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A Study Comparing the Educational Proficiency of Students from High Schools with Eight or Less Teachers, Nine to Sixteen Teachers, and Over Sixteen Teachers Who Attended South Dakota State College as Freshmen During the School Year of 1940-1941

David W. Evans

A STUDY COMPARING THE EDUCATIONAL PROFICIENCY OF STUDENTS FROM HIGH SCHOOLS WITH EIGHT OR LESS TEACHERS, NINE TO SIXTEEN TEACHERS, AND OVER SIXTEEN TEACHERS WHO ATTENDED SOUTH DAKOTA STATE COLLEGE AS FRESHMEN DURING THE SCHOOL YEAR OF 1940-1941

By

David W. Evans

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CHAPTER I

INTRODUCTION

Justification of the Study

Considerable attention has been given to a study of the effect of certain factors in the high-school background on achievements in college of those persons who attend an institution of higher learning.[1] One of the factors that has been given only limited attention is the size of the high school from which the student enters college.

The question of whether or not the graduates of the small high schools do as well as the graduates from larger high schools when they enter college has been discussed frequently by teachers and laymen, but little scientific evidence has been presented to justify valid conclusions one way or another. Having taught in high schools which may be classified as small, medium, and large, the writer became interested in investigating the matter with a certain degree of scientific rigor.

Statement of the Problem

Stated specifically, the aim of this study is to compare the educational proficiency of students who entered South

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1. Daniel Harris, "Factors Affecting College Grades," Offprinted from Psychological Bulletin, Vol. 37, No. 3, March 1940.

Dakota State College in the fall of 1940-1941 as graduates of various sized high schools in this state.

The specific objectives of this study are stated as follows:

1. To determine if there is any relationship between the college aptitude (ACE score) and the size of the South Dakota high school from which State College student has graduated.

2. To determine if there is any relationship between the achievement in College Freshman English and the size of the South Dakota high school from which State College student has graduated.

3. To determine if there is any relationship between the achievement in College Freshman Chemistry and the size of South Dakota high school from which State College student has graduated.

Delimitation of the Problem

The three objectives of the study as presented by the writer served as the limiting factors in the study. A comparison of the achievement was limited to the freshmen students who were graduated from three classes of public high schools in South Dakota and attended South Dakota State College as freshmen during the school year of 1940-1941.

The size of the school was arbitrarily set as schools employing two to eight teachers, nine to sixteen teachers, and more than sixteen teachers in the high school. This in

general conforms to the definition of small, medium, and large high schools in South Dakota.

Sources of Information

Investigation revealed that the office of Educational Research had a complete copy of the data collected by Norman Berg in a previous study; a thesis on the relative value of the high-school mark in prediction of success in college. The author was given permission to use these data. A reproduction of the data card used by Mr. Berg is illustrated on Page 28 of the appendix.

The South Dakota, Education Directory for the year 1940 was used to secure the number of teachers employed in each school.

The grade points were computed on the following basis: A - 5 points, B - 4 points, C - 3 points, D - 2 points, F - 1 point. This system is not in use at South Dakota State College, but this system has been in use in the public schools and military-services schools with which the author is familiar. The author is also of the opinion that mathematical results are more accurate and that the pupil's work deserves more than a zero score for an F grade.

Accuracy and Reliability of Data

As it was stated, all material was secured from the office of Educational Research of South Dakota State College and is based on entering Freshmen Class 1940-1941, which is presumed to be a representative pre-war year. In tabulating

the data all tabulation was rechecked for accuracy. A calculating machine was used in the majority of the work.

CHAPTER II

GENERAL INFORMATION AND BASIC DATA PERTAINING TO THE STUDY

Related Literature

It has been stated that considerable attention has been paid to factors affecting college grade and that an analysis of the effects of the size of the high school was limited in such studies. During the years 1931-1937 some three hundred and thirty studies were published on factors affecting college grades.[2] Of this group seven made reference to size of high school, and the author was able to secure the reference in two cases and a resume in five others. A complete reference is made in the bibliography.

J. V. McQuitty (7) and H. H. Remmers (9), in separate studies, found that it appeared that more superior students seemed to come from large city high schools.

H. R. Douglass (1), D. A. A. Jones and H. R. Laslett (5), and T. E. Pettengill (8) in separate studies did not agree with the finding of McQuitty and Remmers.

