	107	88	111	107	115	90	113
4.	2.75	101	86	105	94	92	97	99	79	109
5.	3.50	118	115	115	117	117	98	142	125	135
6.	2.50	101	98	98	124	110	98	97	72	113
7.	3.00	107	94	105	97	96	96	107	50	100
8.	2.00	66	76	67	81	89	81	111	56	100
9.	3.00	98	92	95	107	93	103	117	84	99
10.	2.75	108	104	101	124	101	90	115	79	117
11.	2.25	94	102	90	91	92	100	113	44	86
12.	3.00	91	94	97	101	112	107	91	85	87
13.	3.00	127	109	107	153	125	103	76	95	94
14.	3.50	96	92	86	124	100	109	82	108	117
15.	3.75	101	86	89	110	110	58	103	106	120

*Minimum required cut-off scores for OAP Number Twenty-five: N-80, S-90, M-80.

TABLE VI

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE MASONRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G*	V	N*	S	P	Q	K	F	M*
1.	2.25	92	102	108	84	126	112	124	100	125
2.	3.00	82	80	92	94	103	94	132	87	118
3.	2.75	81	78	83	107	76	91	82	81	95
4.	3.00	94	94	80	120	125	100	82	87	144
5.	1.75	78	86	88	74	81	97	97	74	72
6.	1.50	85	84	52	71	90	103	138	81	124
7.	2.25	96	102	78	110	103	91	91	87	97
8.	2.25	80	92	79	97	104	96	103	131	132
9.	3.00	90	84	88	114	127	113	113	106	140
10.	3.00	110	92	107	130	122	101	93	85	75
11.	3.00	99	92	98	140	127	104	95	110	100
12.	1.75	92	92	78	117	107	94	103	112	111
13.	2.25	94	82	99	94	110	100	122	104	117
14.	2.00	66	66	75	91	106	100	120	79	108
15.	3.00	51	76	68	71	88	88	93	53	80
16.	3.50	110	115	103	97	94	94	115	112	118

*Minimum required cut-off scores for OAP Number Fourteen: G-90, N-95, M-75.

TABLE VII

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE PAINTING AND DECORATING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G	V	N*	S*	P	Q	K	F	M*
1.	2.25	82	72	92	104	90	97	101	121	115
2.	2.50	103	94	89	163	117	107	86	97	114
3.	2.25	94	104	91	124	112	118	140	153	143
4.	1.75	95	82	94	124	120	100	136	103	125
5.	2.75	73	82	91	88	112	90	140	122	138
6.	3.00	83	76	85	130	113	94	113	122	122
7.	2.00	80	74	63	107	82	89	74	56	61
8.	2.50	83	82	73	124	105	103	91	103	113
9.	2.50	89	84	102	110	107	114	80	86	73
10.	2.00	73	92	60	91	103	93	87	53	104
11.	2.25	103	96	103	107	100	98	101	67	96
12.	3.75	105	86	101	127	135	118	115	129	131
13.	2.75	101	78	105	124	119	104	149	120	172
14.	2.25	115	100	111	127	108	107	89	101	136
15.	2.50	80	76	85	107	92	96	109	114	128
16.	2.50	67	76	70	101	79	100	159	90	131
17.	4.00	103	92	107	107	115	101	124	97	143
18.	3.75	100	100	102	127	121	105	113	92	108
19.	3.50	91	88	81	127	129	100	132	114	129
20.	2.75	80	82	92	81	86	113	113	74	135

*Minimum required cut-off scores for OAP Number Twenty-five: N-80, S-90, M-80.

TABLE VIII

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE PLUMBING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G*	V	N*	S	P	Q	K	F	M*
1.	2.00	86	90	92	91	96	101	111	70	131
2.	2.00	99	96	98	127	96	94	120	86	93
3.	2.00	131	96	122	153	114	110	117	95	108
4.	3.25	96	92	102	114	113	101	130	124	113
5.	2.25	80	84	86	84	101	98	117	87	98
6.	2.25	147	90	96	71	94	112	159	79	112
7.	2.50	85	82	88	97	101	93	105	127	114
8.	2.00	118	70	66	91	105	99	118	105	138
9.	2.25	111	92	115	124	104	99	99	75	112
10.	2.00	79	82	92	68	76	101	99	67	66
11.	2.25	95	82	102	117	120	101	101	112	124
12.	2.50	82	76	94	94	80	103	111	97	107
13.	2.50	102	88	97	124	96	129	115	116	123
14.	2.25	101	88	84	133	119	99	103	98	124
15.	2.00	99	98	93	101	123	118	101	77	110
16.	2.00	69	72	55	94	71	76	105	81	96
17.	3.00	76	94	75	91	92	99	99	71	88

*Minimum required cut-off scores for OAP Number Twenty: G-80, N-75, M-85.

