ACHIEVEMENT OF THE MATHEMATICS MAJORS OF THE KANSAS STATE TEACHERS COLLEGE OF EMPORIA FOR THE YEARS 1917 - 1932

A THESIS

SUBMITTED TO THE DEPARTMENT OF

MATHEMATICS AND THE GRADUATE COUNCIL OF THE KANSAS STATE

TEACHERS COLLEGE OF EMPORIA IN PARTIAL FULFILLMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

By

Fred W. Osterhout

May 1933

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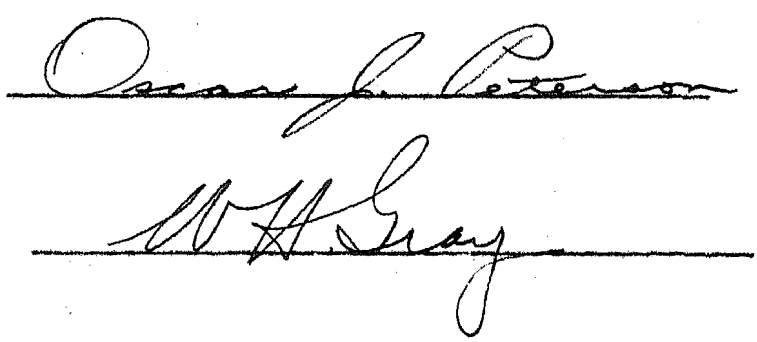

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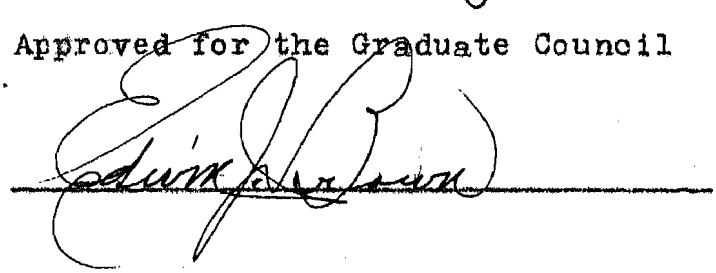

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CHAPTER I

INTRODUCTION

The main object of this investigation was to make a study of the mathematics majors of the Kansas State Teachers College of Emporia, for the years 1917 to 1932 inclusive, to determine what relations, if any, exist between the grades made in mathematics and the grades made in various combinations of college courses, and the effect of age on the grades made in mathematics.

A somewhat similar study was made of the majors in mathematics of the Indiana State Teachers College for the years 1927 to 1932 inclusive, by Elizabeth Higgins. As far as possible the general outline of this study follows that made by Elizabeth Higgins. This makes it possible to compare some of the results with those of the Indiana State Teachers College.

The Problem

The problem deals with a study of the mathematics majors of the Kansas State Teachers College of Emporia, for the purpose of discovering what relationship, if any, exists between the mathematics scholarship, general scholarship, second-major scholarship, intelligence tests, different college groups and various age groups. Scholarship as used in this study is measured by the school grades. The study is divided into the following headings:

1. Comparison of general scholarship and mathematics scholarship.
2. Comparison of academic-mathematics scholarship and professional-mathematics scholarship
3. Comparison of Junior-college-mathematics scholarship and senior-

college-mathematics scholarship.

4. Comparison of mathematics scholarship and scholarship in other majors.

5. Comparison of intelligence percentiles and mathematics scholarship.

6. A study of the effect of age on mathematics scholarship.

CHAPTER II

GENERAL PROCEDURE

Collection of Data

The data for this study were secured by analyzing the records of students in the registrar's office and selecting the names of those majoring in mathematics.A copy was made of the data found on the record sheet of each student majoring in mathematics. The data for each student were recorded as follows:

Serial number.

Year graduated.

Sex.

Age.

Credits.

	A	B	C	D	F
Professional Math.	2	4	4	2	
Junior Col. Math.	4	3	5		
Senior Col. Math.	6	2			
Second major	-	-	-		
General Schol.	16	44	32	4	

After the A's,B's, C's, D's, and F's for each student had been grouped as shown in this illustration,the scholarship indices were figured(the method used will be explained on p 4). The students were then listed in order and each given his or her scholarship indices thus:

No	Sex	Age	Prof. Math.	Acad. Math.	Jr.Col. Math.	Sr.Col. Math.	Gen. Schol.	Second Major.
60	W	21	62-50	81.25	72.91	93.50	68.05	-

Method of Calculating Indices

The scholarship index is the ratio between the school grades and the college hours and was found as follows:

The grading system in operation in the Kansas State Teachers College of Emporia uses the letters A, B, C, D, F. In figuing the scholarship index of a student, the number of hours of A's earned was multiplied by 4, the hours of B's by 3, the hours of C's by 2, the hours of D's by 1 and the hours of F's were counted as 0. These products were added and the sum divided by the product secured by multiplying the number of college hours by 4.

This method can be illustrated by figuring the index for the professional-mathematics scholarship of the student's record listed above. This is the method:

4 X 2 (the hours of A's) = 8
3 X 4 (the hours of B's) = 12
2 X 4 (the hours of C's) = 8
1 X 2 (the hours of D's) = 2

Total ---------- 30

The total number of college hours is 12, which multiplied by 4 gives 48. This would represent a perfect score. The scholarship is therefore 30 divided by 48 or 62.50.

Arrangment and Numbering of Cases

The mathematics majors, 130 in all, were arranged in order and each one given a serial number. These numbers were placed in

arithmetical order with each student's data listed after his or her number.The 49 men students were listed first and the 81 women students last. The data for the different parts of the study were secured from this list.

Statistical Colculations

In studying the different divisions of the problem under consideration,continual use was made of statistical formulas. The different formulas used are listed below:

1. Standard Deviation. (S.D. or),was used in connection with all of the general tables.The formula used for this purpose was:

$$S.D. = \sqrt{\frac{\Sigma F D^2}{N} - c^2} \times step$$

2.Arithmetic Means. (M),was used in comparisons between the men and women. The formula used was:

$$M_x = \frac{\Sigma X}{N}$$

3. Coefficient of Correlation. (r), was used for comparative purposes between different groups in the study. The method used for finding the coefficient of correlation is the well known Pearson product-moment formula:

$$r = \frac{\frac{\Sigma x'y'}{N} - c_x c_y}{\sigma_x \sigma_y}$$

4. Probable Error. (P.E.), was used in connection with the standard deviation,arithmetic means and coefficient of correlation except in cases where the number of individuals involved in the comparison was less than 25,in which case the probable error was not considered. Garrett[1] states that the reliability of the

1.H.E.Garrett. Statistics in Psychology and Education. Longman Green Company.1926 pp. 142

probable error depends upon having a sufficiently large number of cases and should the number be less than 25 there is no justification in using the probable error.

In several cases in this study the number of individuals involved in the comparison was less than 25 and the probable error was not used.

The probable-error formula was used with the mean standard deviation and the coefficient of correlation, the formula being modified for each of the three cases as follows:

$$P.E._{M} = .6745 \frac{S.D.}{\sqrt{N}}$$

$$P.E._{S.D.} = .6745 \frac{S.D.}{\sqrt{2N}}$$

$$P.E._{r} = .6745 \frac{(1-r^2)}{\sqrt{N}}$$

5. Probable Error of the Difference. (P.E.diff.).In a number of cases where comparisons were made between the difference of the means of the men and women,it was desired to find the difference of the probable error also. When a correlation was made between the two groups this formula was used:

$$P.E._{diff} = \sqrt{(P.E._{M})^2 + (P.E._{M_2})^2 - 2r(P.E._{M})(P.E._{M_2})}$$

However,when the coefficient of correlation was not used this formula was taken:

$$P.E._{diff} = \sqrt{(P.E._{M_1})^2 + (P.E._{M_2})^2}$$

If the two groups are uncorrelated r 0, and the third term under the radical becomes zero and disappears. This then gives the foregoing formula.

In case comparisons were made between coefficients of correlation the formula became:

$$P.E_{diff.} = \sqrt{(P.E_{r_1})^2 + (P.E_{r_2})^2}$$

6. Coefficients of Variation. In those parts of the study where the coefficients of variation were used, the formula employed was:

$$V = \frac{S.D. \times 100}{M}$$

CHAPTER III

COMPARISON OF GENERAL SCHOLARSHIP AND MATHEMATICS SCHOLARSHIP

Presentation of Material

Table 1 gives a comparison of the general-scholarship and mathematics-scholarship indices of the mathematics majors. The table gives the data for 49 men and 81 women students, a total of 130. The data given consists of each student's serial number, sex, general-scholarship index and mathematics-scholarship index.