T. C. McCormick (6), at East Central Oklahoma Teachers College, found urban and rural background had no bearing on grades.

Procedure Followed in This Study

A preliminary study of the available data suggested that the mere averaging of the grades of the college students

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2. Ibid., p. 151.

coming from small, medium, or large high schools as a basis for determining the effect of high-school size might not give valid results, since it was conceivable that students coming from the different sized school might differ in native ability. The first step, then, was to determine whether or not a difference did exist, and which group or groups were superior.

A convenient test to determine whether two or more groups differ with regard to a given trait is the chi-square[3] test which is illustrated by application to the data presented in Table I. This table shows the number of students from small, medium, or large-sized schools falling within a given range of scores on the ACE test.

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3. Henry E. Garrett, Statistics in Psychology and Education, pp. 377-387.

TABLE I. NUMBER OF FRESHMEN STUDENTS FALLING INTO SPECIFIED RANGE OF ACE SCORES FOR SMALL, MEDIUM, AND LARGE HIGH SCHOOLS

ACE Score	Small 2-8 Teachers	Medium 9-16 Teachers	Large More Than 16 Teachers	Total
120 and above	(30.56) 22	(13.25) 9	(20.15) 33	64
110 - 119	(24.83) 26	(10.79) 13	(16.37) 13	52
100 - 109	(21.01) 21	(9.13) 11	(13.85) 12	44
90 - 99	(21.48) 20	(9.34) 12	(14.17) 13	45
80 - 89	(13.37) 19	(5.81) 3	(8.81) 6	28
79 or less	(36.74) 30	(11.62) 12	(17.63) 14	56
Total Number of Students	138	60	91	289

In the above table the figures not in parentheses indicate the actual number of students falling into each category. The figures in parentheses indicate the number one would expect to fall into each category if each school group (small, medium, or large) contributed proportionately in accordance with the number in the total column. The numbers are called independence values and are calculated by multiplying the figures in the corresponding totals column and dividing by the total number of cases 289. Thus the figures (30.56) (top of column one) is arrived at by multiplying the total number of persons with an ACE score of 120 or above by the total number of pupils

coming from small schools, and dividing the product by 289, this became (64) (138) / 289, which equals 30.56. All other figures in parentheses in Table I are determined in a similar manner.

While one would not expect the independence value to agree exactly with the observed numbers, neither would one expect a large difference if the size of the school did not in some way affect the distribution between the actual and independence value which may have come about merely by chance or are a result of a real difference in ACE scores (college aptitude) among students coming from the small, medium or large-sized school. This is the question which the application of the chi-square test answers.

The test is completed by finding the difference between each set of independence and observed numbers, dividing this product by the independence value for each set, and adding the obtained quotients for all the sets. The calculations are indicated below:

$(8.52)^2 / 30.56 = 2.3975$
$(1.17)^2 / 24.83 = .055$
$(.01)^2 / 21.01 = .000004$
$(1.48)^2 / 24.48 = .101$
$(5.63)^2 / 13.37 = 2.3706$
$(3.26)^2 / 26.74 = .3974$

$(4.28)^2 / 13.28 = 1.378$
$(2.21)^2 / 10.79 = .4522$
$(1.87)^2 / 9.134 = .3822$
$(2.66)^2 / 9.34 = .7569$
$(2.81)^2 / 5.81 = 1.3603$
$(.38)^2 / 11.62 = .0124$

(Continued)

$(12.85)^2 / 20.15 = 8.194$
$(3.37)^2 / 16.37 = .8289$
$(1.85)^2 / 13.85 = .2469$
$(1.17)^2 / 14.17 = .0960$
$(2.81)^2 / 8.81 = .8955$
$(3.63)^2 / 17.63 = .7470$

TOTAL 20.67

In order to interpret chi-square value of 20.67 it is necessary to refer to chi-square table[4] with the proper number of degrees of freedom[5]. The number of degrees of freedom is equal to the number of rows in the table minus one, times the number of columns mimus one. Table I contains six rows and three columns, so the number of degrees of freedom for the table is 5 x 2 or 10.

Entering the chi-square with ten degrees of freedom, we find that the number 20.67 falls between the probability value of .02 and .05, which means that there are between two and five chances in one hundred that if the experiment were repeated, we would get a chi-square value approximately equal to 20.67.

