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An analysis of vocabulary variables at the college level

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AN ANALYSIS OF VOCABULARY VARIABLES AT THE COLLEGE LEVEL

BY

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PREFACE

More often than not, problems for research do not have to be sought out; they present themselves for consideration.

The problem considered in this thesis is no different. It naturally followed a survey of results from a regular testing of freshmen during Orientation Week in 1948. The problem of vocabulary growth, its relation to fields of concentration, and the possibility of its predictive value in academic success interested the writer. The analysis of the data was approached not with the idea of proving a theory but rather of surveying actual results in the areas of investigation selected.

Grateful acknowledgement is made of the cooperation of the freshmen and seniors who served as subjects. Much appreciation is expressed

to Dr. Merton E. Carver, head of the Department of Psychology, and to Mr. Austin E. Grigg, associate professor, for their help and encouragement---not only with the preparation of the thesis but throughout the undergraduate and graduate studies.

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I

INTRODUCTION AND HISTORY

The strength and growth of vocabulary is one of the decisive factors in successful college work. Educators find it helpful to evaluate not only the general vocabulary ability of the college student, but also the more specialized directions which the development of the student's vocabulary may take.

The author's interest in this problem grew out of the results obtained with freshmen in the Westhampton College orientation program in September 1948. In working up the data from 119 freshmen's scores on the Michigan Vocabulary Profile Test, results were such as to arouse interest in analysis of freshman performance on the test as a whole, performance on the various subtests, and performance comparisons of seniors and freshmen.

After a preliminary survey of the results of freshmen performance, three areas for further investigation were selected: first, a comparison of performance of seniors and freshmen in order to determine the effect of over three years of college education on vocabulary, as indicated by the level of achievement on the whole test and achievement on the separate subtests; second, an analysis of selected samples of senior majors with respect to 1) comparisons of their vocabulary scores on their major fields with scores on the other sections of the test, and 2) comparison of vocabulary strength on subtests by majors and non-majors in the particular field being studied; third, an analysis of freshmen results in order to determine the predictive value of the test along three lines. These were to discover the predictive value of the Michigan Vocabulary Profile Test in overall academic success on the basis of the total score; to find its predictive value for academic success in a specific field on the basis of the particular related-field subtest; and to compare the discriminative value of the verbal or quantitative aspects of the test in the prediction of academic success.

The test used for this investigation was the Michigan Vocabulary Profile Test prepared under the direction of Dr. Edward B.Greene, University of

Michigan in 1937. It is designed to give a profile of an individual's vocabulary in eight fields of information which are considered to be important and independent to a marked degree. "Such a profile is more valuable than a single general vocabulary score because it shows the extent of an individual's knowledge in particular fields."[1] Dr. Greene states as his purpose that use of the test should contribute to the solution of problems such as

> connection of growth and retention of specific information with training and interests; essential vocabularies for certain vocations; importance of vocabulary in reading; importance of vocabulary in educational and vocational planning.[2]

The test itself consists of eight subdivisions which are scored independently and as a total. These include:

1. Human Relations-Mental and social processes and situations.
2. Commerce-Business, Manufacture, Sales, Economics.
3. Government-Legislative, Executive, Judicial.
4. Physical Sciences-Physics, Chemistry, Mechanics.
5. Biological Sciences-Zoology, Anatomy, Pathology.
6. Mathematics-Arithmetic, Algrbra, Geometry, Trigonometry.
7. Fine Arts-Plastic, Graphic, Architecture.
8. Sports-Ten most common sports which adults play.[3]

Each division of the test consists of

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[1] E.B.Greene, Michigan Vocabulary Profile Test: Manual, p.1.
[2] E.B.Greene, Measurement of Human Behavior, p.206.
[3] Ibid.

thirty items arranged in levels of difficulty according to percentage of a group of 430 college sophomores passing the specific item. Each item involves a definition or description and four words or phrases, only one of which is completely and accurately defined or described. The subject is asked to select the correct answer of four alternative choices. The raw score is the number of items answered correctly. The entire test is designed to require 60 minutes as an average, although no time limit is set. Time required to complete the test ranges from 40 to 80 minutes.

In constructing the test the author placed the emphasis on information rather than on ability to define words through reasoning. In fact, he states that "a test of information was desired which would be affected as little as possible by reasoning processes."[4] The elimination of reasoning (using a knowledge of roots and prefixes) in the score was attempted by using the same prefixes and roots more than once in an item and by selecting wrong answers which were nearly, but not quite, synonomous with the right answer. This was not entirely successful however, but the number of such "reasoning" items was reduced no doubt by this procedure.

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[4] Ibid.

Construction of the test was the outcome of a cooperative project at the University of Michigan in which instructors and graduate students contributed a total of 6181 words which they considered important and somewhat technical. Of these, 1766 were finally selected as suitable for preliminary testing. Test items were then devised containing a definition and five words, only one of which was completely and accurately defined. These were given to various educational groups at the high school and college levels; the original items were revised on the basis of the following criteria:

1.)Number of times an answer was selected; wrong answers seldom or never chosen were eliminated; wrong answers frequently selected by more able students were generally eliminated; only four answers were retained.

2.)Individual items were correlated with total score for subtest on which it was included; items showing correlations below .30 were discarded or revised. Thus the tests have an unusually high degree of internal consistency.

3.)Difficulty values were assigned to each item corresponding to the percentage of 430 college sophomores passing the item. Such percentages were converted to standard deviation values in accordance with area tables for the normal probability curve and items were assigned scale values.[5]

Validity in the case of this test refers to the accuracy with which it measures an individual's

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[5] E.B.Greene,"A Sampling of Vocabularies of Superior Adults", Journal of Higher Education,IX,Oct.1938, pp.383-89.

vocabulary in the particular fields. In the construction of such a test as this, no simple method of checking validity has been discovered. Dr. Greene suggests that the best guarantee of validity is the highly complicated method employed in the selection of test items. Another indication of validity is seen in the profiles of various occupational groups in which the highest score was made on the subtests most closely related to the occupation in question. For example, the first-year law students scored highest in commerce and government, engineering and college physical sciences and mathematics were closely linked, while first-year medical students scored highest in the sections devoted to physical and biological sciences.[6]

Reliability of the test was measured by the test-retest method---retest being made one week later with an equivalent form of the test. Correlations ranged between .78 and .94 with a median of .81 which, though no exceptionally high is quite acceptable.