TABLE IX

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE REFRIGERATION AND SHEET METAL STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GAP	G*	V	N	S*	P	Q	K	F	M*
1.	1.75	88	68	80	133	39	99	78	116	133
2.	2.00	85	84	83	101	95	96	107	96	90
3.	2.00	107	88	99	130	117	105	97	108	98
4.	2.00	98	96	94	88	79	93	84	104	78
5.	1.50	75	72	77	107	107	94	87	67	103
6.	2.25	79	76	103	58	71	104	107	106	118
7.	3.00	104	90	103	120	94	101	91	82	81
8.	3.75	128	111	128	130	108	108	126	101	106
9.	2.00	112	92	114	101	85	100	128	106	152
10.	2.75	105	88	105	147	115	104	93	107	98
11.	2.25	92	96	102	91	106	117	128	74	97
12.	3.25	99	96	82	133	110	87	82	80	79
13.	2.75	83	74	94	97	117	96	82	83	111
14.	2.50	110	96	111	107	95	103	107	90	129
15.	2.50	100	92	82	130	106	93	105	90	150
16.	3.00	110	96	111	107	113	113	95	104	124
17.	2.25	103	84	91	120	69	99	107	82	76
18.	3.00	110	98	113	140	116	120	132	109	142
19.	2.25	107	84	111	114	84	100	95	57	90
20.	3.25	90	76	89	140	110	99	103	107	113

*Minimum required cut-off scores for OAP Number Ten: G-95, S-95, M-85.

TABLE X

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE TECHNICAL DRAFTING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G*	V	N*	S*	P	Q	K	F	M
1.	2.00	94	90	90	120	110	96	124	119	106
2.	3.00	101	92	96	130	124	118	132	90	116
3.	2.75	105	121	103	91	111	115	84	49	101
4.	2.75	105	94	99	117	117	115	99	93	74
5.	3.00	104	104	99	110	96	101	120	106	144
6.	2.50	111	102	84	150	114	96	84	77	94
7.	2.00	103	96	109	117	104	109	118	89	96
8.	2.50	119	94	99	166	125	109	120	95	152
9.	2.75	118	108	117	120	82	91	118	88	108
10.	2.50	106	92	117	107	131	115	155	117	156
11.	2.75	116	108	111	137	143	126	136	116	143
12.	3.25	110	90	93	140	99	107	97	73	115
13.	2.75	103	112	109	110	116	107	82	77	63
14.	2.00	94	90	88	120	77	101	91	77	91
15.	2.50	109	100	101	124	99	98	118	112	89
16.	2.00	106	96	87	127	106	100	91	96	90
17.	2.25	89	82	94	101	100	60	117	79	138
18.	2.50	123	133	103	127	103	114	117	100	134
19.	2.25	102	88	95	114	105	101	109	77	104
20.	2.75	86	82	85	133	98	97	111	99	114

*Minimum required cut-off scores for Haskell Institute's self-imposed OAP for Technical Drafting: G-115, N-105, S-115.

TABLE XI

TWO-YEAR VOCATIONAL GRADE POINT AVERAGES AND APTITUDE SCORES FOR THE WELDING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

Student	GPA	G	V	N	S*	P	Q	K	F*	M*
1.	2.50	106	100	99	124	91	100	105	97	86
2.	2.75	102	88	87	124	115	89	117	96	113
3.	2.00	79	76	90	91	101	101	101	77	116
4.	2.75	98	104	82	120	99	81	99	98	113
5.	1.75	87	90	83	114	75	81	91	99	91
6.	2.25	77	84	83	97	104	101	159	79	104
7.	2.25	92	86	92	117	127	134	91	115	81
8.	1.50	113	109	101	124	96	94	78	64	83
9.	2.00	101	88	105	91	103	128	118	96	98
10.	2.50	79	84	75	91	96	82	105	122	128
11.	2.75	87	84	84	110	99	112	130	89	138
12.	2.75	92	84	100	110	124	138	117	103	127
13.	3.00	89	86	84	114	115	93	101	101	142
14.	2.25	77	84	79	97	81	88	87	77	116
15.	3.25	94	96	96	97	100	96	97	113	131
16.	1.75	73	78	75	91	91	86	120	90	130
17.	2.25	68	84	61	78	118	81	120	104	123
18.	2.25	83	82	90	91	112	101	105	60	94
19.	1.50	76	72	78	84	137	107	105	86	105
20.	2.50	77	78	90	74	108	84	101	64	93
21.	1.75	104	96	99	120	97	103	95	110	108
22.	2.50	100	96	81	104	109	98	95	116	118
23.	2.00	96	90	103	101	109	103	118	81	100
24.	2.00	96	102	88	117	105	104	84	81	121
25.	2.00	70	76	77	97	119	104	107	69	110
26.	2.00	87	86	94	104	102	90	97	89	99
27.	3.00	93	92	71	130	109	101	89	97	94
28.	2.00	85	84	100	84	104	117	107	108	93

*Minimum required cut-off scores for OAP Number Twenty-seven: S-80, F-90, M-85.

TABLE XII

GRADE POINT AVERAGES AND THE RANGE OF G APTITUDE SCORES FOR THE AUTO MECHANIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

G* Scores	Grade Point Average				
	A	B	C	D	F
115-119		2	3		
110-114		2	4		
105-109	1	7	7		
100-104	2	3	6		
95- 99		2	6		
90- 94		2	11		
85- 89	3		2		
80- 84	1	1	4	2	
75- 79		1	2		
70- 74			2		
Totals for 76 Students	7	20	47	2	0

*OAP pattern Number Eleven minimum cut-off score: 95. Coefficient of correlation = -.01.