Results of Calculations

Table 1 which contains all of the cases included in this study shows that:

(1) The range of the general scholarship indices was 47.81, of the mathematics indices 58.34.

(2) The highest general-scholarship index, 97.81, was made by a man, student number 14.

(3) The lowest general-scholarship index, 50.00, was made by a man, student number 26.

(4) The highest mathematics-scholarship index, 100.00, was made by five men and five women, student numbers 14, 19, 49, 123, 129, 21, 27, 74, 102, 108.

(5) The lowest mathematics-scholarship index, 41.66, was made by a woman, student number 115.

TABLE 1

TABLE SHOWING GENERAL-SCHOLARSHIP INDICES AND MATHEMATICS-SCHOLARSHIP INDICES OF MATHEMATICS MAJORS

Student	Sex	General Schol. Index	Math. Schol. Index
3	M	53.92	59.37
7	M	76.31	78.40

Table 1 (continued)

Student	Sex	General Schol. Index	Math. Schol. Index
8	M	78.74	71.42
11	M	85.34	86.90
14	M	97.81	100.00
18	M	60.89	59.72
19	M	81.91	100.00
20	M	78.53	85.00
22	M	58.59	86.90
26	M	50.00	42.10
28	M	79.30	84.09
29	M	61.68	77.77
31	M	65.96	85.00
34	M	67.22	73.61
35	M	67.35	76.92
37	M	74.19	87.00
38	M	79.52	95.23
39	M	63.78	94.04
41	M	79.48	82.81
43	M	65.81	61.25
44	M	90.96	85.18
49	M	77.31	85.71
47	M	65.25	50.00
48	M	79.62	68.42
49	M	93.40	100.00
53	M	85.33	96.66
54	M	69.17	93.18
61	M	70.35	85.00
62	M	79.70	92.50
66	M	87.00	80.43
67	M	69.27	84.21
75	M	80.30	77.88
81	M	67.54	73.07
83	M	90.07	97.72
90	M	56.49	65.90
91	M	61.97	70.83
93	M	72.13	91.12
96	M	65.51	57.95
104	M	58.09	44.00
106	M	84.17	94.56
107	M	85.54	78.00
111	M	77.10	72.22
112	M	88.49	91.66
119	M	77.60	96.66
120	M	77.56	91.07

Table 1 (continued)

Student	Sex	General Schol. Index	Math. Schol. Index
123	M	95.00	100.00
124	M	64.74	91.66
128	M	79.21	78.40
129	M	95.64	100.00
1	W	62.03	70.23
2	W	78.91	90.17
4	W	75.35	90.21
5	W	55.45	75.00
6	W	88.03	76.92
9	W	64.12	75.00
10	W	70.56	94.56
12	W	77.87	69.04
13	W	65.17	72.16
15	W	86.59	88.88
16	W	65.59	77.38
17	W	81.34	86.11
21	W	89.18	100.00
23	W	60.48	59.09
24	W	65.33	97.82
25	W	60.33	63.04
27	W	77.22	100.00
30	W	61.41	93.18
32	W	55.56	50.00
33	W	70.15	84.37
36	W	69.41	59.09
40	W	64.88	70.31
42	W	70.99	83.69
46	W	77.66	85.57
50	W	76.19	89.13
51	W	63.25	69.11
52	W	54.15	70.00
55	W	62.88	69.30
56	W	83.95	95.00
57	W	90.90	93.47
58	W	73.95	86.11
59	W	85.40	86.95
60	W	68.05	81.25
63	W	66.81	91.66
64	W	71.47	73.68
65.	W	71.12	72.50
68	W	81.68	64.28
69	W	76.22	89.28

Table 1 (continued)

Student	Sex	General Schol. Index	Math. Schol. Index
70	W	59.90	76.08
71	W	85.94	95.23
72	W	80.55	78.84
73	W	59.49	85.86
74	W	78.07	100.00
76	W	73.77	69.23
77	W	70.60	59.70
78	W	58.45	63.75
79	W	80.88	84.77
80	W	70.08	95.53
82	W	80.14	86.25
84	W	61.52	63.63
85	W	76.84	77.88
86	W	76.44	81.52
87	W	80.18	95.19
88	W	73.62	79.16
89	W	69.04	77.17
92	W	75.46	63.46
94	W	85.22	86.95
95	W	78.64	90.47
97	W	79.94	92.70
98	W	71.71	80.64
99	W	66.53	60.86
100	W	80.57	90.38
101	W	79.30	96.46
102	W	81.49	100.00
103	W	89.73	94.73
105	W	67.16	65.78
108	W	78.78	100.00
109	W	78.57	47.82
110	W	67.64	71.25
113	W	65.40	79.00
114	W	79.25	95.00
115	W	57.07	41.66
116	W	72.79	81.89
117	W	73.49	90.17
118	W	77.66	96.73
121	W	88.14	97.32
122	W	83.25	83.33
125	W	68.00	92.50
126	W	73.23	75.22
127	W	82.42	93.75
130	W	86.52	95.58

Read table thus: Column I, student's serial number; Column II, Sex; Column III, General scholarship index; Column IV, Mathematics scholarship index.

Table 2 gives the arithmetic means and standard deviation of the general-scholarship indices and of the mathematics-scholarship indices for the men students, for the women students and for the men and women students combined.

TABLE 2

MEAN AND STANDARD DEVIATION OF MATHEMATICS MAJORS IN MATHEMATICS SCHOLARSHIP AND IN GENERAL SCHOLARSHIP

Group and Measure	General Schol.	Math. Schol.
Men students		
Mean and P.E.	74.91 ± .98	81.25 ± 1.17
S.D. and P.E.	13.18 ± .89	12.20 ± .83
Women students		
Mean and P.E.	73.38 ± .78	80.90 ± 1.16
S.D. and P.E.	10.40 ± .55	15.55 ± .82
Men and women		
Mean and P.E.	73.95 ± .68	81.21 ± .92
S.D. and P.E.	11.60 ± .48	15.61 ± .65

Read table thus: The mean for the men students in general scholarship is 74.91 with a probable error of .98, in mathematics scholarship the mean is 81.25 with a probable error of 1.17. The standard deviation for the men students in general scholarship is 13.18 with a probable error of .89, in mathematics scholarship the mean deviation is 12.20 with a probable error of .83.

Table 3 gives the coefficient of correlation between general scholarship and mathematics scholarship for the men students, the women students, and for the men and women students combined.

TABLE 3

COEFFICIENT OF CORRELATION IN GENERAL SCHOLARSHIP AND MATHEMATICS SCHOLARSHIP

	r(gen.math.)	P.E.r
Men	.730	.045
Women	.506	.055
Men and Women Combined	.563	.040

Read table thus: The coefficient of correlation between general scholarship and mathematics scholarship for the men students is .730 with a probable error of .045.

Analysis of Results and Conclusion

1.Central Tendency.- Referring to Table 2 it will be noticed that there is a difference between the mean of the general scholarship and the mean of the mathematics scholarship for any particular group of students. For example,the mean of the general scholarship for the men students is 74.91 while the mean of the mathematics scholarship for the men students is 81.25.The difference between the two is 6.34. Table 4 is a study of the reliability of this difference.

TABLE 4

RELIABILITY OF THE DIFFERENCE BETWEEN GENERAL SCHOLARSHIP AND MATHEMATICS SCHOLARSHIP OF MATHEMATICS MAJORS

	Mean Gen.Schol.	Mean Math.Schol.	Diff.	Favor	P.E.diff.	Sign Ratio
Men	74.91 ± 98	81.25 ± 1.17	6.34	Math.	.80	7.92
Women	73.38 ± .78	80.90 ± 1.16	7.52	Math.	1.02	7.37
M.&.W.	75.95 ± .68	81.21 ± .92	5.26	Math.	.78	6.74

Read table thus:The mean for the men students in general scholarship is 74.91 with a P.E. of.98,the mean for the Math. Schol. is 81.25 with a P.E. of 1.17,the diff. is 6.34 in favor of Math.PE diff. 80 sign ratio is 7.92.

In Table 4 the difference between the mean of the general scholarship for the men students,6.34, when divided by .80,the P.E. difference,gives the significant ratio of 7.92. According to Garrett[2] a significant ratio of four or over indicates complete reliability.