In addition to the original work during the test construction with various educational levels, further studies were conducted with several occupational groups. These studies (using first-year law students,

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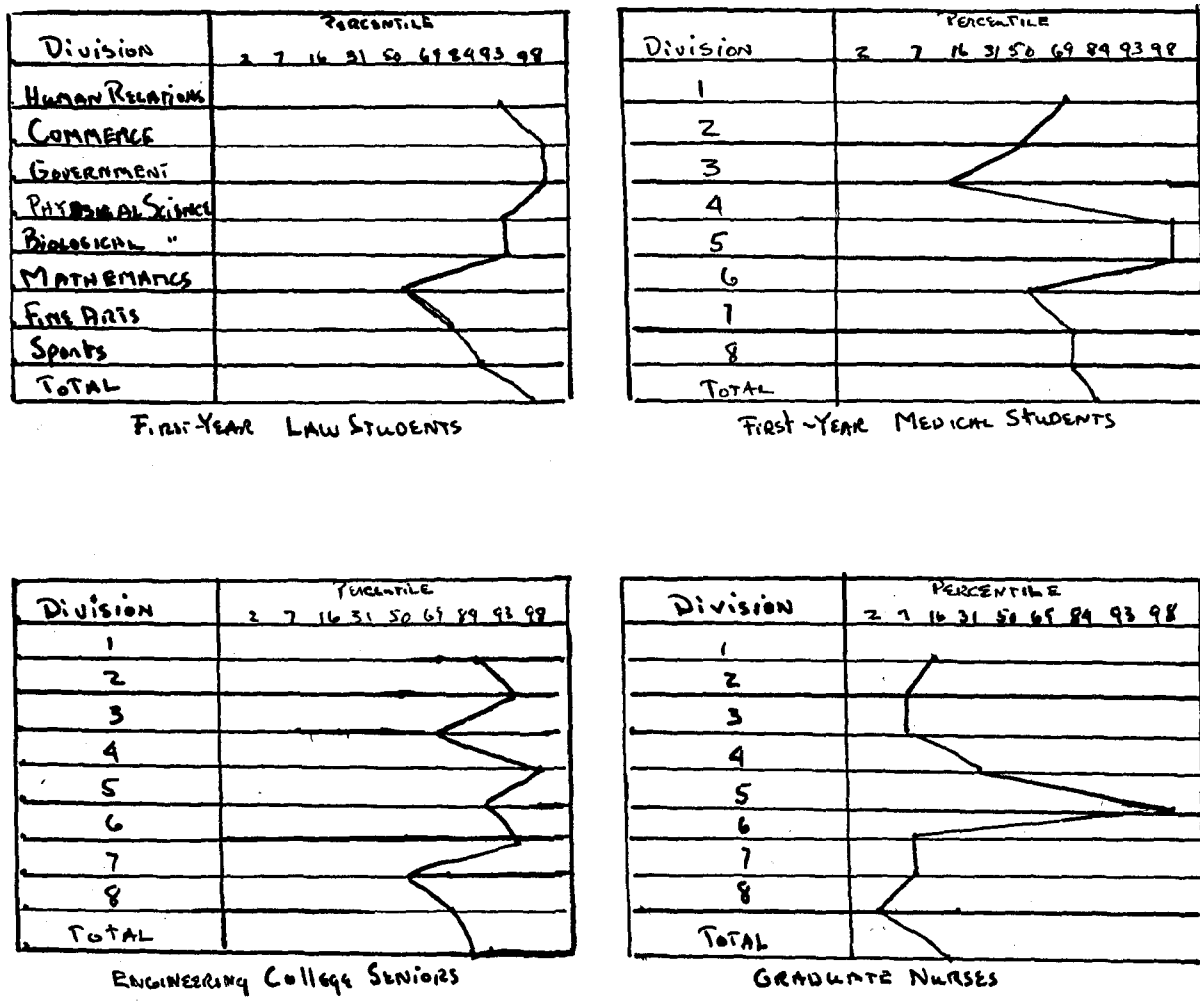
[6] op.cit., Greene, Michigan Vocabulary Profile: Manual, p.6.

graduate nurses, senior engineering students, senior business administration students, students in first-year medical school, education graduates, and social study graduates) all indicated profiles specifically characteristic of the separate occupational fields. Figure I illustrates examples of these occupational profiles.[7]

FIGURE I. Michigan Vocabulary Profiles of Various Occupational Groups.



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[7] Ibid.

A study of the growth of technical vocabulary has been made using nursing school students as subjects. During three years of training the only substantial increase in vocabulary is represented in the section dealing with the biological sciences. Academic success of nurses correlated .54 with the biological division of the Michigan Vocabulary Profile, .38 with total test score, and .44 with the American Council on Education College Entrance Examination scores. Dr. Greene concluded that "Apparently, a better prediction of success in nursing school can be made on the basis of technical information in biological science vocabulary than on the basis of other sorts of information or verbal skills."[8]

It appears that vocabulary power is not a unitary factor. In a study of intercorrelations obtained for the subtests of the Michigan Vocabulary Profile Test, Dr. Greene found correlations all below .55 with a median of .27. He also pointed out that, while low means with a college group implies independence, the trend would be even more marked for a large unselected sample. (These figures are from a study using literary college sophomores.)[9] Zero or nearly zero correlations were found between fine arts and scores in commerce,

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[8] Ibid.
[9] Ibid.

government, and physical science. Approximately .50 was the correlation of physical science scores with those in biological science, mathematics, commerce, and sports. Dr. Greene points out that these observations support the supposition that there are present a number of fairly wellisolated factors. Psychologically, there is little evidence for any functional relationship between much of the information in any two of these divisions, with the exception of mathematics which is a tool subject in many areas of human reasoning.

Contrary to some views expressed, vocabulary scores showed low correlation with scores on tests of certain reading skills. Using 245 college sophomores Dr. Greene administered tests (six) that call for various kinds of reading skills and then correlated the scores on these with the total scores made on the Michigan Vocabulary Test. The results were as follows:

a. with Michigan Speed of Reading- .14
b. with Minnesota Number Comparison- .16
c. with Minnesota Name Comparison- .18
d. with a Syllogism Test- .06
e. with the Cooperative English Test, grammar-.26
f. with Spelling- .29

These figures indicate that there are at least some reading and perceptual skills which are not highly related to vocabulary as measured by the Michigan test.[10]

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[10] Ibid., p.7.

The test, then, is not a reading ability test.