TABLE XIII

GRADE POINT AVERAGES AND THE RANGE OF S APTITUDE SCORES FOR THE AUTO MECHANIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
145-159			2		
130-144	1	5	7		
115-129	2	9	16		
100-114	4	4	14		
85- 99		1	2		
70- 84		1	4	2	
55- 69					
40- 54			1		
25- 39					
10- 24			1		
Totals for 76 Students	7	20	47	2	0

*OAP pattern Number Eleven minimum cut-off score: 85. Coefficient of correlation = .07.

TABLE XIV

GRADE POINT AVERAGES AND THE RANGE OF F APTITUDE SCORES FOR THE AUTO MECHANIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

F* Scores	Grade Point Average				
	A	B	C	D	F
150-154		1			
145-149		1			
140-144					
135-139			1		
130-134		3			
125-129		2	4		
120-124	1	1			
115-119			5		
110-114	1	3	2		
105-109	1	2	2		
100-104	1	2	1		
95- 99		2	9	1	
90- 94	2	2	3		
85- 89			5		
80- 84			4		
75- 79			2		
70- 74		1	2		
65- 69			1	1	
60- 64	1		2		
55- 59			2		
50- 54			2		
Totals for 76 Students	7	20	47	2	0

*OAP pattern Number Eleven minimum cut-off score: 75. Coefficient of correlation = .28.

TABLE XV

GRADE POINT AVERAGES AND THE RANGE OF N APTITUDE SCORES FOR THE CARPENTRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

N* Scores	Grade Point Average				
	A	B	C	D	F
120-124		2			
115-119		3	2		
110-114				1	
105-109	2		1		
100-104		1	1		
95- 99			1		
90- 94		1	2		
85- 89					
80- 84		1		1	
75- 79			1		
70- 74		1	1		
Totals for 22 Students	2	9	9	2	0

*OAP pattern Number Twenty-five minimum cut-off score: 80. Coefficient of correlation = .25.

TABLE XVI

GRADE POINT AVERAGES AND THE RANGE OF S APTITUDE SCORES FOR THE CARPENTRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
150-164		2			
135-149		2	1		
120-134		2	3		
105-119	1	1	3	1	
90-104	1	1	1	1	
75- 89			1		
60- 74					
45- 59					
30- 44					
15- 29					
0- 14		1			
Totals for 22 Students	2	9	9	2	0

*OAP pattern Number Twenty-five minimum cut-off score: 90. Coefficient of correlation = .05.

TABLE XVII

GRADE POINT AVERAGE AND THE RANGE OF M APTITUDE SCORES FOR THE CARPENTRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

M* Scores	Grade Point Average				
	A	B	C	D	F
145-149		2			
140-144	1		1		
135-139		1			
130-134			1		
125-129		1	1		
120-124			1		
115-119		1		1	
110-114		1	2		
105-109	1	1	1	1	
100-104		1			
95- 99			2		
90- 94					
85- 89		1			
80- 84					
Totals for 22 Students	2	9	9	2	0

*OAP pattern Number Twenty-five minimum cut-off score: 80. Coefficient of correlation = .20.

TABLE XVIII

GRADE POINT AVERAGE AND THE RANGE OF N APTITUDE SCORES FOR THE ELECTRICIAN STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

N* Scores	Grade Point Average				
	A	B	C	D	F
125-129		2			
120-124	1	1			
115-119			1		
110-114			1		
105-109		1			
100-104		2	2		
95- 99		1	3		
90- 94		1	2		
85- 89					
80- 84					
75- 79		1			
Totals for 19 Students	1	9	9	0	0

*OAP pattern Number Twenty-four minimum cut-off score: 85. Coefficient of correlation = .27.

TABLE XIX

GRADE POINT AVERAGE AND THE RANGE OF S APTITUDE SCORES FOR THE ELECTRICIAN STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
145-149			1		
140-144		1			
135-139		1			
130-134					
125-129	1		1		
120-124		2	3		
115-119					
110-114			3		
105-109					
100-104		2	1		
95- 99					
90- 94		1			
85- 89					
80- 84		1			
75- 79		1			
Totals for 19 Students	1	9	9	0	0

*OAP pattern Number Twenty-four minimum cut-off score: 95. Coefficient of correlation = -.07

TABLE XX

GRADE POINT AVERAGE AND THE RANGE OF F APTITUDE SCORES FOR THE ELECTRICIAN STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

F* Scores	Grade Point Average				
	A	B	C	D	F
120-124			2		
115-119		1			
110-114					
105-109					
100-104	1	3	1		
95- 99		2	2		
90- 94			1		
85- 89		1	1		
80- 84					
75- 79		2	1		
70- 74					
65- 69					
60- 64					
55- 59			1		
Totals for 19 Students	1	9	9	0	0

*OAP pattern Number Twenty-four minimum cut-off score: 80. Coefficient of correlation = .10.

TABLE XXI

GRADE POINT AVERAGE AND THE RANGE OF G APTITUDE SCORES FOR THE ELECTRONIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

G* Scores	Grade Point Average				
	A	B	C	D	F
125-129		1			
120-124		2	1		
115-119		2	2		
110-114		1	4		
105-109	1	2	2		
100-104		1	1		
95- 99					
90- 94			2		
Totals for 22 Students	1	9	12	0	0

*OAP pattern Number Five minimum cut-off score: 105. Coefficient of correlation = .16.