In each of the cases given in Table 4,the significant ratio is greater than four,hence it is safe to conclude that the mathematics scholarship of the mathematics majors of the Kansas State Teachers College of Emporia is higher than their general scholarship.This conclusion is exactly opposite to that found in a similar study of the mathematics majors of the Indiana State Teachers College by Elizabeth Higgins[3].

2.Variability.-Table 5 gives the coefficient of variation of the men students,the women students and the men and women students combined in general scholarship and in mathematics scholarship.

TABLE 5

COEFFICIENT OF VARIATION IN GENERAL SCHOLARSHIP AND MATHEMATICS SCHOLARSHIP.

	Gen. Schol.	Math. Schol.	Ratio of Variation
V men	17.59	15.01	1.17
V women	14.17	19.22	0.73
V men and women combined	15.68	19.22	0.81

Read table thus:The coefficient of V.for the men students in Gen.S Schol. is 17.59,in Math.Schol. is 15.01,Ratio of V. is 1.17.

2 H.E.Garrett.Statistics in Psychology and Education. Longmans Green Company.1926.pp.133-135.

3.Elizabeth Higgins.Study of the Achievement and Related Factors of Mathematics Majors at Indiana State Teachers College for the Years 1926 - 1932. Contributions of the Graduate School Indiana State Teachers College.Number 76.1932.pp.17.

The figures show that the men are more variable in general scholarship than in mathematics scholarship, while the women are more variable in mathematics scholarship than in general scholarship.

The ratio of variation can be obtained by dividing the coefficient of variation of one by the coefficient of variation of the other. For example the coefficient of variation of the men in general scholarship is 17.59 and the coefficient of variation of the men in mathematics scholarship is 15.01. Dividing by 17.59 by 15.01 the ratio is found to be 1.17, that is the men are 117% as variable in general scholarship as in mathematics scholarship. In the same way it is found that the women are 73% as variable in general scholarship as in mathematics scholarship, while the men and women combined are 81% as variable in general scholarship as in mathematics scholarship.

Now comparing the men and women, dividing 17.59 by 14.17 and 15.01 by 19.22 (as given in Table 5) tha results show that the men are 124% as variable as the women in general scholarship and 78% as variable in mathematics scholarship.

3. Correlation.- The coefficient of correlation between general scholarship and mathematics scholarship for men students was found to be .730 with a probable error of .045. (see Table 3) The true coefficient of correlation must lie somewhere between the limits of the obtained coefficient of correlation plus four times its probable error and the obtained coefficient and minus four times its probable error. That is the true coefficient for the men students lies somewhere between .910, (.730 + 4 X .045) and .550, (.730 - 4 X .045). Likewise the true coefficient of correlation for the women students lies somewhere between .726, (.506 + 4 X .055)

and .286,(.506 - 4 X .055),and the true coefficient of correlation for the men and women students combined lies somewhere between .723,(.563 + 4 X .040) and .403,(.563 - 4 X .040).

These figures indicate that there is a close relationship existing between general scholarship and mathematics scholarship. According to Garrett[4] the coefficient of correlation of .730 for the men students would be classed as high and the coefficient of correlation for the women students of .506 would be classed as marked.

4. Sex Differences.-Table 6 shows the difference in central tendency between the men and women students in general scholarship and mathematics scholarship.

TABLE 6

MEASURES OF RELIABILITY OF THE DIFFERENCES BETWEEN MEN AND WOMEN IN GENERAL AND MATHEMATICS SCHOLARSHIP

	Mean of men	Mean of women	Diff.	P.E. Diff.	Sign Ratio
General Schol.	74.91 ± .98	73.38 ± .68	.53	1.19	.44
Math. Schol.	81.25 ± 1.17	81.21 ± .92	.04	1.48	.02

Read table thus:The mean general scholarship for the men is 74.91 with a P.E. of .98,for the women 73.38 with a P.E. of .68,the diff. is .53,the P.E. diff. is 1.19,the sign ratio is .44.

In the case of generalscholarship the mean for the men was 74.9 with a probable error of .98.The mean for the women was 73.38 with a probable error of .68.The difference of .53 was in favor of the men.The P.E. difference was 1.19 and the significant ratio was .44.Likewise the difference between the men and women in mathematics scholarship was .04 in favor of the men and the significant ratio was .02.The significant ratio is neither case

4 H.E.Garrett. Statistics in Psychology and Education. Longmans Green Company.1926.pp.298.

significant ratio was .02.The significant ratio in neither case is high enough to give complete reliability,for to do so it would need be four or higher.

5. Graphical Representation of the General Scholarship Indices and Mathematics Scholarship Indices.- The formulas in which the standard deviation (S.D.) is made use of,implies that the curve be normal.However,in many cases,it is found that the curve is skewed. Rugg[5] states that in the case of a skewed curve,the measures included in a unit distance on the scale can be stated only approximately.

Figures I and II show the distribution of the general-scholarship indices and the mathematics-scholarship indices respectively.In each graph the red line shows the distribution for the men students,the green line for the women students,and the blue line for the men and women combined.

It will be noticed in Figure I for the general scholarship that the three curves are quite regular,but in Figure II for the mathematics scholarship the three curves are badly skewed.

Therefore,when formulas are used,involving the standard deviation of mathematics scholarship,the results obtained can not be relied on completely.

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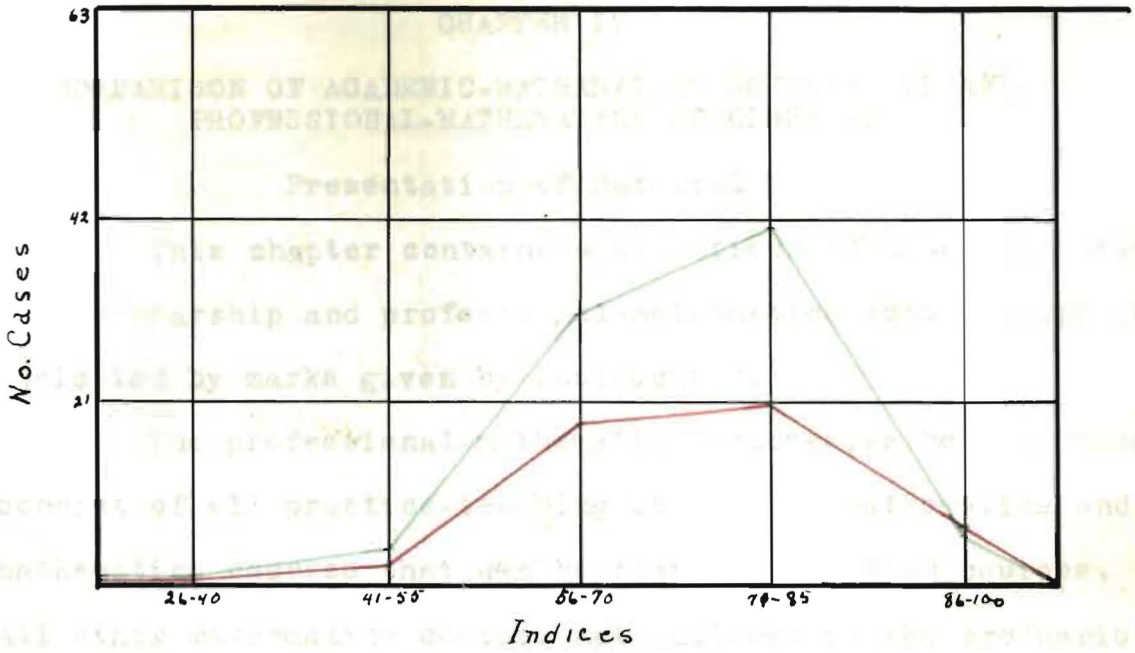
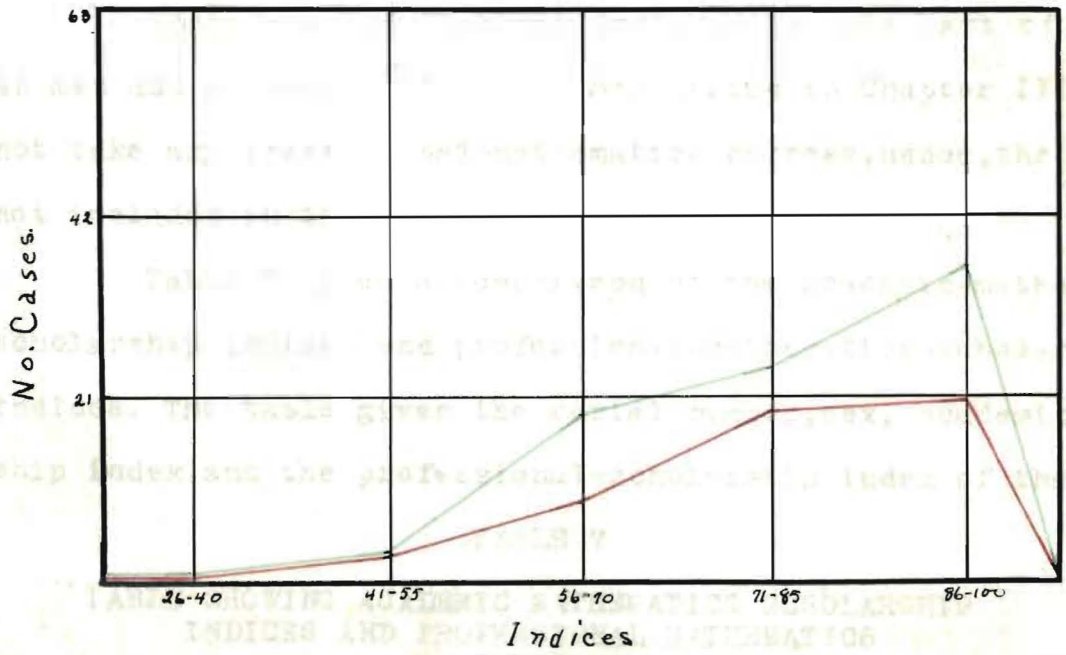
5 H. O. Rugg. Statistical Methods Applied to Education. Houghton Mifflin Company.1917.pp.151.