The correlations of the total Michigan Vocabulary scores with vocabulary sections on other tests are high. The Michigan Test correlated with the vocabulary section of the Cooperative English Test .56 and with the vocabulary section of the American Council on Education College Entrance Examination .61.[11]

Certain cautions are given by the author of the test to those who would go too far into "crystal-balling" on the basis of the profile. First, the scores are representative only of present performance; prediction of future achievement rests with these plus a thorough study of the subject's past interests and training. Second, the upper level of the profile is not discriminative for advanced professional people. Third, although they are usually very small, practice, forgetting, and chance effects are not entirely eliminated. Fourth, the items of a particular subtest are not exclusively representative of any one profession or occupation, since these usually require several fields of knowledge.[12]

Now cognizant of the strengths and limitations of the Michigan Vocabulary Profile Test, as

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[11] Op.cit., Greene, Measurement of Human Behavior, p.209.
[12] Ibid.

well as its background and uses, it is possible to understand more clearly the practical applications of the test in this problem.

II

PROCEDURE AND FINDINGS

In September 1948, 119 freshmen entering Westhampton College were given the Michigan Vocabulary Profile Test, Form AM. With these results at hand, it was then decided to give the same test to the seniors in order to compare the vocabulary performance of the two groups in a number of respects. It was arranged in April of 1949, with all but one half-semester of the college experience behind them, to administer this test to 50 Westhampton seniors, who were given Form BM of the Michigan Vocabulary Profile. In this sample there were twenty psychology and sociology majors, seven biology majors, seven history majors, four mathematics majors, and twelve majors in miscellaneous fields--English, languages, chemistry, and physical education.

In working up the data the scores in fine arts and sports were not used. For reasons of expediency it was necessary to shorten the testing time for seniors.[13]

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[13] In voting to cooperate in the testing program, the seniors felt that they did not have more than one hour to give to testing because of the pressure of duties and activities of the last semester of the senior year.

This adjustment does not affect the major objectives of this study. Dr. Greene says, "The last two Divisions, Fine Arts and Sports, are probably less important vocationally than the others. They may be omitted without affecting the scores of the other sections."[14] A second point in defense of expendiency is that the character of the fine arts department at Westhampton has changed substantially in the past four years. It can also be pointed out that the various sports included in the physical education training is a matter of personal choice after the freshman year. A third factor would be that the test items for both test divisions do not constitute a valid measure of the work of the two corresponding departments as they are now represented at Westhampton College. That is, the Fine Arts division of the profile includes plastic, graphic, and architecture while the Westhampton Fine Arts Department places greater emphasis on esthetic appreciation and standards of taste. The Sports division of the profile is of the ten most popular adult sports--which do not, however, coincide exactly with the sports included in the Westhampton Physical Education Department.

In the first and last portions of the problem the statistical method used for handling the data

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[14] op.cit., Greene, Michigan Profile-Manual, p.1.

was the biserial correlation. This was felt to be the most accurate and most clearly comprehensible method with which to treat the data at hand.[15] The middle section, in which the senior results are analyzed, is not treated from the biserial approach since the samples are so small. In this, comparisons were made of differences of the means; from these, probable trends were indicated, but no biserial correlations were computed.

The first problem was a comparison of vocabulary performance of seniors with freshmen in order to gauge the effect of college training, both specific courses and the experience of being in a collegiate environment, on vocabulary. This was investigated by comparing the scores of the two groups on the test as a whole and the achievements of each group on the various subtests. The mean scores of the entire test and for each subtest were computed for the freshmen and seniors. The significance of the discriminatory function of these means was then determined through the use of the biserial correlation technique. The results are shown in Table I.

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[15] formula for biserial correlation $= \frac{(M_x - M_y)\left(\frac{pq}{z}\right)}{\frac{1}{N_T}\sqrt{N_T(\xi_T^2) - (\xi_T)^2}}$

where M_x = Mean of Group 1; M_y = Mean of Group 2; p = % in larger group; q = % in smaller group; z reflects the area of the curve; N_T number of total; (ξ_T^2) = sum of the squares of the scores; $(\xi_T)^2$ sum of the scores squared.
Edwards. Statistical Analysis. p.114.

TABLE I. Means and Biserial Correlation for Michigan Vocabulary Profile Test with 119 Freshmen and 50 Seniors

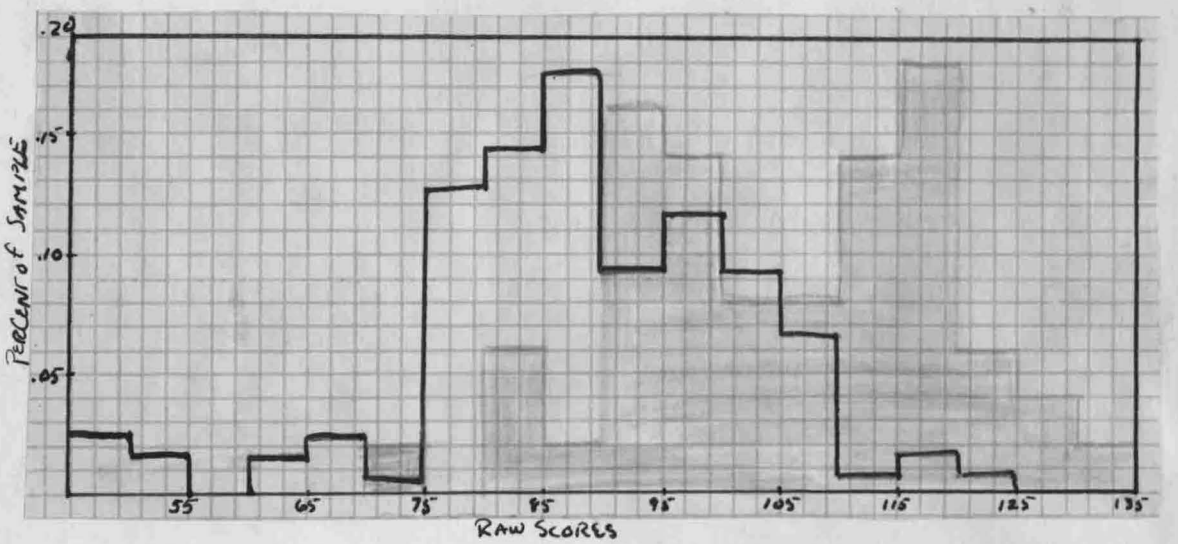
Test Division	Senior Mean	Freshmen Mean	Sigma of Total	Biserial Correlation
Total Score	104.82	87.17	16.0	.661
Div.1-Human Relations	18.80	16.14	3.9	.412
Div.2-Commerce	17.76	13.63	3.67	.679
Div.3-Government	18.66	15.97	3.56	.457
Div.4-Physical Sciences	13.32	9.94	3.88	.527
Div.5-Biological "	18.16	14.48	3.82	.582
Div.6-Mathematics	18.32	17.20	3.58	.183

The biserial correlation of .661 between total scores of seniors and freshmen is clearly indicative of the fact that the test reflects a significant increase of vocabulary ability over the four-year period of college experience.