TABLE XXII

GRADE POINT AVERAGE AND THE RANGE OF S APTITUDE SCORES FOR THE ELECTRONIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
145-149			1		
140-144		1			
135-139					
130-134		5	3		
125-129			1		
120-124			4		
115-119		1			
110-114		1	2		
105-109		1			
100-104	1		1		
95- 99					
Totals for 22 Students	1	9	12	0	0

*OAP pattern Number Five minimum cut-off score: 95. Coefficient of correlation = -.15.

TABLE XXIII

GRADE POINT AVERAGE AND THE RANGE OF P APTITUDE SCORES FOR THE ELECTRONIC STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
150-154		1			
145-149					
140-144			1		
135-139		1	1		
130-134			1		
125-129		2			
120-124		2			
115-119	1		3		
110-114			1		
105-109		1	2		
100-104		1	1		
95- 99			1		
90- 94		1	1		
Totals for 22 Students	1	9	12	0	0

*OAP pattern Number Five minimum cut-off score: 100. Coefficient of correlation = .12.

TABLE XXIV

GRADE POINT AVERAGE AND THE RANGE OF N APTITUDE SCORES FOR THE MACHINIST STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

N* Scores	Grade Point Average				
	A	B	C	D	F
115-119		1			
110-114					
105-109	1	3			
100-104		1			
95- 99		2	1		
90- 94	1		1		
85- 89	1	1			
80- 84					
75- 79					
70- 74					
65- 69			1		
60- 64			1		
Totals for 15 Students	3	8	4	0	0

*OAP pattern Number Twenty-five minimum cut-off score: 80. Coefficient of correlation = .44.

TABLE XXV

GRADE POINT AVERAGE AND THE RANGE OF S APTITUDE SCORES FOR THE MACHINIST STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
150-154		1			
145-149					
140-144					
135-139					
130-134					
125-129					
120-124		2	2		
115-119		1			
110-114	2				
105-109		1			
100-104		1			
95- 99		1			
90- 94		1	1		
85- 89	1				
80- 84			1		
Totals for 15 Students	3	8	4	0	0

*OAP pattern Number Twenty-five minimum cut-off score: 90. Coefficient of correlation = -.01.

TABLE XXVI

GRADE POINT AVERAGE AND THE RANGE OF M APTITUDE SCORES FOR THE MACHINIST STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

M* Scores	Grade Point Average				
	A	B	C	D	F
135-139		1			
130-134					
125-129					
120-124	1				
115-119		2			
110-114	1		1		
105-109		1			
100-104		1	2		
95- 99		1			
90- 94		1			
85- 89	1	1	1		
80- 84					
Totals for 15 Students	3	8	4	0	0

*OAP pattern Number Twenty-five minimum cut-off score: 80. Coefficient of correlation = .18.

TABLE XXVII

GRADE POINT AVERAGE AND THE RANGE OF G APTITUDE SCORES FOR THE MASONRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

G* Scores	Grade Point Average				
	A	B	C	D	F
110-114		1	1		
105-109					
100-104					
95- 99		1	1		
90- 94		2	3		
85- 89				1	
80- 84		2	1		
75- 79			1		
70- 74					
65- 69			1		
60- 64					
55- 59					
50- 54		1			
Totals for 16 Students	0	7	8	1	0

*OAP pattern Number Fourteen minimum cut-off score: 90. Coefficient of correlation = -.02.

TABLE XXVIII

GRADE POINT AVERAGE AND THE RANGE OF N APTITUDE SCORES FOR THE MASONRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

N* Scores	Grade Point Average				
	A	B	C	D	F
105-109		1	1		
100-104			1		
95- 99		1	1		
90- 94		1			
85- 89		1	1		
80- 84		2			
75- 79			4		
70- 74					
65- 69		1			
60- 64					
55- 59					
50- 54				1	
Totals for 16 Students	0	7	8	1	0

*OAP pattern Number Fourteen minimum cut-off score: 95. Coefficient of correlation = .34.

TABLE XXIX

GRADE POINT AVERAGE AND THE RANGE OF M APTITUDE SCORES FOR THE MASONRY STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

M* Scores	Grade Point Average				
	A	B	C	D	F
140-144		2			
135-139					
130-134			1		
125-129			1		
120-124				1	
115-119		1	2		
110-114			1		
105-109			1		
100-104		1			
95- 99		1	1		
90- 94					
85- 89					
80- 84		1			
75- 79		1			
70- 74			1		
Totals for 16 Students	0	7	8	1	0

*OAP pattern Number Fourteen minimum cut-off score: 75. Coefficient of correlation = -.10.

TABLE XXX

GRADE POINT AVERAGE AND THE RANGE OF N APTITUDE SCORES FOR THE PAINTING AND DECORATING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

N* Scores	Grade Point Average				
	A	B	C	D	F
110-114			1		
105-109	1	1			
100-104	2		2		
95- 99					
90- 94		2	3		
85- 89		1	2		
80- 84		1			
75- 79					
70- 74			2		
65- 69					
60- 64			2		
Totals for 20 Students	3	5	12	0	0

*OAP pattern Number Twenty-five minimum cut-off score: 80. Coefficient of correlation = .44.