Average Grade Points Earned in College Chemistry in Relation to Size of High School from Which Pupil Was Graduated

The average grade points earned were calculated on the basis of grade value as an A equals five grade points, B is equal to four grade points and etc.

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4. Ibid., p. 379. See Page 27 Appendix for partial table of X^2 values.

5. Ibid., p. 378.

Thus a grade of A in college chemistry for three terms would equal fifteen grade points. A grade of C in college chemistry would equal nine grade points.

The simplest way of making this analysis would be to compare the mean grade-point average of college freshmen chemistry students who have graduated from the different sized high schools. This procedure, however, would not take into account the possibility of variation in general academic aptitude between size of school groups.

Fortunately the effect of difference in aptitude can be somewhat controlled by using the methods of rank technique.

Calculation of Methods of Ranks

The method of ranks can be used whenever the data can be presented in a two-way table on the basis of two or more criteria. Each item in the columns is ranked as (1 - 2 - 3) in either ascending or descending order, and the mean rank is calculated for each column.[6] The deviation of the mean in each column is the basis of the test for X_r^2.

Wallis defines the X_r^2 statistic as (P - 1) times the ratio of the actual variance among columns means to the variance expected on the basis of the null hypotheses, the

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6. Frank G. Schultz, "Recent Developments in the Statistical Analysis of Ranked Data Adapted to Educational Research," The Journal of Experimental Education, Vol. 13 3, 1945, pp. 149-152.

symbol "p" representing the number of columns in the rank matrix.[7]

Since it has been shown by Friedman[8] that the mean rank of table of ranks is $\frac{1}{2}(P + 1)$ and the variance $(P^2 - 1) / 12N$ in which "N" equals the number of rows in the table, the above-mentioned verbal definition can be translated into

$$\chi_r^2 = \frac{\frac{(P-1)}{P}\left\{\bar{r}_j - \frac{1}{2}(P+1)\right\}^2}{\frac{P^2-1}{12N}}$$

in which $\bar{r}_j$ equals the mean rank of the j^{th} column.

By algebraic manipulation this equation became

$$\chi_r^2 = \frac{12N\left\{\bar{r}_j - \frac{1}{2}(P+1)\right\}^2}{P(P+1)}$$

The details of this procedure can best be explained by using the data in Table II which gives the average grade points earned in college chemistry for the three classes of high schools. The next step is to rank the average grade points in Table II. The figures enclosed in parentheses

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7. W. Allen Wallis, "The Correlation Ratio for Ranked Data," Journal of the American Statistical Association, Vol. 34, 1937, pp. 533-538.

8. Milton Friedman, "The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance," Journal of the American Statistical Association, Vol. 32, 1937, pp. 675-701.

indicate the rank for each category. The ranks are in descending order, and wherever the grade-point average did not deviate five-tenths of a grade point, the same rank was given.[9] Thus in the first row the small school had a grade-point average 11.52, the medium-sized school had a grade-point average of 11.66, and the large school had a grade-point average of 10.52. In this case the small and medium-sized school received the rank of 1.5 and the large school the rank of 3. The same procedure was followed for all rows in Table II.

The next step in the procedure is to obtain the mean rank for each column.

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9. Ibid., p. 681.

TABLE II. RELATION BETWEEN GRADE-POINT AVERAGE IN COLLEGE CHEMISTRY AND SIZE OF HIGH SCHOOL FROM WHICH PUPIL WAS GRADUATED

ACE Score	Small 2-8 Teacher School	Medium 9-16 Teacher School	Large More Than 16 Teachers
120 and above	11.52 (A) (1.5) (B)	11.66 (1.5)	10.52 (3)
110 - 119	10.20 (2.5)	11.0 (1)	10.0 (2.5)
100 - 109	8.8 (1.5)	8.45 (1.5)	7.5 (3)
90 - 99	8.31 (1.5)	7.45 (3)	8.27 (1.5)
80 - 89	8.22 (2.5)	9.5 (1)	8.5 (2.5)
79 or less	8.07 (1)	6.5 (2.5)	6.83 (2.5)
Sum of Rank	10.5	10.5	15
Mean Rank	1.75	1.75	2.5
Deviation from the Theoretical Mean	-.25	-.25	+.5
Deviation Squared	.0625	.0625	.25

Theoretical mean equals 2

Sum of deviation squared equals .375

(A) Grade-point average for all students with ACE score 120 or better who attended a small school. Same procedure for each cell.*

(B) Rank of average grade-point average for each cell.