The subtests were analyzed to determine whether or not this increase in vocabulary proficiency was largely in one field or in several fields; it was also hoped that the influence of any specific past training might be revealed. An examination of the correlations obtained indicate that vocabulary growth tends to be scattered rather than concentrated, and that it is apparently related to the degree of past training.

Figure II shows the distribution of the total scores of the seniors and freshmen. Increase in vocabulary is indicated in the areas where the red extends beyond the black toward the right and upper portions of the figure.

FIGURE II. Distribution of Total Scores of Seniors and Freshmen on the Michigan Vocabulary Profile Test.



Freshmen Seniors

On the following pages in Figure III are shown the frequency distributions of the six subtests. As in Figure II, the increase in vocabulary is shown in the portions where the red extends beyond the black.[16]

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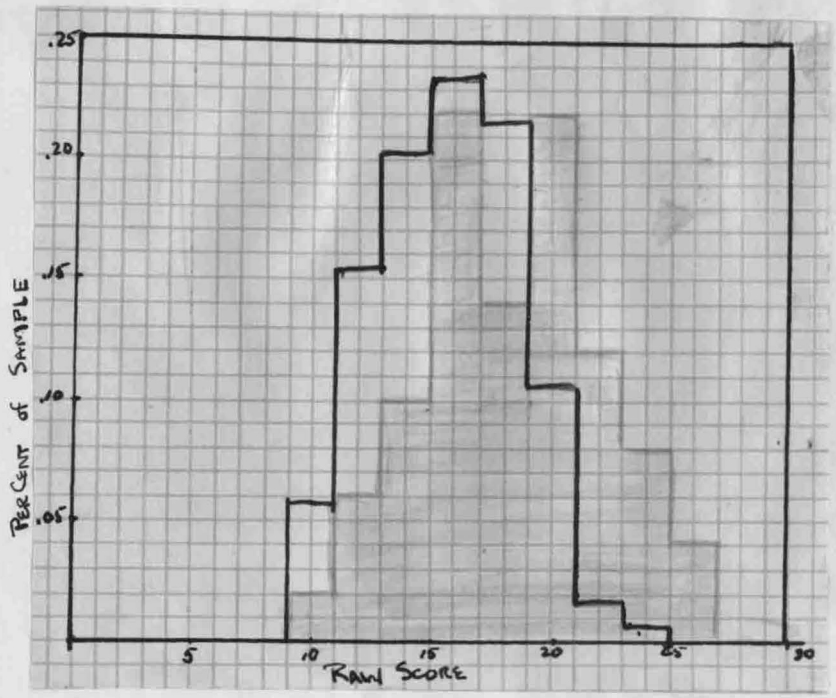
[16] For frequency tables, see Appendix A.