TABLE XXXI

GRADE POINT AVERAGE AND THE RANGE OF S APTITUDE SCORES FOR THE PAINTING AND DECORATING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
160-164			1		
155-159					
150-154					
145-149					
140-144					
135-139					
130-134		1			
125-129	2	1	1		
120-124		1	3		
115-119					
110-114			1		
105-109	1		3		
100-104			2		
95- 99					
90- 94			1		
85- 89		1			
80- 84		1			
Totals for 20 Students	3	5	12	0	0

*OAP pattern Number Twenty-five minimum cut-off score: 90. Coefficient of correlation = .03.

TABLE XXXII

GRADE POINT AVERAGE AND THE RANGE OF M APTITUDE SCORES FOR THE PAINTING AND DECORATING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

M* Scores	Grade Point Average				
	A	B	C	D	F
170-184		1			
155-169					
140-154	1		1		
125-139	1	3	4		
110-124		1	3		
95-109	1		2		
80- 94					
65- 79			1		
50- 64			1		
Totals for 20 Students	3	5	12	0	0

*OAP pattern Number Twenty-five minimum cut-off score: 80. Coefficient of correlation = .36.

TABLE XXXIII

GRADE POINT AVERAGE AND THE RANGE OF G APTITUDE SCORES FOR THE PLUMBING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

G* Scores	Grade Point Average				
	A	B	C	D	F
145-149			1		
140-144					
135-139					
130-134			1		
125-129					
120-124					
115-119			1		
110-114			1		
105-109					
100-104			2		
95- 99		1	3		
90- 94					
85- 89			2		
80- 84			2		
75- 79		1	1		
70- 74					
65- 69			1		
Totals for 17 Students	0	2	15	0	0

*OAP pattern Number Twenty minimum cut-off score: 80. Coefficient of correlation = -.21.

TABLE XXXIV

GRADE POINT AVERAGE AND THE RANGE OF N APTITUDE SCORES FOR THE PLUMBING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

N* Scores	Grade Point Average				
	A	B	C	D	F
120-124			1		
115-119			1		
110-114					
105-109					
100-104		1	1		
95- 99			3		
90- 94			4		
85- 89			2		
80- 84			1		
75- 79		1			
70- 74					
65- 69			1		
60- 64					
55- 59			1		
Totals for 17 Students	0	2	15	0	0

*OAP pattern Number Twenty minimum cut-off score: 75. Coefficient of correlation = .07.

TABLE XXXV

GRADE POINT AVERAGE AND THE RANGE OF M APTITUDE SCORES FOR THE PLUMBING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

M* Scores	Grade Point Average				
	A	B	C	D	F
135-139			1		
130-134			1		
125-129					
120-124			3		
115-119					
110-114		1	4		
105-109			2		
100-104					
95- 99			2		
90- 94			1		
85- 89		1			
80- 84					
75- 79					
70- 74					
65- 69			1		
Totals for 17 Students	0	2	15	0	0

*OAP pattern Number Twenty minimum cut-off score: 85. Coefficient of correlation = -.19.

TABLE XXXVI

GRADE POINT AVERAGE AND THE RANGE OF G APTITUDE SCORES FOR THE REFRIGERATION-SHEET METAL STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

G* Scores	Grade Point Average				
	A	B	C	D	F
125-129	1				
120-124					
115-119					
110-114		2	2		
105-109		1	2		
100-104		1	2		
95- 99		1	1		
90- 94		1	1		
85- 89			2		
80- 84		1			
75- 79			1	1	
Totals for 20 Students	1	7	11	1	0

*OAP pattern Number Ten minimum cut-off score: 95. Coefficient of correlation = .52.

TABLE XXXVII

GRADE POINT AVERAGE AND THE RANGE OF S APTITUDE SCORES FOR THE REFRIGERATION-SHEET METAL STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
145-149		1			
140-144		2			
135-139					
130-134	1	1	3		
125-129					
120-124		1	1		
115-119					
110-114			1		
105-109		1	1	1	
100-104			2		
95- 99		1			
90- 94			1		
85- 89			1		
80- 84					
75- 79					
70- 74					
65- 69					
60- 64					
55- 59			1		
Totals for 20 Students	1	7	11	1	0

*OAP pattern Number Ten minimum cut-off score: 95. Coefficient of correlation = .42.

TABLE XXXVIII

GRADE POINT AVERAGE AND THE RANGE OF M APTITUDE SCORES FOR THE REFRIGERATION-SHEET METAL STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

M* Scores	Grade Point Average				
	A	B	C	D	F
150-154			2		
145-149					
140-144		1			
135-139					
130-134			1		
125-129			1		
120-124		1			
115-119			1		
110-114		2			
105-109	1				
100-104				1	
95- 99		1	2		
90- 94			2		
85- 89					
80- 84		1			
75- 79		1	2		
Totals for 20 Students	1	7	11	1	0

*OAP pattern Number Ten minimum cut-off score: 85. Coefficient of correlation = -.03.

TABLE XXXIX

GRADE POINT AVERAGE AND THE RANGE OF G APTITUDE SCORES FOR THE TECHNICAL DRAFTING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

G* Scores	Grade Point Average				
	A	B	C	D	F
120-124			1		
115-119		2	1		
110-114		1	1		
105-109		2	3		
100-104		3	2		
95- 99					
90- 94			2		
85- 89		1	1		
Totals for 20 Students	0	9	11	0	0

*OAP pattern Number None (Haskell Implemented) minimum cut-off score: 115. Coefficient of correlation = .01.