Legend: Men ——— Women ——— M.&.W.
Figure I.- Distribution of General-Scholarship Indices.



Legend: Men ——— Women ——— M.&.W.
Figure II.- Distribution of Mathematics-Scholarship Indices.

CHAPTER IV

COMPARISON OF ACADEMIC-MATHEMATICS SCHOLARSHIP AND PROFESSIONAL-MATHEMATICS SCHOLARSHIP

Presentation of Material

This chapter contains a comparison of academic-mathematics scholarship and professional-mathematics scholarship, as indicated by marks given by instructors.

The professional-mathematics courses, as here considered, consist of all practice-teaching courses in mathematics and all mathematics courses that can be classed as method courses. All other mathematics courses not included in the professional-mathematics classification are considered as belonging to the academic-mathematics classification.

There are 126 students included in this part of the study, 45 men and 81 women. Of the 49 men listed in Chapter III, four did not take any professional-mathematics courses, hence, the four are not included in this part of the study.

Table 7 gives a comparison of the academic-mathematics-scholarship indices and professional-mathematics-scholarship indices. The table gives the serial number, sex, academic-scholarship index and the professional-scholarship index of the students.

TABLE 7

TABLE SHOWING ACADEMIC MATHEMATICS SCHOLARSHIP INDICES AND PROFESSIONAL MATHEMATICS INDICES

Student	Sex	Acad.Math. Index	Prof.Math. Index
3	M	59.37	50.00
8	M	71.42	83.33
11	M	86.90	100.00
14	M	100.00	100.00
18	M	59.72	54.16

Table 7 (continued)

Student	Sex	Acad.Math. Index	Prof.Math. Index
19	M	100.00	80.55
20	M	85.00	50.00
22	M	86.90	75.00
26	M	42.10	50.00
28	M	84.09	87.50
29	M	77.77	66.66
31	M	85.00	75.00
35	M	76.92	75.00
37	M	87.00	100.00
38	M	95.23	70.00
39	M	94.04	81.25
41	M	82.81	100.00
43	M	61.25	100.00
45	M	85.71	82.14
47	M	50.00	50.00
48	M	68.42	75.00
49	M	100.00	100.00
53	M	96.66	100.00
54	M	93.10	90.00
61	M	85.00	75.00
62	M	92.50	100.00
66	M	80.43	100.00
67	M	84.21	78.57
75	M	77.88	75.00
83	M	97.72	85.00
90	M	65.90	65.00
91	M	70.83	75.00
93	M	91.12	100.00
96	M	57.95	75.00
104	M	44.00	60.00
106	M	94.56	50.00
107	M	78.00	100.00
111	M	72.22	83.33
112	M	91.66	81.25
119	M	96.66	50.00
120	M	91.07	91.66
123	M	100.00	100.00
124	M	91.66	85.00
128	M	78.40	83.33
129	M	100.00	100.00
1	W	70.23	60.00
2	W	90.17	75.00
4	W	90.21	80.00
5	W	75.00	64.28

Table 7 (continued)

Student	Sex	Acad.Math. Index	Prof.Math. Index
6	W	76.92	56.25
9	W	75.00	95.00
10	W	94.56	83.33
12	W	69.04	50.00
13	W	72.16	70.00
15	W	88.88	100.00
16	W	77.38	65.00
17	W	86.11	82.35
21	W	100.00	100.00
23	W	59.09	75.00
24	W	97.82	87.50
25	W	63.04	62.50
27	W	100.00	68.50
30	W	93.18	83.33
32	W	50.00	75.00
33	W	84.37	62.50
36	W	59.09	81.25
40	W	70.31	87.50
42	W	83.69	60.00
46	W	85.57	87.50
50	W	89.13	90.00
51.	W	69.11	90.00
52	W	70.00	55.00
55	W	69.30	41.66
56	W	95.00	85.00
57	W	93.47	100.00
58	W	86.11	100.00
59	W	86.95	100.00
60	W	81.25	62.50
63	W	91.66	75.00
64	W	73.68	75.00
65	W	72.50	80.00
68	W	64.28	50.00
69	W	89.28	80.00
70	W	76.08	75.00
71	W	95.23	91.66
72	W	78.84	75.00
73	W	85.86	62.50
74	W	100.00	90.00
76	W	69.23	75.00
77	W	59.70	66.66
78	W	63.75	79.16
79	W	84.77	75.00

Table 7 (continued)

Student	Sex	Acad.Math. Index	Prof,Math. Index
80	W	95.53	75.00
82	W	86.25	85.00
84	W	63.63	65.00
85	W	77.88	85.71
86	W	81.52	60.00
87	W	95.19	87.50
88	W	79.16	75.00
89	W	77.17	50.00
92	W	63.46	75.00
94	W	86.95	75.00
95	W	90.47	87.50
97	W	92.70	87.50
98	W	80.64	81.25
99	W	60.68	75.00
100	W	90.38	100.00
101	W	96.41	100.00
102	W	100.00	83.33
103	W	94.73	100.00
105	W	65.78	50.00
108	W	100.00	100.00
109	W	47.82	62.50
110	W	71.25	87.50
113	W	79.00	75.00
114	W	95.00	100.00
115	W	41.66	50.00
116	W	81.89	90.00
117	W	90.17	81.25
118	W	96.73	93.95
121	W	97.32	90.90
122	W	83.33	85.71
125	W	92.50	68.75
126	W	75.22	100.00
127	W	93.75	100.00
130	W	95.37	69.37

Read table thus: Column I,student's serial number;Column II Sex;Column III,Academic Math.index; Column IV,Prof.Math.Index.

Table 8 gives the arithmetic means and standard deviation of the academic-mathematics-scholarship indices for the men students,for the women students and for the men and women students combined.

Table 8

MEANS AND STANDARD DEVIATION OF MATHEMATICS MAJORS IN ACADEMIC-MATHEMATICS SCHOLARSHIP AND PROFESSIONAL-MATHEMATICS SCHOLARSHIP

Group and Measure	Academic Math. Schol.	Prof. Math. Schol.
Men Students		
Mean and P.E.	81.58 ± 1.58	80.19 ± 1.16
S.D. and P.E.	15.63 ± 1.11	17.80 ± 1.26
Women Students		
Mean and P.E.	81.19 ± .85	78.25 ± 1.26
S.D. and P.E.	11.38 ± .60	16.80 ± .89
Men and Women		
Mean and P.E.	81.34 ± .97	78.94 ± 1.05
S.D. and P.E.	16.23 ± .69	17.65 ± .76

Read table thus: The mean for the men students in academic-mathematics scholarship is 81.58 with a probable error of 1.58, in professional-mathematics scholarship 80.19 with a probable error of 1.16. The standard deviation for the men students in academic-mathematics scholarship is 15.63 with a probable error of 1.11, in professional-mathematics scholarship 17.80 with a probable error of 1.26.