Frequency Distributions of Subtests

% Sample vs Raw Score

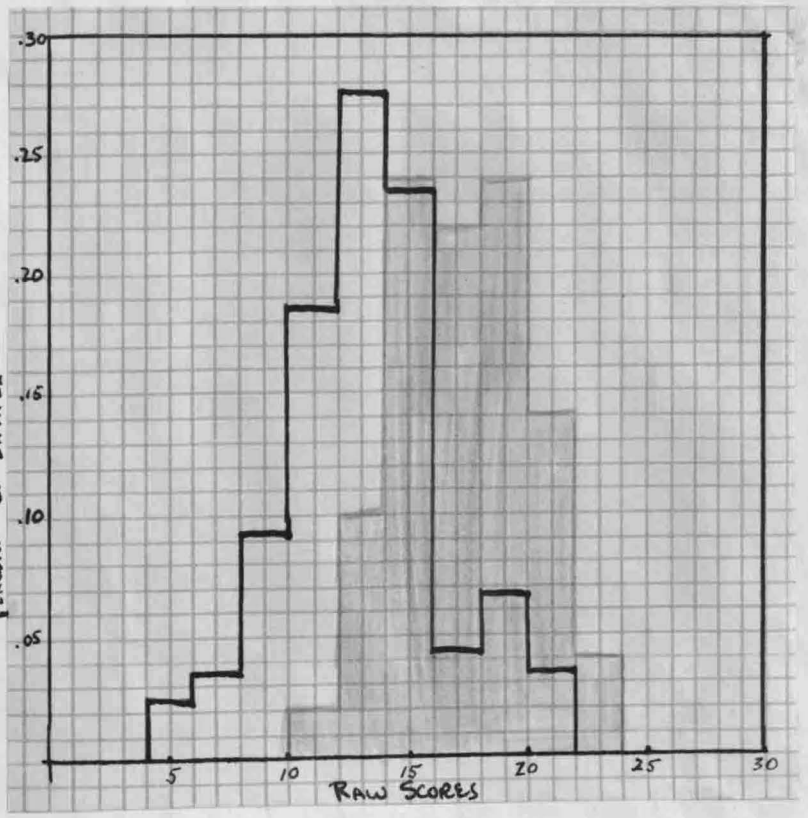


Division 1 —

Human Relations

Seniors

Freshmen



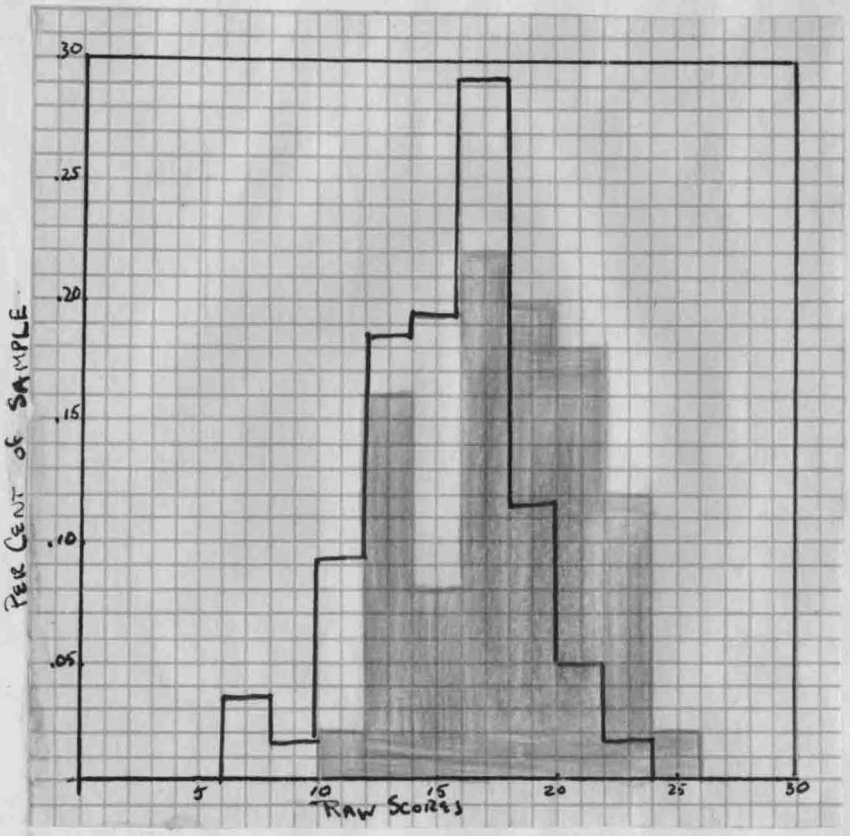
Division 2 —

Commerce

Seniors

Freshmen

Frequency Distributions of Subtests (con't.)