*The word cell refers to that category which students are grouped as to size of school and ACE score.

From the data and calculation in Table II the numerical value of the statistics became:

$$X_r^2 = \frac{12 \times 6}{3 \times 4} \times .375 = 2.25$$

The mean rank of each column is indicated in Table II. In the absence of relation between size of school and achievement in college chemistry the means would not deviate greatly. In Table II the mean rank for the small and medium school was 1.75 and the large school 2.5.

The computation of X_r^2 is simple. The means of the three ranks is equal to the true mean of 2. The difference between the mean rank for each column and 2 is given as deviation from the theoretical mean in Table II. The sum of the squares of these differences is .375 and the $X_r^2 = 2.25$.

Entering the exact distribution of X_r^2 for tables with from 2 to 9 sets of three ranks with P = 3 and N = 6, we find that the number 2.25 falls between the probability value of .43 and .57. This means that there are between forty-three and fifty-seven chances in one hundred that if the experiment was repeated, we would get X_r^2 value approximately equal to 2.25.[10]

A Comparison of Average Grade Points Earned in College English

In comparing the English achievements of the student from the small, medium, or large high school, the same

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10. Ibid., p. 688. See Page 29 Appendix for partial table of X_r^2 values.

procedure was followed as in comparing the work in college chemistry.

In Table III was tabulated the grade points earned by each group of students. The groups were ranked and the data tabulated. The grade-point average for the small school was 10.81, the medium school 11.31, and the large school 10.87. The small and the large school received the rank of 2.5 and the medium-sized school a rank of 1.

In Table III the mean rank for the large and for the small school was 2.166 and for the medium-sized school 1.666. The deviation from the true mean were squared and summed. The sum of the deviation was .166668.

TABLE III. RELATION BETWEEN GRADE-POINT AVERAGE IN COLLEGE ENGLISH AND SIZE OF HIGH SCHOOL FROM WHICH PUPIL WAS GRADUATED

ACE Score	Small 2-8 Teacher School	Medium 9-16 Teacher School	Large More Than 16 Teachers
120 and above	10.81 (A) (2.5) (B)	11.31 (1)	10.87 (2.5)
110 - 119	10.11 (1.5)	10.30 (1.5)	8.61 (3)
100 - 109	8.04 (3)	9.0 (1)	8.83 (2)
90 - 99	8.09 (2)	7.41 (3)	8.77 (1)
80 - 89	7.47 (3)	8.66 (1)	8.16 (2)
79 and less	7.03 (1)	6.41 (2.5)	6.41 (2.5)
Sum of Rank	13.0	10.0	13.0
Mean Rank	2.166	1.666	2.166
Deviation from the Theoretical Mean	+.166	-.334	+.166
Deviation Squared	.027556	.111556	.027556

Theoretical Mean Equals 2

Sum of Deviation Squared Equals .166668

(A) Grade-point average for all students with ACE score 120 or better who attended a small school. Same procedure used for each cell*.

(B) Rank of the average grade points for each cell.

*The word cell refers to that category in which students are grouped as to size of school and ACE score.

From the data and calculation in Table III the numerical value of the statistic became:

$$\chi_r^2 = \frac{12 \times 6}{3 \times 4} \times .166668 = 1.00008$$

Entering the exact distribution of X_r^2 for tables with from 2 to 9 sets of three ranks with P = 3 and N = 6, we find that the number 1.00008 falls between the probability value of .57 and .74. This means that there are between fifty-seven and seventy-four chances in one hundred that if the experiment were repeated we would get X_r^2 value approximately equal to 1.00008*.

*See Page 29 Appendix for partial table of X_r^2 values.

CHAPTER III

ANALYSIS OF THE DATA

A Comparison of the Pupil from the Small, Medium, or Large High School and Their (ACE) College-Aptitude Test Scores

In the preceding chapter were presented the data for the three classes of high school, the small, medium, or large high school and the results of the college-aptitude test. In Table I was tabulated the number of pupils in each category as to college-aptitude test and size of school.

The chi-square test was applied to determine if the groups did differ in any given traits. That is, did the size of the school have any relationship to the scores on the college-aptitude test. The chi-square test gave scientific proof that for the distribution to occur by chance was a probability between .02 and .05. (By interpolation the .03 was established.) While this probability does not reach the .01 level where one can say positively that the data in Table I were significantly different, it does reach the approximate value of .03 and one can say these data are significantly different at the .03 level. The chi-square test used on these data indicates that divergence of the observed from the expected results may have been caused by the size of the school.