Table 9 gives the coefficient of correlation between academic-mathematics scholarship and professional-mathematics scholarship, for the men students, for the women students and for the men and women students combined.

TABLE 9

COEFFICIENT OF CORRELATION IN ACADEMIC-MATHEMATICS SCHOLARSHIP AND PROFESSIONAL-MATHEMATICS SCHOLARSHIP

	$r_{(acad.)(prof.)}$	$P.E._r$
Men	.374	.086
Women	.595	.048
Men and Women Combined	.516	.004

Read table thus:The coefficient of correlation,for the men students,between the academic-mathematics scholarship and professional-mathematics scholarship is .374 with a probable error of .086.

Analysis of Results and Conclusion

1.-Central Tendency.- Table 10 shows the reliability of the difference between academic-mathematics scholarship and professional-mathematics scholarship for the men students,the women students and the men and women students combined.

TABLE 10

RELIABILITY OF THE DIFFERENCE BETWEEN ACADEMIC-MATHEMATICS SCHOLARSHIP AND PROFESSIONAL-MATHEMATICS SCHOLARSHIP

	Mean Acad. Math.	Mean.Prof. Math.	Diff.	Favor	P.E. Diff.	Sign Ratio
Men	81.58 ±1.57	80.19 ± 1.16	1.39	Acad.	1.55	.89
Women	81.19 ± .85	78.25 ± 1.26	2.94	Acad.	1.01	2.91
M.&.W.	81.34 ± .97	78.94 ± 1.05	2.40	Acad.	.98	2.45

Read table thus: The mean for the men students in academic-mathematics scholarship is 81.58 with a probable error of 1.57,in professional-mathematics scholarship 80.19 with a probable error of 1.16.The difference is 1.39 in favor of the academic-mathematics scholarship.The probable error difference is 1.55 and the sign ratio is .89.

Since the significant ratio in each case is less than four,the difference between the mean-academic-mathematics scholarship and the mean-professional-mathematics scholarship is not entirely reliable.The significant ratio .89 of the men students,according to Garrett's Table[6] indicates about 73 chances in 100 of a true difference greater than zero and the significant ratio 2.91 of the women students indicates about 97 chances in 100 of a true difference greater than zero while

6 H.E.Garrett. Statistics in Psychology and Education. Longmans Green Company.1926. pp 135.

the significant ratio of the men and women students combined, 2.45,indicates about 95 chances in loo of a true difference greater than zero.

2.Variability.- Table 11 gives the coefficient of variability of the men students,the women students,and the men and women students combined in academic-mathematics scholarship and professional-mathematics scholarship.

TABLE 11

COEFFICIENT OF VARIATION IN ACADEMIC-MATHEMATICS AND PROFESSIONAL-MATHEMATICS SCHOLARSHIP

	Acad.Math. Schol.	Prof.Math. Schol.	Ratio of Vari.
V Men	19.15	22.19	86%
V Women	14.01	21.46	65%
V M.&.W.Combined	19.94	22.35	89%

Read table thus: The variation of the men in academic-mathematics scholarship is 19.15,in professional-mathematics scholarship 22.19 with a ratio of variation of 86%.

The table shows that both men and women are more variable in professional-mathematics scholarship than in academic-mathematics scholarship.

The ratio of variation obtained by dividing the coefficient of variation of one by the coefficient of variation of the other shows that the men are 86% as variable in academic-mathematics scholarship as they are in professional-mathematics scholarship.The women are 65% as variable in academic-mathematics scholarship as they are in professional-mathematics scholarship and the men and women combined are 89% as variable. In comparing the men and women together the men are 136% as variable as the women in academic-mathematics scholarship and 103% as variable in professional-mathematics scholarship.

3. Correlation.- The coefficient of correlation between academic-mathematics scholarship and professional-mathematics scholarship (see Table 9) for men students is .374 with a probable error of .086. The true coefficient of correlation lies somewhere between .718,(.374 + 4 X .086) and .030, (.374 -4 X .086).The true coefficient of correlation for the women lies between .787,(.595 + 4 X.048) and .403,(.595 - 4 X .048). The true coefficient of correlation for the men and women combined lies between .532,(.516 + 4 X .004) and .500,(.516 - 4 X .004).

The coefficient of correlation of the men students of . .374 shows that the relationship between the academic-mathematics scholarship and professional-mathematics scholarship is sligh e.The relationship in the case of the women is marked. With the men and women combined it is also marked.

4. Sex Differences.- Table 12 shows the difference in central tendency between the men and women students in academic-mathematics scholarship and professional-mathematics scholarship.

TABLE 12

MEASURE OF THE RELIABILITY OF THE DIFFERENCE BETWEEN MEN AND WOMEN IN ACADEMIC-MATHEMATICS SCHOLARSHIP AND PROFESSIONAL MATHEMATICS SCHOLARSHIP

	Mean of Men	Mean of Women	Diff.	Favor	P.E. Diff.	Sign Ratio
Acad.Math.Schol.	81.58 ±1.57	81.19 ± .85	.39	Men	1.17	.33
Prof.Math.Schol.	80.19 ±1.16	78.94 ± 1.25	1.25	Men	1.56	.80

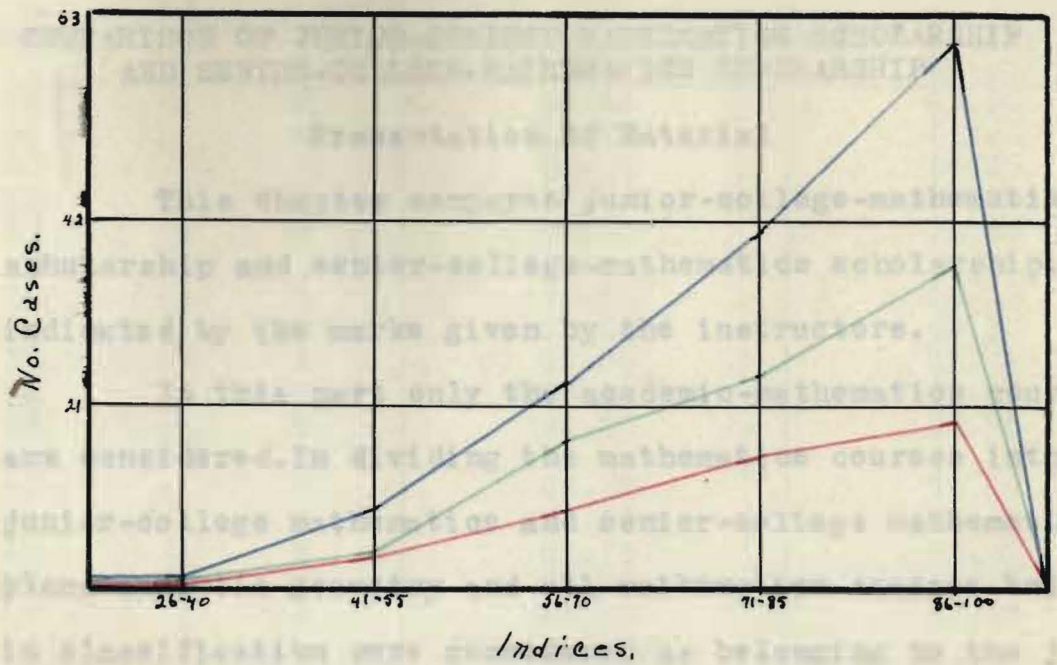
Read table thus: The mean for the men in academic-mathematics scholarship is 81.58 with a probable error of 1.57, for the women in academic-mathematics scholarship is 81.19 with a probable error of .85.The difference,.39, is in favor of the men. The probable error difference is 1.17. The sign ratio is .33.

In the case of the academic-mathematics scholarship the mean for the men was 81.58 with a probable error of 1.57.