Division 3 —

Government

Seniors

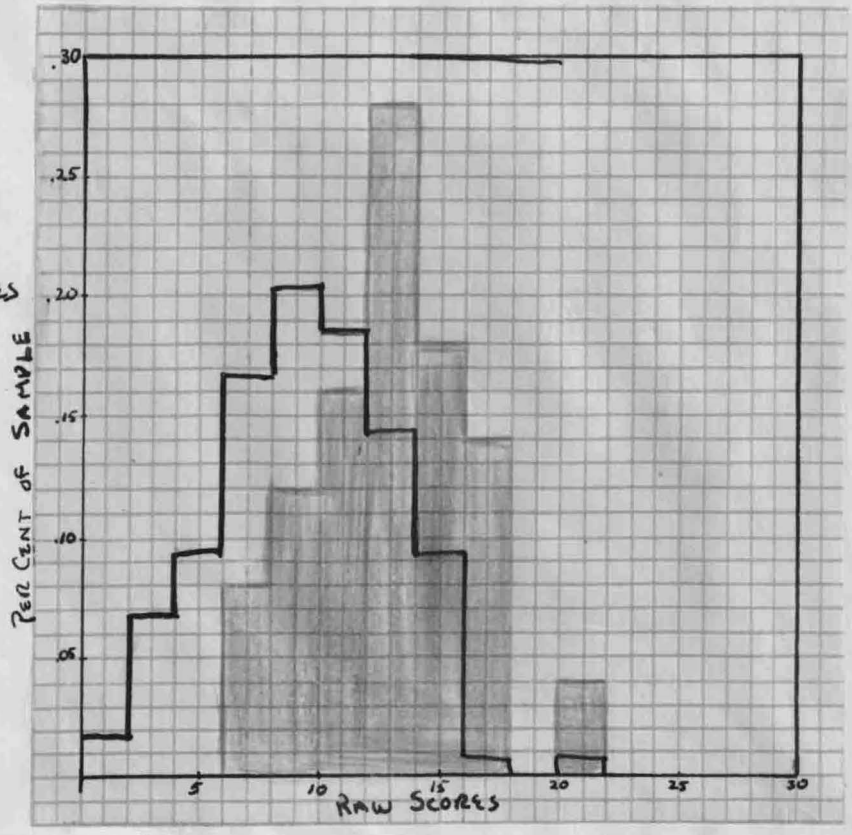
Freshmen

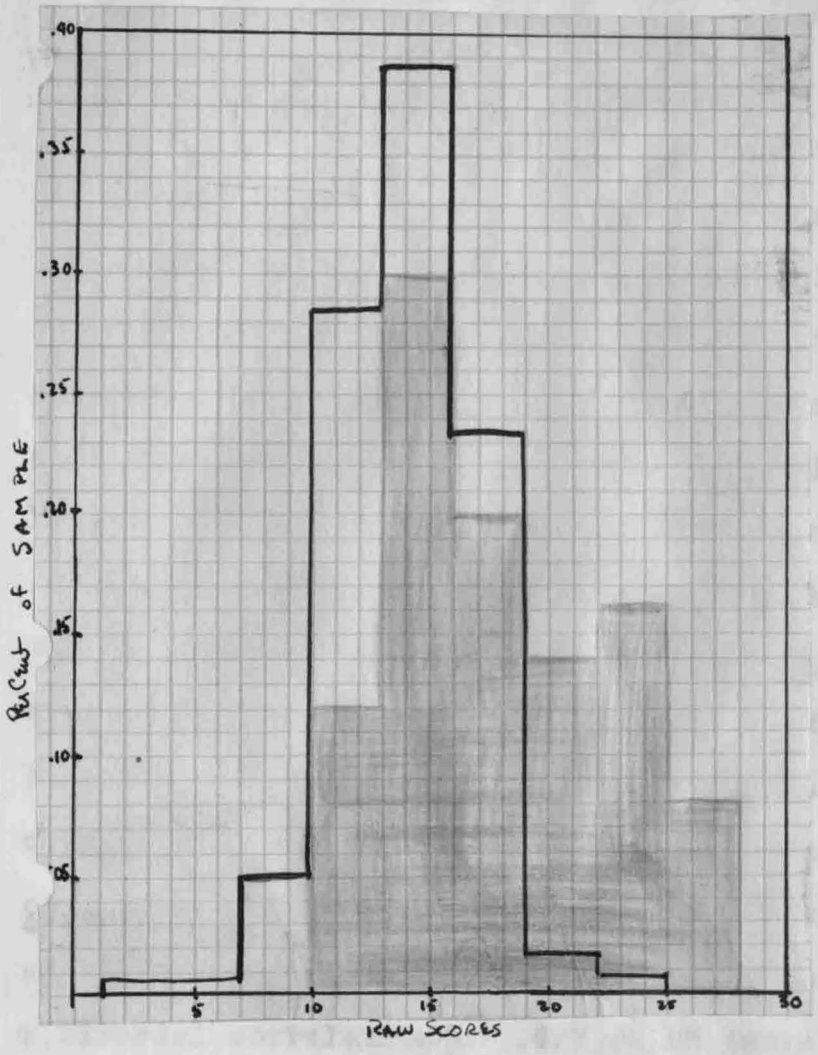
Division 4 —

Physical Sciences

Seniors

Freshmen





DIVISION 5 —

BIOLOGICAL SCIENCES

SENIORS

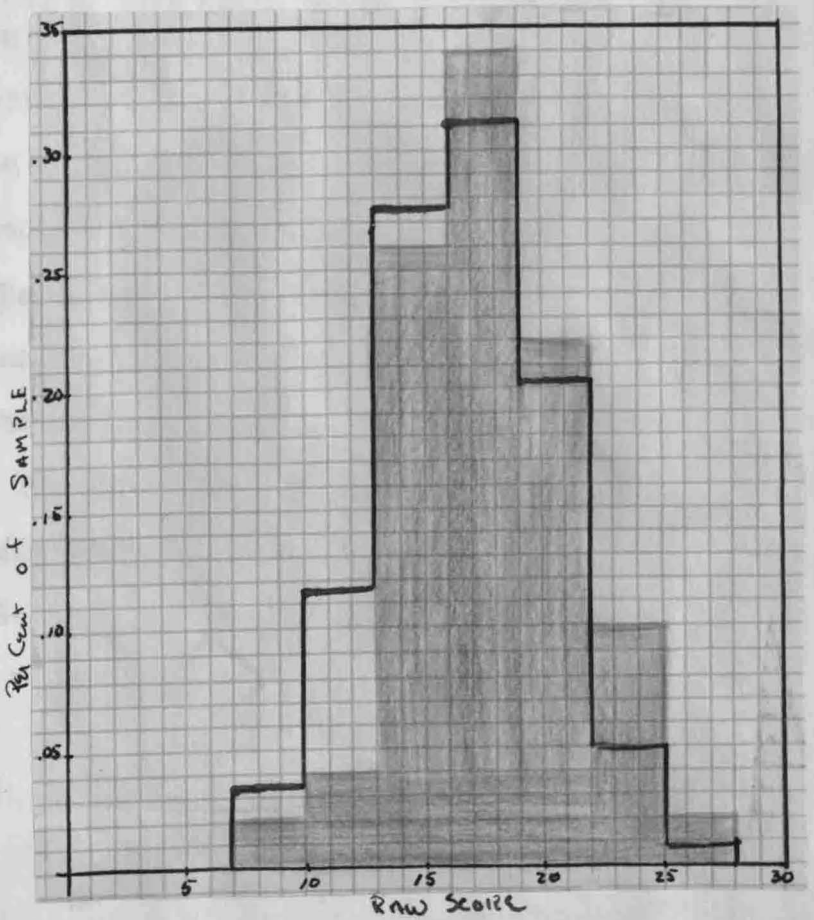
FRESHMEN

DIVISION 6 -

MATHEMATICS

SENIORS

FRESHMEN



The biserial correlation between senior scores and freshmen scores of Division 1-Human Relations was .412 which may reflect specific training, although the data could be merely indicative of growth of a general nature probably caused by the college experience rather than training in a particular field. Division 2-Commerce yielded a biserial correlation of .679---the highest obtained, higher even than that of the total score means. This is what might have been expected, since very few freshmen have had training in business, sales, or economics whereas it is quite a usual thing for seniors to include at least one course of such nature (usually Principles of Economics) somewhere in their curriculum. Division 3-Government gave a biserial correlation of .457 which indicates some vocabulary growth in this area. Because a good general background in history and government is required for college entrance, any marked gain over the four-years in this area would not be expected. The increase which was found, however, reflects the effect on vocabulary growth of political science and American history courses which are often included in the senior curriculum.

The subtests stressing quantitative information also yielded interesting results. The correlation of Div.4-Physical Sciences was .527 which implies increase in vocabulary and reflects the specific

college training in this field. A negligible number of freshmen enter with a background of physics, mechanics, and chemistry; (the test items emphasize the first two) whereas the requirements at Westhampton are so stated that nearly every girl must take physics. The fact that this course has little apparent interest and practical value to the average girl and therefore means that she does not retain as much as in certain other more highly motivated courses may explain why the correlation is not higher than it is.

Division 5-Biological Sciences yielded a biserial correlation of .582 which is significant and indicative of an increase in this area as well as being reflective of college training in biology. While freshmen usually offer one science course for entrance, it is often general science or a very general biology course. The test items are slanted toward zoology, anatomy, and pathology which are more on the college level. The sixth division-Mathematics gave not only the lowest correlation on the test but also was .229 below the next lowest. At first glance this seems inconsistent, but on further examination it is quite as one might expect. Nearly all entering freshmen have a good background in mathematics as part of their entrance requirements; only

one year of mathematics is required at Westhampton, usually taken in the freshman year, and, without practice, not a large percent of details is retained till the senior year. In view of this situation it is not surprising to find the small increase in mathematical vocabulary as indicated by a biserial correlation of .183.

The second portion of the problem was an analysis of selected samples of senior majors with respect to 1.) comparison of their scores on their major fields with scores on the other sections of the test, and 2.) comparison of performance on related subtests of majors with non-majors in the particular field being studied. There were four groups which, since there were corresponding fields represented in subtests of the vocabulary profile, could be used in this section of the problem. There were twenty psychology and sociology majors for whom Div.1-Human Relations was selected as related; seven history majors for whom Div.3-Government was selected as related; seven biology majors with biological sciences as related; and four mathematics using the mathematics subtest. Other major groups were not represented by closely related subdivisions.

As has been indicated already, the samples were so small as to rule out a biserial correlation since it is of little value when the smallest group is

under 13. The psychology and sociology majors are the only ones with which it could have been used, but for the sake of consistency in handling of data these were treated in the same manner as the other three groups. Therefore, in this section the difference in the mean is used in analysis rather than a biserial correlation since the samples were so small.

A second difference in organization of data in this portion was the necessity of using standard scores for the first section in which comparison is made between scores on the major field and scores on the other sections of the test. The use of the standard scores was necessary since raw scores are not of equal value on the various subtests; ie. a raw score of 14 might be in the 2% ile for Div.1, 31%ile for Div. 4, and 7%ile for Div. 7. A conversion table was computed[17] for converting raw scores to T-scores or standard scores using the formula $T \frac{10(x-M)}{\text{sigma}} \pm 50$, where x is the raw score, M is the mean of the distribution, and sigma is the standard deviation.

In Table II are the results obtained in the first section of analysis made of seniors. This

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[17] For conversion table, see Appendix B.

was a comparison of scores on their major fields with scores on the other sections of the test:

TABLE II. T-Score Means of Performance on Major vs. Other Five Subtests.