Having found that a difference does exist in the ACE scores and size of the high school, the next step was to analyze the academic achievement of the students in college chemistry.

A Comparison of Pupil Achievement in College Chemistry and Size of High School from Which Pupil Was Graduated

In Table II were presented the data on achievement of the students in college chemistry. The average in grade points for all students in each category was controlled by their ACE score and size of high school. In ranking the achievement of the students based on their marks in college chemistry, it appeared that the student of the larger schools ranked lower than the smaller schools.

By substituting the numerical value of data in Table II into statistic X_r^2 we find a value of 2.25. This value 2.25 means that we have a probability of somewhere between forty-three and fifty-seven chances in one hundred that if this experiment were repeated we would get a X_r^2 value approximately equal to 2.25. Therefore one can say as far as achievement in college chemistry there is not any statistical difference. This distribution is an oddity when we observe that the grade-point average of both small and medium school is higher than the larger school in all except three cells. One might say even though the larger school did do better in the college-aptitude test, when it came to achievement in college chemistry, the small and medium schools did slightly better work if results are based on grade points earned in that subject.

A Comparison of Pupil Achievement in College Freshman English and Size of High School from Which Pupil Was Graduated

In Table III the data on achievement of the students in college English were tabulated. The same procedure was followed in analyzing the marks and ranks of the students as was used on college chemistry achievements.

The deviation in grade points was small and the ranking appeared to favor the medium-sized school. The deviation of grade points for students who scored 120 or better on the ACE test was .54 of one grade point. The greatest deviation in column mean was .334.

When the numerical value of the data in Table III was treated statistically the value of X_r^2 was 1.00008. This gives one a probability that the observed results could occur somewhere between fifty-seven and seventy-four times in one hundred. This high probability indicates there is little if any difference in the students' achievements in college English in regard to size of the school as a factor of influence.

CHAPTER IV

CONCLUSIONS AND GENERAL SUMMARY OF STUDY

A Recapitulation of the Study

The aim of this study was to compare the educational proficiency of pupils from different sized public high schools in South Dakota, who entered South Dakota State College as freshmen during the school year of 1940.

The objectives of this study were stated as follows:

1. To compare college-aptitude test score and size of high school the pupil attended.
2. To compare average grade points earned in college chemistry and size of high school the pupils attended.
3. To compare average points earned in English and size of high school the pupil attended.

In Chapter I the problem was introduced and delimited, and the source of information concerning the study was presented. In Chapter II was presented related literature and procedure used in study. In Chapter III was presented analysis of data.

Conclusions Drawn from the Study

The main conclusions from the study are summarized in this section. The reader will have in mind that there were three types of data: (1) college-aptitude score made by pupils in the study, (2) grade achievements in college chemistry, and (3) grade achievement in college English.

The conclusions are based on achievement in the students' college-aptitude score, college English, and college chemistry.

1. Based on the chi-square test, ($P = .03$) one is justified in saying that there is a difference in college aptitude among students coming from small, medium, and large-sized high schools; the larger schools having the largest proportion of capable students and the smaller schools having the largest proportion of less capable students.
2. Based on the X_r^2 test ($P = .43$ to $.57$) there is no significant difference in achievement in college chemistry among college freshmen graduating from small, medium, and large high schools. Observed differences tend to favor the graduates of small and medium-sized high schools, but the differences are not sufficiently consistent to justify the conclusion that the graduates from small and medium-sized high schools will usually have the advantage.

3. Based on the X_r^2 test (P = .57 to .74) there is no significant difference in achievement in college English among college freshmen graduating from small, medium, and large-sized high schools. Observed differences tend to be in favor of the graduates of the medium-sized high schools, but the differences are not sufficiently consistent to justify the conclusion that graduates of medium-sized high schools will usually have the advantage.
4. In spite of the fact that the graduates of the larger high schools had the advantage with regard to college aptitude, their achievement in college freshman English and chemistry was not superior to that of students graduating from small and medium-sized high schools.

Caution in Interpreting These Results

In interpreting the results of this study it should be kept in mind that South Dakota State College generally attracts students who are interested in a practical type of education. It is quite possible that because of this fact the students entering this institution in 1940-1941 therefore did not constitute a representative sample of all South Dakota high-school graduates. This being the case, one could not be justified in predicting that the same or similar results would be obtained if a comparable study were to be conducted at other institutions in South Dakota.