TABLE XL

GRADE POINT AVERAGE AND THE RANGE OF N APTITUDE SCORES FOR THE TECHNICAL DRAFTING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

N* Scores	Grade Point Average				
	A	B	C	D	F
115-119		1	1		
110-114		1			
105-109		1	1		
100-104		1	2		
95- 99		3	2		
90- 94		1	2		
85- 89		1	2		
80- 84			1		
Totals for 20 Students	0	9	11	0	0

*OAP pattern Number None (Haskell Implemented) minimum cut-off score: 105. Coefficient of correlation = .22.

TABLE XLI

GRADE POINT AVERAGE AND THE RANGE OF S APTITUDE SCORES FOR THE TECHNICAL DRAFTING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
165-169			1		
160-164					
155-159					
150-154			1		
145-149					
140-144		1			
135-139		1			
130-134		2			
125-129			2		
120-124		1	3		
115-119		1	1		
110-114		2	1		
105-109			1		
100-104			1		
95- 99					
90- 94		1			
Totals for 20 Students	0	9	11	0	0

*OAP pattern Number None (Haskell Implemented) minimum cut-off score: 115. Coefficient of correlation = .12.

TABLE XLII

GRADE POINT AVERAGE AND THE RANGE OF S APTITUDE SCORES FOR THE WELDING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

S* Scores	Grade Point Average				
	A	B	C	D	F
130-134		1			
125-129					
120-124		2	2	1	
115-119			2		
110-114		2	2		
105-109					
100-104			3		
95- 99		1	3		
90- 94			5		
85- 89					
80- 84			1	1	
75- 79			1		
70- 74			1		
Totals for 28 Students	0	6	20	2	0

*OAP pattern Number Twenty-seven minimum cut-off score: 80. Coefficient of correlation = .34.

TABLE XLIII

GRADE POINT AVERAGE AND THE RANGE OF F APTITUDE SCORES FOR THE WELDING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

F* Scores	Grade Point Average				
	A	B	C	D	F
120-124			1		
115-119			2		
110-114		1	1		
105-109			1		
100-104		2	1		
95- 99		3	3		
90- 94			1		
85- 89			2	1	
80- 84			2		
75- 79			3		
70- 74					
65- 69			1		
60- 64			2	1	
Totals for 28 Students	0	6	20	2	0

*OAP pattern Number Twenty-seven minimum cut-off score: 90. Coefficient of correlation = .36.

TABLE XLIV

GRADE POINT AVERAGE AND THE RANGE OF M APTITUDE SCORES FOR THE WELDING STUDENTS FOR THE GRADUATING CLASSES OF 1966 AND 1967 OF HASKELL INSTITUTE

M* Scores	Grade Point Average				
	A	B	C	D	F
140-144		1			
135-139			1		
130-134		1	1		
125-129		1	1		
120-124			2		
115-119			3		
110-114		2	1		
105-109			1	1	
100-104			2		
95- 99			2		
90- 94		1	4		
85- 89			1		
80- 84			1	1	
Totals for 28 Students	0	6	20	2	0

*OAP pattern Number Twenty-seven minimum cut-off score: 85. Coefficient of correlation = .40.

TABLE XLV

COEFFICIENTS OF CORRELATION OF GRADE POINT AVERAGE AND APTITUDE SCORES FOR STUDENTS GRADUATING IN 1966 AND 1967 IN THE VOCATIONAL DEPARTMENT AT HASKELL INSTITUTE AND SHOWING CUT-OFF SCORES FOR THE SUBTESTS OF THE GATB

Vocation and OAP Pattern		G		N		S		P		F		M	
		Cut-off Score	r	Cut-off Score	r	Cut-off Score	r	Cut-off Score	r	Cut-off Score	r	Cut-off Score	r
Auto Mechanic	(11)	95	-.01			85	.07			75	.28		
Carpentry	(25)			80	.25	90	.05					80	.20
Electrician	(24)			85	.27	95	-.07			80	.10		
Electronics	(5)	105	.16			95	-.15	100	.12				
Machinist	(25)			80	.44	90	-.01					80	.18
Masonry	(14)	90	-.02	95	.34							75	-.10
Painting Decorating	(25)			80	.44	90	.03					80	.36
Plumbing	(20)	80	-.21	75	-.07							85	-.19
Refrigeration/ Sheet Metal	(10)	95	.52			95	.42					85	-.03
Technical Drafting	(**)	115	.01	105	.22	115	.12						
Welding	(27)					80	.34			90	.36	85	.40

**Haskell's self-imposed OAP pattern for Technical Drafting.

TABLE XLVI

DISTRIBUTION OF STUDENTS GRADUATING IN 1966 AND 1967 IN VOCATIONAL PROGRAMS AT HASKELL INSTITUTE AND SHOWING NUMBER AND PER CENT WHO MEET AND DID NOT MEET MINIMUM OAP SCORES AND PER CENT OF STUDENTS ATTAINING DIFFERENT GRADES