Sample	Major-Related Mean T-Score	Other 5 Subtests Mean T-Score	Difference In Means
Psychology & Sociology	51.7	48.3	3.4
History	53.86	50.45	3.21
Biology	64.0	52.97	11.03
Mathematics	68.0	53.10	14.90

The figures in Table II indicate that in each group the majors performed better in their own field than in the other five subtests. This is particularly true of the groups whose fields are more technical, more quantitative, and less verbal in nature, suggesting that growth in technical and specialized vocabulary is more frequent and more emphasized in subjects in this area. The superiority in means for biology and mathematics are 11.03 and 14.9 respectively, while those for psychology-sociology and history are 3.4 and 3.21 respectively.

In comparing performance on related subtests by majors and non-majors, the results are shown in Table III.

TABLE III. Raw Score Means by Subtests of Majors vs. Non-Majors.

Related Subtest	Means Made by Major	Means Made by Non-Major	Difference in Means
Div.1-Human Relations	19.35	18.35	1.0
Div.3-Government	20.0	18.44	1.56
Div.5-Biological Sciences	24.28	17.16	7.12
Div.6-Mathematics	24.75	17.76	6.99

The figures shown in Table III are especially interesting. They are somewhat different from what was expected at the outset of this study, in that it had been anticipated that all the groups would show a difference in the means. Actually the human relations and government showed differences of only 1 and 1.56 respectively, while the biological sciences and mathematics divisions showed differences of 7.12 and 6.99 respectively. In the explanation of these data, it becomes logical that those with more technical, more quantitative, and less verbal subjects should score higher, since human relations and government are the more general subjects which are an integral part of nearly every program in a liberal arts college, while the more technical ones are not acquired

on as comprehensive a level.

The third portion of the problem was an analysis of the freshmen results to determine the predictive value of the test along three lines; to discover its predictive value for overall academic success on the basis of the total score; to find its predictive value for academic success in a specific field on the basis of the particular related field subtest; and to reveal comparative discriminative value of the test with respect to prediction along verbal or quantitative lines.

In working up the data in this phase of the project, the method of biserial correlation was again used to discover the validity of the test for predicting academic achievement. The boundary line of academic successfulness was arbitrarily set at C; the grades at the end of the first semester were used as the standard. Thus it was that wherever a dichotomy was made in upper and lower academic groups, the line was drawn at C---those with C or above were regarded as being in the upper group; those with below C in the lower group. The grades used were those recorded at the end of the first semester in February 1949. These results are shown in Table IV.

TABLE IV. Predictive Value of the Michigan Vocabulary Profile Test from 114 Freshmen

Level of Prediction	Mean of Upper Group	Mean of Lower Group	Sigma of Total	Biserial Correlation
Overall Success (whole test)	93.87	80.45	14.87	.564
Success in one field	17.53	16.62	4.62	.119
Discriminative value				
Verbal (English)	87.80	77.04	16.3	.368
Quantitative(Math.)	89.88	82.58	14.35	.306

In the prediction of overall academic success, the difference of the mean of total scores between the upper and lower groups is 13.42, yielding a biserial correlation of .564. This shows a significant difference between the two groups and implies that the test has a good predictive value for overall academic success. It must be pointed out, however, that obviously prediction of academic success should not be made on the basis of this one test alone since more than vocabulary ability is involved in academic success. Nevertheless, the correlation is suggestive of the fact that one can predict the upper or lower group distribution from the total profile score. The correlation of .564 from the

Michigan Vocabulary Profile is .114 above the correlation of .45 of the American Council of Education Psychological Examination with academic success.[18] This means that as far as Westhampton College is concerned, the Michigan Vocabulary Profile is more predictive of academic success than the currently used A.C.P.E.

The second section of the freshmen data was examined in order to determine if the separate subtests of the profile could be used in prediction of academic success in the related field. The mathematics division of the test was used since this subject is required of all freshmen and therefore made available the largest sample. As in the previous section the division into upper and lower academic groups was on the arbitrarily chosen cut-off point of C or above in the upper group and below C in the lower group. Using these data the difference in the means was only .91 giving a low correlation of .119. From this it is evident that prediction of academic success should be in terms of the total scores rather than on the basis of separate subtest achievement.

From the latter portion of the freshmen data, an analysis was made in order to compare the discriminative value of the verbal and quantitative

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[18] A.B.Crawford and P.S.Burnham, Forecasting College Achievement, p.95.

aspects in the prediction of academic success. In doing this the procedure was to select a subject which was definitely slanted verbally (English) and one slanted quantitatively (mathematics) and both of which occur in the program of the majority of freshmen; 114 freshmen were included in this sample. A biserial correlation was computed with both groups divided using the same criterion of academic success as previously (C and above, or below C).

The figures in Table IV indicate the correlation, of total scores on the Michigan Vocabulary Profile Test with academic success in English, was .368, the difference in the means being 9.56. The same statistical computation with college grades in mathematics as the basis of the academic division yields a correlation of .306 with the difference in means of 7.3. Because of the verbal nature of the test it was anticipated that the difference in the correlations would have been greater in favor of the verbal than the .062 which was actually found. This may be more clearly understood in the light of the fact that the mathematics or quantitative section of the test was verbal rather than actually quantitative. Another factor is that, of 114 cases, only 20 were in the below-C-average group in English, while there were 43 in the corresponding group in mathematics.

These results tend to indicate then, that prediction of academic success on the basis of total profiles is nearly equal with respect to discrimination between quantitative and verbal concepts.

III

SUMMARY AND CONCLUSIONS

In any study of a test and its results which goes beyond the original scoring and interpretation of the data each new analysis suggests other problems which it would be of value and interest to investigate. This study has been no exception. Most fruitful perhaps would be to follow up a representative sample of college freshmen year by year to see if such a group gains steadily and significantly from year to year, and if these gains follow any characteristic pattern. It would also be interesting to determine whether or not there is any particular year in which the gain is greatest in vocabulary ability in terms of total growth or growth in specialized areas.

Another interesting problem hinted at in the data obtained from the freshmen sample would be to investigate the possible influence of location

and type of preparatory schools on vocabulary in terms of the profile score. The mean score of Westhampton College freshmen (which included a majority of southern prepared students) is about 20 raw score points below the mean of the standardizing sample of freshmen, who were from Michigan. A casual survey of the data indicated that there might be a positive relationship between the kind and location of the preparatory school and vocabulary score. In direct relation to this would be an analysis of the effect of a rural vs. an urban preparatory school. A verification of these suggestions would be interesting and would support what has already been indicated in this study---that for the most valuable use in Westhampton, norms for this particular college should be compiled. This would increase the validity of the test as an indication of interests, a use which the test is now finding in the newly established University Psychological Service Center.