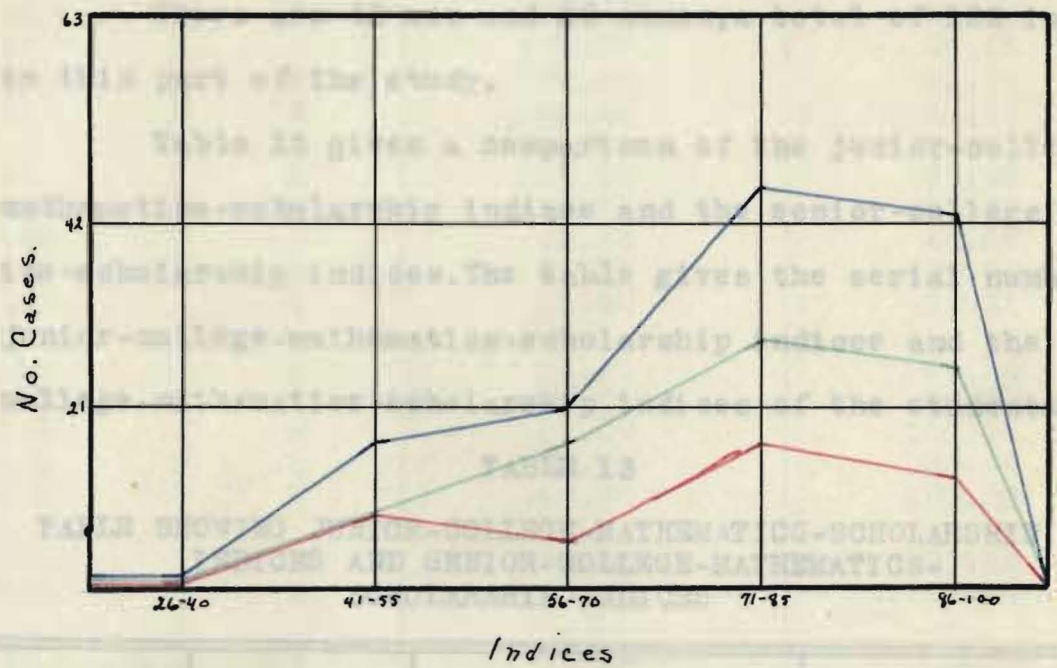
The mean for the women was 81.19 with a probable error of .85. The difference of .39 was in favor of the men. In professional-mathematics scholarship there was a difference of 1.25 in favor of the men. The significant ratio in neither case is large enough to assure complete reliability. In academic-mathematics scholarship the ratio indicates about 59 chances in 100 of a true difference greater than zero, and in professional-mathematics scholarship the ratio indicates about 71 chances in 100 of a true difference greater than zero.

5. Graphical Representation of Academic-Mathematics Scholarship and Professional-Mathematics Scholarship.- Figures III and IV give a graphical distribution of the academic-mathematics-scholarship indices. The red line represents the men students, the green line the women students and the blue line both the men and women students.

The curves in each case are skewed, especially those in Figure III. This fact should therefore be kept in mind in any data given in Chapter IV in which the standard deviation is considered.



Legend: Men ——— Women ——— M.&.W. ———
Figure III.-Distribution of Academic-Mathematics Scholarship.



Legend: Men ——— Women ——— M.&.W. ———
Figure IV.- Distribution of Professional-Mathematics Scholarship.

CHAPTER V

COMPARISON OF JUNIOR-COLLEGE-MATHEMATICS SCHOLARSHIP AND SENIOR-COLLEGE-MATHEMATICS SCHOLARSHIP

Presentation of Material

This chapter compares junior-college-mathematics scholarship and senior-college-mathematics scholarship, as indicated by the marks given by the instructors.

In this part only the academic-mathematics courses are considered. In dividing the mathematics courses into junior-college mathematics and senior-college mathematics, plane analytic geometry and all mathematics courses below it in classification were considered as belonging to the junior-college group while all mathematics courses with a classification above plane-analytic geometry were placed in the senior-college group.

There are 42 men and 80 women, a total of 122 included in this part of the study.

Table 13 gives a comparison of the junior-college mathematics-scholarship indices and the senior-college mathematics-scholarship indices. The table gives the serial number, sex, junior-college-mathematics-scholarship indices and the senior-college-mathematics-scholarship indices of the students.

TABLE 13

TABLE SHOWING JUNIOR-COLLEGE-MATHEMATICS-SCHOLARSHIP INDICES AND SENIOR-COLLEGE-MATHEMATICS-SCHOLARSHIP INDICES

Student	Sex	Junior-Col. Math.Schol.	Senior-Col. Math.Schol.
7	M	85.00	64.28
11	M	81.62	100.00
14	M	100.00	100.00
19	M	100.00	100.00
20	M	100.00	100.00

Table 13 (continued)

Student	Sex	Junior.Col. Math.Schol.	Senior Col. Math.Schol.
22	M	86.66	87.50
26	M	50.00	25.00
28	M	93.33	64.29
29	M	85.00	68.75
31	M	89.70	75.00
34	M	78.33	50.00
35	M	81.23	62.50
37	M	87.50	85.71
38	M	93.33	100.00
39	M	94.23	93.75
41	M	86.37	75.00
43	M	65.38	53.57
44	M	83.75	89.28
45	M	92.85	71.42
47	M	50.00	50.00
49	M	100.00	100.00
54	M	92.85	93.75
61	M	80.26	100.00
66	M	71.87	100.00
67	M	76.92	100.00
75	M	79.68	75.00
81	M	63.33	86.36
83	M	100.00	96.15
90	M	64.28	68.75
91	M	81.25	50.00
93	M	86.90	100.00
96	M	59.21	50.00
104	M	44.44	42.85
106	M	92.18	100.00
107	M	75.00	85.71
111	M	75.00	64.28
112	M	93.75	87.50
119	M	95.00	100.00
120	M	88.09	100.00
123	M	100.00	100.00
124	M	88.33	100.00
129	M	100.00	100.00
1	W	73.33	62.50
2	W	90.00	87.50
4	W	95.00	81.25
5	W	75.00	75.00
6	W	81.25	62.50
9	W	69.23	100.00
10	W	97.05	87.50

Table 13 (continued)

Student	Sex	Junior Col. Math. Schol.	Senior Col. Math. Schol.
12	W	76.66	50.00
13	W	76.06	50.00
15	W	95.83	75.00
16	W	78.33	75.00
17	W	86.25	85.55
21	W	100.00	100.00
23	W	66.07	46.87
24	W	97.05	100.00
25	W	63.23	62.50
27	W	100.00	100.00
30	W	90.62	100.00
32	W	50.00	50.00
33	W	87.50	75.00
36	W	60.71	56.25
40	W	75.00	62.50
42	W	82.81	85.71
46	W	92.50	62.50
50	W	91.66	84.37
51	W	86.36	37.50
52	W	77.94	53.12
55	W	72.91	62.50
56	W	100.00	85.71
57	W	96.87	85.71
58	W	79.16	100.00
59	W	82.34	100.00
60	W	72.91	93.50
63	W	88.88	100.00
65	W	94.49	75.00
68	W	70.00	50.00
69	W	82.69	100.00
70	W	71.66	84.37
71	W	93.33	100.00
72.	W	87.50	50.00
73	W	80.76	92.50
74	W	100.00	100.00
76	W	70.31	67.50
77	W	63.46	50.00
78	W	56.25	75.00
79	W	88.46	80.00
80	W	93.05	100.00
82	W	92.50	80.00
84	W	60.41	67.50
85	W	83.82	66.66
86	W	82.50	80.77

Table 13(continued)

Student	Sex	Junior Col. Math.Schol.	Senior Col. Math.Schol.
87	W	100.00	88.62
88	W	81.81	75.00
89	W	91.66	50.00
92	W	52.50	100.00
94	W	91.17	75.00
95	W	93.05	75.00
97	W	93.75	90.62
98	W	82.60	75.00
99	W	90.00	25.00
100	W	90.47	75.00
101	W	92.85	100.00
102	W	100.00	100.00
103	W	93.75	100.00
105	W	73.43	25.00
108	W	100.00	100.00
109	W	58.33	36.36
110	W	58.92	100.00
113	W	80.55	75.00
114	W	97.05	100.00
115	W	48.33	25.00
116	W	77.27	85.71
117	W	88.33	92.30
118	W	95.58	100.00
121	W	96.42	100.00
122	W	87.50	75.00
125	W	100.00	75.00
126	W	76.19	75.00
127	W	91.06	100.00
130	W	94.64	100.00

Read table thus: Column I, Student's serial number; Column II, sex; Column III, Junior Col. Math. Schol.; Column IV, Senior Col. Math. Schol.

Table 14 gives the arithmetical mean and standard deviation of the junior-college-mathematics-scholarship indices and the senior-college-mathematics-scholarship indices, for the men students, the women students and for the men and women combined.