Vocation	Number in Sample	Meeting Minimum OAP Scores		Not Meeting Minimum OAP Scores		Grade Range				
		Number	Per Cent	Number	Per Cent	A	B	C	D	F
Auto Mechanic	76	37	48.7	39	51.3	7	20	47	2	0
Carpentry	22	17	77.3	5	22.7	2	9	9	2	0
Electrician	19	14	73.8	5	26.2	1	9	9	0	0
Electronics	22	16	72.7	6	27.3	1	9	12	0	0
Machinist	15	12	80	3	20	3	8	4	0	0
Masonry	16	5	31.2	11	68.8	0	7	8	1	0
Painting/ Decorating	20	13	65	7	35	3	5	12	0	0
Plumbing	17	13	76.4	4	23.6	0	2	15	0	0
Refrigeration/ Sheet Metal	20	9	45	11	55	1	7	11	1	0
Technical Drafting	20	2	10	18	90	0	9	11	0	0
Welding	28	14	50	14	50	0	6	20	2	0
Totals	275	152	55.3	123	44.7	18	91	158	8	0
Per Cent						6.5	33.1	57.5	2.9	0

TABLE XLVII

COEFFICIENTS OF CORRELATION BETWEEN
THE GPA AND THE APTITUDE SCORES

Vocation	Subtest	Correlation
Auto Mechanic	G	-.01
	S	.07
	F	.28
Carpentry	N	.25
	S	.05
	M	.20
Electrician	N	.27
	S	-.07
	F	.10
Electronics	G	.16
	S	-.15
	P	.12
Machinist	N	.44*
	S	-.01
	M	.18
Masonry	G	-.02
	N	.34
	M	-.10
Painting/Decorating	N	.44*
	S	.03
	M	.36
Plumbing	G	-.21
	N	-.07
	M	-.19
Refrigeration/Sheet Metal	G	.52*
	S	.42*
	M	-.03
Technical Drafting	G	.01
	N	.22
	S	.12
Welding	S	.34
	F	.36
	M	.40*

*Significant within definition of this study.

TABLE XLVIII

NUMBER AND PER CENT OF STUDENTS WHO SHOWED GIVEN LEVELS OF POTENTIAL BY THE G SCORE ON THE GATB BUT DID NOT EARN A 3.50-4.00 GPA*

Vocation	100 Junior College		105** Electronics		110 4-Year College		115*** Technical Drafting		120 Professional College		
	No.	%	No.	%	No.	%	No.	%	No.	%	Totals
Auto Mechanic	24	19.2			10	8.0			0	---	34
Carpentry	9	7.2			4	3.2			2	1.6	15
Electrician	5	4.0			4	3.2			1	.8	10
Electronics	2	1.6	4	3.2	6	4.8			4	3.2	16
Machinist	4	3.2			1	.8			1	.8	6
Masonry	0	---			2	1.6			0	---	2
Painting/ Decorating	3	2.4			1	.8			0	---	4
Plumbing	2	1.6			2	1.6			2	1.6	6
Refrigeration/ Sheet Metal	6	4.8			4	3.2			0	---	10
Technical Drafting	10	8.0			2	1.6	3	2.4	1	.8	16
Welding	5	4.0			1	.8			0	---	6
Totals	70	56.0	4	3.2	37	29.6	3	2.4	11	8.8	125

*Excludes eighteen of the 275 students who had a 3.50-4.00 GPA.
**Minimum G score of the OAP.
***Minimum G score of the Haskell self-imposed OAP.

APPENDIX B

COURSE DESCRIPTIONS AND COURSE OFFERINGS OF THE ELEVEN VOCATIONS OF THE TRADE-TECHNICAL TERMINAL TRAINING AT HASKELL INSTITUTE*

1. Auto Mechanics. In this vocation students learn to diagnose faulty operation and to make the necessary replacement of defective parts so that a vehicle is restored to its proper operating condition according to manual specifications. A large portion of the student's time is spent in actual repair and servicing of various types of automotive equipment.

Course offerings are:

Fundamentals of Auto Mechanics
Auto Mechanics I, II, III, IV, V, VI and VII
Blueprint Reading
Driver Education
Business Fundamentals
Communication Skills

2. Carpentry and Cabinet Making. Carpentry as offered at Haskell involves actual construction. The work of a carpenter is commonly divided into rough and finished carpentry, each representing a very important phase of the building trade.

The cabinet-making shop is well-equipped for students who want to specialize as cabinet or furniture makers.

Course offerings are:

Safety Procedures
Power Equipment and Tools
Concrete Form Construction
Rough Framing
Exterior Trim
Interior Trim
Blueprint Reading

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*U. S. Department of Interior, Bureau of Indian Affairs, Haskell Institute Catalog (Lawrence, Kansas: Haskell Press, 1964).

Related Mathematics
Communication Skills

3. Electricity. The training program in electricity is designed to give a thorough background in the general electrical field and also to allow each student to specialize in one of the trade's branches. Under this plan, a student may specialize in: Industrial Wiring, Commercial Wiring, Residential Wiring, Motor and Generator Winding, and High Line Work.

The electrician must know the basic principles and theory of electricity and its application as applied to installation, maintenance, and servicing. Students receive theoretical training and practical experience in all phases of the vocation.

Course offerings are:

Fundamentals of Electricity
Material Technology
Blueprint Reading
Estimating
Applied Shop Mathematics
Motors
Motor Controls
Transformers
High Line Construction
Electrical Code
Small Appliance Repair
Related Mathematics
Related Science
Communication Skills

4. Electronics. This vocation is designed to train students in basic theory, advancing through more technical phases of electronics. Successful completion of this training will enable a student to enter a field which is extremely short of qualified personnel.