Perhaps a little different approach but certainly a fruitful one would be a problem in validation of similar tests for fields not at present included in the battery--such as English (grammar and literature), languages, fine arts of an esthetic

nature, and philosophy. These and others are problems in which investigation would be interesting and valuable to those using the test as a basis for educational and vocational counseling.

As was suggested in the preface, no particular hypothesis was being tried out in this study, although after reading through the original and supplementary data, certain trends were anticipated, which by and large have been supported by the statistical analysis of the data obtained. On the basis of the findings of this study the following statements may be made by way of summary:

1. There is a significant increase of vocabulary ability during the four years of college experience.
2. The increase is well-scattered throughout the fields sampled by the Michigan Vocabulary Profile Test; it is, however, more apparent in commerce, biology, physical sciences--in that order.
3. The amount of growth is greatest in those courses that are generally regarded as more technical, more quantitative, and less verbal in nature, with the exception of mathematics and this may be caused by widespread uniformity of train-

ing in that subject.

4. Senior majors make better scores on their own fields of concentration than on other subtests, the more technical the vocabulary required the greater the difference in the score.

5. Senior majors score higher on their own fields of concentration than do non-majors in the more technical fields; in the humanities and social sciences, majors do not perform significantly better than non-majors since basic training in these fields is an integral part of nearly every liberal arts program.

6. Scores on the profile may be used for prediction of academic success, the predictive value comparing favorably with that of the American Council Psychological Examination which is in current use here at the University.

7. The total score is valid for prediction of general academic achievement while little is accomplished in using a separate subtest; the subtest may suggest a trend but does not correlate high enough for an actual prediction of general academic success.

8. Prediction of academic success from the total score is nearly equally valid with respect to discrimination between quantitative and verbal concepts.

9. Use of the test is justified as part of a more inclusive battery designed to forecast college achievement or to guide the counseling of individual students.

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APPENDIX A

Frequency Tables for Graphs of Frequency Distributions

TABLE I. Total Scores-119 Freshmen; 50 Seniors

Interval	Freshmen		Seniors	
	No.of Cases	% of Sample	No.of Cases	% of Sample
30-134	-	-	1	.02
25-129	-	-	2	.04
20-124	1	.008	3	.06
15-119	2	.016	9	.18
10-114	1	.008	7	.14
05-109	8	.067	4	.08
00-104	12	.092	4	.08
95-99	14	.117	7	.14
90-94	12	.092	8	.16
85-89	21	.176	1	.02
80-84	17	.143	3	.06
75-79	15	.126	-	-
70-74	1	.008	1	.02
65-69	3	.025	-	-
60-64	2	.016	-	-
55-59	-	-	-	-
50-54	2	.016	-	-
45-49	3	.025	-	-

TABLE II.Division 1. 119 Freshmen; 50 Seniors

Interval	Freshmen		Seniors	
	No. of Cases	% of Sample	No. of Cases	% of Sample
26-27	-	-	2	.04
24-25	1	.008	4	.08
22-23	2	.016	6	.12
20-21	13	.109	11	.22
18-19	26	.218	7	.14
16-17	28	.235	11	.22
14-15	24	.202	5	.10
12-13	18	.151	3	.06
10-11	7	.058	1	.02

TABLE III. Division 2. 119 Freshmen; 50 Seniors

Interval	Freshmen No.of Cases	Freshmen % of Sample	Seniors No.of Cases	Seniors % of Sample
23-24	-	-	2	.04
21-22	4	.034	7	.14
19-20	8	.067	12	.24
17-18	5	.042	11	.22
15-16	28	.235	12	.24
13-14	33	.277	5	.10
11-12	22	.185	1	.02
19-10	12	.092	-	-
7-8	4	.034	-	-
5-6	3	.025	-	-

TABLE IV. Division 3. Freshmen 119; Seniors 50

Interval	Freshmen No.of Cases	Freshmen % of Sample	Seniors No.of Cases	Seniors % of Sample
25-26	-	-	1	.02
23-24	2	.016	6	.16
21-22	6	.050	9	.18
19-20	14	.117	10	.20
17-18	35	.294	11	.22
15-16	23	.193	4	.08
13-14	22	.185	8	.16
11-12	11	.092	1	.02
9-10	2	.016	-	-
7-9	4	.034	-	-

TABLE V. Division 4. 119 Freshmen; 50 Seniors

Interval	Freshmen No.of Cases	Freshmen % of Sample	Seniors No.of Cases	Seniors % of Sample
21-22	1	.008	2	.04
19-20	-	-	-	-
17-18	1	.008	7	.14
15-16	12	.092	9	.18
13-14	17	.143	14	.28
11-12	22	.185	8	.16
9-10	24	.202	6	.12
7-8	20	.168	4	.08
5-6	12	.092	-	-
3-4	8	.067	-	-
1-2	2	.016	-	-

TABLE VI. Division 5. 119 Freshmen; 50 Seniors

Interval	Freshmen		Seniors	
	No.of Cases	% of Sample	No.of Cases	% of Sample
26-28	-	-	4	.08
23-25	1	.008	8	.16
20-22	2	.016	7	.14
17-19	28	.235	10	.20
14-16	46	.386	15	.30
11-13	34	.285	6	.12
8-10	6	.050	-	-
5-7	1	.008	-	-
2-4	1	.008	-	-

TABLE VII. Division 6. 119 Freshmen; 50 Seniors

Interval	Freshmen		Seniors	
	No. of Cases	% of Sample	No.of Cases	% of Sample
26-28	1	.008	1	.02
23-25	6	.050	5	.10
20-22	24	.202	11	.22
17-19	37	.311	17	.34
14-16	33	.277	13	.26
11-13	14	.111	2	.04
8-10	4	.034	1	.02

APPENDIX B

A Conversion Table from Raw Scores to T-Scores for 50 Seniors

Raw Scores	Div.1	Div.2	Div.3	Div.4	Div.5	Div.6	Raw Scores
27						74	27
26	70		71		68	71	26
25	67		68		66	69	25
24	64		65		63	66	24
23	62	69	62		61	63	23
22	59	66	59		59	60	22
21	56	62	57	73	57	57	21
20	53	58	54	70	54	55	20
19	50	54	51	67	52	52	19
18	48	51	48	64	50	49	18
17	46	48	46	61	47	46	17
16	43	44	43	58	45	43	16
15	40	40	40	55	42	41	15
14	37	36	37	52	40	38	14
13	34	32	34	49	38	35	13
12	31	28	31	46	35	32	12
11	29		28	43	33	29	11
10	26			40		26	10
9				37		24	9
8				34			8
7				31			7