TABLE 14

MEAN AND STANDARD DEVIATION OF MATHEMATICS MAJORS IN JUNIOR-COLLEGE-MATHEMATICS SCHOLARSHIP AND SENIOR-COLLEGE-MATHEMATICS SCHOLARSHIP

Group and Measure	Junior Col. Math.	Senior Col. Math.
Men Students		
Mean and P.E.	82.60 ± 1.23	81.35 ± 2.04
S.D. and P.E.	11.90 ± .87	19.62 ± 1.44
Women Students		
Mean and P.E.	83.23 ± 1.07	77.60 ± 1.64
S.D. and P.E.	14.27 ± .76	21.78 ± 1.16
Men and Women Students		
Mean and P.E.	83.01 ± .96	78.89 ± 1.37
S.D. and P.E.	15.65 ± .77	22.38 ± .96

Read table thus: The mean for the men students in junior-college-mathematics scholarship is 82.60 with a probable error of 1.23, in senior-college-mathematics scholarship 81.35 with a probable error of 2.04. The standard deviation for the men students in junior-college-mathematics scholarship is 11.90 with a probable error of .87, in senior-college-mathematics-scholarship 19.62 with a probable error of 1.44.

Table 15 gives the coefficient of correlation between junior-college-mathematics scholarship and senior-college-mathematics scholarship, for the men students, for the women students and for the men and women students combined.

TABLE 15

COEFFICIENT OF CORRELATION IN JUNIOR-COLLEGE-MATHEMATICS SCHOLARSHIP AND SENIOR-COLLEGE-MATHEMATICS SCHOLARSHIP

	r(jr.col.)(sr.col.)	P.E.r
Men	.664	.060
Women	.462	.059
Men and Women	.645	.035

Read table thus: The coefficient of correlation for the men students between the junior-college-mathematics scholarship and senior-college-mathematics scholarship is .664 with a probable error of .060.

Analysis of Results and Conclusions

1. Central Tendency.- Table 16 shows the reliability of the difference between junior-college-mathematics scholarship and senior-college-mathematics scholarship for the men students, the women students and the men and women students combined.

TABLE 16

RELIABILITY OF THE DIFFERENCE BETWEEN JUNIOR-COLLEGE-MATHEMATICS SCHOLARSHIP AND SENIOR-COLLEGE-MATHEMATICS SCHOLARSHIP

	Mean Jr.Col. Math.	Mean Sr.Col. Math.	Diff.	Favor.	P.E. Diff.	Sign Ratio
Men	82.60 ± 1.23	81.35 ± 2.04	1.25	Jr.Col.	.81	.60
Women	83.23 ± 1.07	77.60 ± 1.64	5.63	Jr.Col.	.57	.10
M.&.W.	83.01 ± .96	78.89 ± 1.37	4.12	Jr.Col.	.41	.09

Read table thus: The mean for the men students in junior-college-mathematics scholarship is 82.60 with a probable error of 1.23, in senior-college-mathematics scholarship 81.35 with a probable error of 2.04, the difference is 1.25 in favor of the junior college. The probable error difference is .81 and the sign ratio is .60.

The significant ratio in each case is less than four hence the difference between the mean-junior college-mathematics scholarship and the mean-senior-college-mathematics scholarship is not entirely reliable. The significant ratio of .60 for the men students indicates about 66 chances in 100 of a true difference greater than zero. The significant ratio for the men and women students combined, .09, indicates about 53 chances in 100 of a true difference greater than zero.

2. Variability.- Table 17 gives the coefficient of variation for the men students, the women students and the men and women

students combined in the junior-college-mathematics scholarship and senior-college-mathematics scholarship.

TABLE 17

COEFFICIENT OF VARIATION IN JUNIOR-COLLEGE-MATHEMATICS SCHOLARSHIP AND SENIOR-COLLEGE-MATHEMATICS SCHOLARSHIP

	Jr.Col.Math.	Sr.Col.Math.	Ratio of Vari.
V. Men	14.40	24.11	59%
V. Women	17.39	28.06	61%
V. Men and Women	18.85	28.36	66%

Read table thus: The coefficient of variation for the men students in junior-college-mathematics scholarship is 14.40, in senior-college-mathematics scholarship 24.11. The ratio of variation is 59%.

The table shows a greater variation in the senior-college-mathematics scholarship than in the junior-college-mathematics scholarship in each case.

The ratio of variation, obtained by dividing the coefficient of variation of the one by the coefficient of variation of the other, shows that the men are 59% as variable in junior-college-mathematics scholarship as in senior-college-mathematics scholarship. The women are 61% as variable and the men and women combined are 66% as variable.

Comparing the men and women, dividing the coefficient of variation of the men by the coefficient of variation of the women, it is found that the men are 82% as variable as the women in junior-college-mathematics scholarship and 27% as variable in senior-college-mathematics scholarship.

3. Correlation.- The coefficient of correlation between junior-college-mathematics scholarship for the men students is .664 with a probable error of .060. (Table 15) The true coeffi-

cient of correlation must lie somewhere between .804,(.664 +4 X .06) and .424,(.664 - 4 X .060). The true coefficient of correlation for the women students must lie between .898,(.462 + 4 X .059) and .226,(.462 - 4 X .590). The true coefficient of correlation for the men and women combined lies somewhere between .785, (.645 +4 X .035) and .505,(.645 - 4 X .035). The limits of the true coefficient for the men students ranges from high,(.904) to marked (.424).For the women the range is from high,(.898) to slight, (.226) and for the men and women combined the range is from high (.785) to marked (.505).

4. Sex Differences.- Table 18 shows the difference in central tendency between the men and women students in junior-college-mathematics scholarship and senior-college-mathematics scholarship.

In junior-college-mathematics scholarship,the mean for the men is 82.60 with a probable error of 1.07. The difference of .63 is in favor of the women. In senior-college-mathematics scholarship the mean for the men is 81.35 with a probable error of 2.04.The mean for the women is 77.60 with a probable error of 1.64.The difference of 3.75 is in favor of the men.

TABLE 18

MEASURE OF THE RELIABILITY OF THE DIFFERENCE BETWEEN MEN AND WOMEN IN JUNIOR-COLLEGE-MATHEMATICS SCHOLARSHIP AND SENIOR-COLLEGE-MATHEMATICS SCHOLARSHIP

	Mean of Men	Mean of the Women	Diff.	Favor	P.E. Diff.	Sign Ratio
Jr.Col.Math.	82.60 ± 1.23	83.23 ± 1.07	.63	Women	.16	.25
Sr.Col.Math.	81.35 ± 2.04	77.60 ± 1.64	3.75	Men	.40	.10

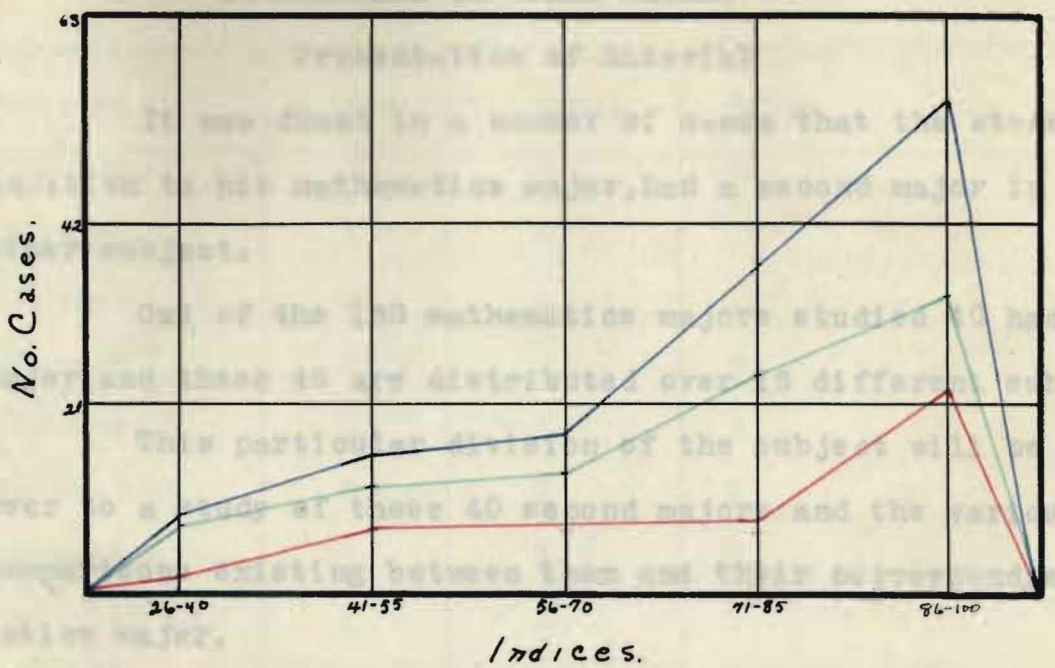
Read table thus: The mean for the men in Junior-college-mathematics is 82.60 with a probable error of 1.23,for the women 83.23 with a probable error of 1.07.The difference is .63 in favor of the women.The P.E.Diff is .16,the sign ratio is .25.