Furthermore, it should be kept in mind that the data for this study cover the period 1940-1941 when the quality of teaching among the various sized schools may have been more uniform than it is under present conditions of supply and demand for teachers.

General Summary Statement

It was the aim of this study to compare the educational proficiency of college freshmen from South Dakota public high schools who entered South Dakota State College, having received their high-school training in three different sized high schools. In doing this, the college freshmen were compared in terms of college-aptitude test scores, college chemistry grade-point averages, and college English grade-point averages. In making these comparisons, the methods of rank correlation X_r^2 technique and chi-square test were used. It was found that as far as college-aptitude scores were concerned, the achievement of pupils from the larger high schools was of significant difference at .03 level. In treating the college chemistry and English grade-point averages statistically, it was found that the distribution was not significant.

In the case of college chemistry grade-point averages, it could have occurred by chance alone forty-three to fifty-seven times in one hundred, and with college English grade-point averages from fifty-seven to seventy-four times in one hundred. Even though this distribution could have occurred

by chance alone, it is noted that the grade-point average of pupils from small and medium-sized high schools was slightly higher than those from large high schools.

In terms of achievement in college chemistry and English, it must be said that so far as this study was concerned, there was apparently no statistical significance found. One cannot be too definite in conclusion, however, since this study was limited in scope. Before a definite conclusion can be drawn, other studies of more extensive scope should be made.

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CHI-SQUARE TABLE

Given the Probability (P) that with a given "Degree of Freedom" (N) the X^2 value obtained in the comparison of the Distribution of a sample with the theoretical sample.

N	P = .99	P = .95	P.70	P.50	P.20	P.05	P.02	P.01
10	2.558	3.940	7.267	9.342	13.442	18.307	21.161	23.209

ESEARCH DATA CARD No. 1

ame Jane Doe High School Conde, S. D. Boy or Girl
ate of Grad ____ 1940 H.S. Rank Not Given File Rank ____

igh School Unit Average 2.22 Fresh. Gr. Pt. Average .78

ubject	Mark	Units	Subject	Mark	Units	Subject	Mark	Credits
ng. 1	C	1	Anc.Hist.			Eng. 1, abc	FF	0
ng. II	B	1	Med&Mod.Hist			Eng. 10		
ng. III	C	1	Eng. Hist					
ng. IV 2.0	D	1	U.S. Hist	C	1	Alg. 3		
			World Hist	C	1	Alg.		
lg. 1	C	1	S.S.Ave. 1.8			Trig.		
lg. II			Civics	D	½	Analyt.		
l. Geom. 2.0	C	1	Economics			Calc.25,26,27		
ol. Geom.			Sociology					
rigon.						Chem. 1, abc	DFF	0
						Chem 2, abc		
en. Sci.	B	1	Latin I			Chem. 19		
iology	C	1	German II			Phys. 1, abc		
hemistry			French III			Phys. 2, abc		
hysics 2.0	C	1	Spanish IV			Phys. 5		
			Underline the language					
			Gen. Ag.			Biol. 10, ab		
us. Law			Voc. Ag.			Zool. 10, ab		
us. Arith.	C	½	Gen. H. Ec.			Botany 1, ab	CF	3
ookkeeping			Voc. H. Ec.			Hist. 1		
us. Train.	B	1	Debate			Hist. 2		
horthand			Drama			R. Soc. 1,ab		
yping I,II	BC	2	Journalism					
			Ind.Arts&Shop	B	1	French 1, abc		
						Spanish 1,abc		

CE, T___ Q___ L___ Math Apt___ Sci.Apt.___ Engl.T___ German 1, abc___

17-31
16- 3
18- 6
51-40 .78

METHODS OF RANKS TABLE

Exact Distribution of X_r^2 for table with (N = 6) sets of three ranks. P is the probability of obtaining a value of X_r^2 as great as or greater than the corresponding value of X_r^2.

N = 6

X_r^2	P
0.00	1.000
.33	.956
1.00	.740
1.33	.570
2.33	.430
3.00	.252
4.00	.184
4.33	.142
5.33	.072
6.33	.052
7.00	.029
8.33	.012
9.00	.0081
9.33	.0055
10.33	.0017
12.00	.00013