Course offerings are:

Basic Electronics I
Electronics II
Related Mathematics
Communication Skills
Related Science

5. Machine Shop. The objective of the training program in machine shop is to teach the intelligent and safe use of machine tools. The program will equip the student with the necessary knowledge and practical experience essential to enter and progress in the machinist trade. Students have the opportunity to operate and maintain the engine lathe, turret lathe, mill, drill press, and tool-grinder. Each student receives actual work experience in all phases of the machinist trade by assisting with the maintenance and repair of institutional equipment.

A student who completes the course successfully may become a general machinist or enter into one of the trade's many specialized branches.

Course offerings are:

Fundamentals of Machine Shop
Machine Shop I, II, III, IV, V, VI and VII
Welding I
Blueprint Reading I and II
Related Mathematics
Communication Skills

6. Masonry. A student mason has the opportunity to gain the technical knowledge and on-the-job experience necessary to enter the masonry trade. The training program consists of approximately 144 hours of classroom instruction and 1,500 hours of practical training per year.

After successfully completing a two-year program a graduate has approximately 3,000 hours toward the required 6,000 hours for a Journeyman's Card. If a student is fully qualified and can pass a required on-the-job performance test, most apprenticeship unions will accept his 3,000 hours of Haskell training and place the student in the third year of an apprenticeship program. The level of employment depends primarily on the person's ability and knowledge.

Course offerings are:

Building Material Technology
Fundamentals of Masonry
Estimating
Masonry I, II, III, IV, V, VI and VII
Blueprint Reading
Related Mathematics
Communication Skills

7. Painting and Decorating. The painting and decorating program compares favorably with similar two-year training programs in most metropolitan areas. All painters' unions require a minimum of 144 clock hours of study of the theoretical and technical aspects of the craft during each year of apprenticeship. Haskell provides for 180 clock hours per year, plus 900 clock hours of laboratory and/or on-the-job experience.

Course offerings are:

Fundamentals of Painting
Painting I, II and III
Color Dynamics
Furniture Refinishing
Spray Equipment
Contract Estimating
Paint Failures and Remedies
Wallpapering
Special Decorative Finishes
Related Mathematics
Communication Skills

8. Plumbing. The plumbing program is comparable to the first two years of adult training courses offered in most metropolitan areas. The program encompasses these broad general objectives: to develop the necessary skill in performing the intricate and varied work of the trade; to acquire the related knowledge of science, blueprint reading and mathematics; an understanding of safety and health practices; a thorough knowledge of the care and the use of tools and equipment pertinent to the plumbing trade; to develop an appreciation and understanding of the law and code requirements and of the trade union agreements governing the plumbing trade.

Course offerings are:

Fundamentals of Plumbing
Pipe and Fittings
Soil Pipe
Cold Water Supply
Hot Water Supply
Drainage Systems
Fixtures
Lead Work
Plumbing Mathematics
Blueprint Reading

Related Mathematics
Communication Skills
Related Science

9. Sheet Metal/Refrigeration and Air Conditioning.

Sheet Metal. The training in sheet metal prepares students to work in general sheet metal shops or to specialize in one of the various branches of the field. Emphasis is placed upon the construction of roofs, cornices, gutter, down spouts and other similar work. Practical problems are worked out in the shop and students receive training by assisting workmen in the construction, repair and maintenance of the school plant.

Course offerings are:

Fundamentals of Sheet Metal
Sheet Metal I, II, III and IV
Industrial Sheet Metal
Welding
Blueprint Reading
Sheet Metal Mathematics
Related Mathematics
Communication Skills
Related Science

Refrigeration and Air Conditioning. This training program is approved by the Refrigeration Service Engineers Society which specializes in supplying information to improve the refrigeration mechanic's knowledge of his trade.

Young men entering this trade should have a background in science and mathematics. Mechanical aptitude and the ability to understand work with electricity are also important qualifications. A person should be in good physical condition as he is often required to lift and move some of the heavy air conditioning and refrigeration equipment.

Following graduation, employment can be found with heating, refrigeration or air conditioning contractors.

Course offerings are:

Fundamentals of Refrigeration I
Fundamentals of Air Conditioning I
Refrigeration II
Commercial Refrigeration and System Components

Air Conditioning Principles and Applications
Related Mathematics
Communication Skills
Related Science

10. Technical Drafting. This vocation is designed to prepare the student for employment as a draftsman who assists skilled technicians, professional designers and builders in planning and developing goods and products for the industrial world. The training program is divided into several areas of study as listed in the course offerings.

Course offerings are:

Introduction to Engineering Drawing
Preliminary Machine Drawing
Descriptive Geometry
Machine Drawing
Basics of Mapping and Topographic Drawing
Structural Drafting
Pipe Drafting
Electrical Drafting
Architectural Drafting
Sheet Metal Drafting
Technical Illustration
Related Science
Related Mathematics
Communication Skills

11. Welding. The program is designed to offer general training encompassing the basic processes. The program follows a logical sequence, advancing from the basic processes to the more complex and advanced operations. The student gains theoretical knowledge and on-the-job experience necessary for employment in this trade. Students learn to operate the oxygen-fuel equipment, the electric arc welder, the micro-wire welder and the inert gas shielded arc welder.

Course offerings are:

Fundamentals of Welding
Welding I, II, III, IV and V
Blueprint Reading
Related Mathematics
Communication Skills