The significant ratio in each case is too low to give complete reliability.In junior-college mathematics the significant ratio of .25 indicates about 57 chances in 100 of a true difference greater than zero,and in the senior-college mathematics the significant ratio of .10 indicates about 53 chances in 100 of a true difference greater than zero.

5.Graphical Representation of Junior-College-Mathematics Scholarship and Senior-College-Mathematics Scholarship.- Figures V and VI give a graphical distribution of the Junior-college-mathematics-scholarship indices and the senior-college-mathematics-scholarship indices.The red line represents the men students,the green line the women students,and the blue line the men and women students combined. The curve in each case is badly skewed,hence the data in which the standard deviation for these comparisons are used can not be entirely relied on.

Legend: Men ——— Women ——— M.&.W. ———
Figure V.- Distribution of the Junior-College-Mathematics Scholarship.

72565



Legend: Men ——— Women - - - - M.&.W. ———

Figure VI.- Distribution of the Senior-College-Mathematics Scholarship.

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CHAPTER VI

COMPARISON OF MATHEMATICS SCHOLARSHIP AND SCHOLARSHIP IN OTHER MAJORS

Presentation of Material

It was found in a number of cases that the student, in addition to his mathematics major, had a second major in some other subject.

Out of the 130 mathematics majors studied 40 had a second major, and these 40 are distributed over 15 different subjects.

This particular division of the subject will be given over to a study of these 40 second majors and the various comparisons existing between them and their corresponding mathematics major.

Table 19 gives a list of the different subjects over which the 40 second majors are distributed and the number of men, the number of women and the number of men and women combined, selecting each subject.

As there were but 40 students in all having a second major and as these 40 were distributed over 15 different subjects, the number selecting any one subject was necessarily small. For this reason the subjects are grouped into four different divisions as follows:

1. The first group is the science group and is composed of biology, agriculture, physics and chemistry.

2. The second group will be classed as the social science group and is made up of history, sociology, psychology and education.

3. The third group consists of commerce, physical education, art, speech and manual training. This group will henceforth be spoken of as the professional group.

4. Fourth group composed of English and Latin.

TABLE 19

NUMBER OF MATHEMATICS MAJORS CHOOSING MAJORS IN OTHER SUBJECTS

Subject	Men	Women	Total
Physics	9	2	11
History	1	6	7
English	0	4	4
Biology	0	3	3
Commerce	0	3	3
Psychology	0	2	2
Education	1	1	2
Physical Ed.	1	0	1
Agriculture	1	0	1
Latin	0	1	1
Chemistry	1	0	1
Art	0	1	1
Sociology	0	1	1
Speech	0	1	1
Man.Train.	1	0	1

Read table thus: Column I, designates the subjects; Column II, the number of men students; Column III, the number of women students; column IV, the total number of students.

It will be noticed from Table 19 that out of the 15 combinations used in selecting a second major, 22 made their selection from the three combinations, Mathematics-science, mathematics-history and mathematics-english. There were 11 second majors or 27.5% of all found in the mathematics-physics group, 7 or 17.5% of all in the mathematics-history group and 12.5% of all in the mathematics-English group. The others were scattered

over the remaining 12 subjects with not more than 2 found in any one subject. The fact that 27.5% of all the second majors were found in the mathematics-physics combination would seem to indicate that physics is more closely associated with mathematics than are the other subjects.

A separate table was made for each of the four groups and one for a combination of all four together. These tables show the number, sex, mathematics-scholarship index, and the second-major-scholarship index for each mathematics major appearing in the particular list.

Table 20 gives a comparison of the mathematics-scholarship indices and the science-scholarship indices.

TABLE 20

TABLE SHOWING MATHEMATICS-MAJOR-SCHOLARSHIP INDICES AND SCIENCE MAJOR SCHOLARSHIP INDICES

Student	Sex	Math. Schol. Index	Science Schol. Index
14	M	100.00	100.00
19	M	100.00	85.41
22	M	86.90	82.95
29	M	77.77	88.75
37	M	87.90	83.00
44	M	85.18	91.37
49	M	100.00	100.00
106	M	94.56	97.82
129	M	100.00	100.00
4	W	90.21	83.75
52	W	70.00	59.76
55	W	69.30	79.31
57	W	93.47	97.61
92	W	63.46	86.63

Read table thus: Column I, indicates the students serial number; Column II, the sex; Column III, the mathematics-scholarship index; Column IV, the science-scholarship index.

Table 21 gives a comparison of the mathematics-scholarship indices and the social-science-scholarship indices. The

table gives the serial number, sex, mathematics-scholarship indices and the social-science-scholarship indices for each student.

TABLE 21

TABLE SHOWING MATHEMATICS-MAJOR-SCHOLARSHIP INDICES AND SOCIAL-SCIENCE-MAJOR-SCHOLARSHIP INDICES

Student	Sex	Math. Schol. Index	Social Science Index
67	M	84.21	75.92
120	M	91.07	70.16
13	W	72.16	74.25
16	W	77.38	63.28
36	W	59.09	70.00
56	W	95.00	80.00
59	W	86.95	89.16
69	W	89.28	89.81
76	W	69.23	87.50
79	W	84.77	92.04
82	W	86.25	97.00
126	W	75.22	89.00

Read table thus: Column I designates the student's serial number; Column II, the sex; Column III, mathematics-scholarship index; Column IV, social-science index.

Table 22 gives a comparison of the mathematics-scholarship indices and the professional-group-scholarship indices. The table gives the serial number, sex, mathematics-scholarship indices and the professional-group-scholarship indices for each student.

TABLE 22

TABLE SHOWING MATHEMATICS-MAJOR-SCHOLARSHIP INDICES AND PROFESSIONAL-MAJOR -GROUP-SCHOLARSHIP INDICES

Student	Sex	Math. Schol. Index	Prof. Group. Index
47	M	50.00	78.88
61	M	85.00	86.95
112	M	91.66	95.53
119	M	96.66	90.83
25	W	63.04	69.08
27	W	68.75	91.40
40	W	70.31	70.27
50	W	89.13	87.82
109	W	47.82	72.00

Read table thus: Column I designates the students serial number; Column II, the sex; Column III, Mathematics-scholarship index; Column IV, professional-group-scholarship index.

Table 23 gives a comparison of the mathematics-scholarship indices and the English-Latin-scholarship indices. The table gives the serial number, sex, mathematics scholarship index and the English-Latin-scholarship index for each student.

TABLE 23

TABLE SHOWING MATHEMATICS-MAJOR-SCHOLARSHIP INDICES AND ENGLISH-LATIN-MAJOR-SCHOLARSHIP INDICES

Student	Sex	Math. Schol. Index	Eng. Latin Schol. Index
2	W	90.17	66.66
23	W	59.09	56.25
21	W	100.00	87.67
89	W	77.17	81.00
110	W	71.25	75.00

Read table thus: Column I designates the student's serial number; Column II, sex; Column III, mathematics-scholarship index; Column IV, English-Latin-scholarship index.

Table 24 gives a comparison of the mathematics-scholarship indices and the second-major-scholarship indices. The table gives the serial number, sex, mathematics-scholarship index and the second-major-scholarship index for each student.

TABLE 24

TABLE SHOWING MATHEMATICS-MAJOR-SCHOLARSHIP INDICES AND SECOND-MAJOR-SCHOLARSHIP INDICES

Student	Sex	Math. Schol. Index	Second Major Schol. Index
14	M	100.00	100.00
19	M	100.00	85.41
22	M	86.90	82.41
29	M	77.77	55.45
37	M	87.00	83.00
44	M	85.18	91.37
47	M	50.00	78.88
49	M	100.00	100.00
61	M	85.00	86.95
67	M	85.21	75.92

Table 24 (continued)

Student	Sex	Math.Schol. Index	Second Major Schol.Index
106	M	94.56	97.82
112	M	91.66	95.53
119	M	96.66	90.83
120	M	91.07	76.16
129	M	100.00	100.00
2	W	90.17	66.66
4	W	90.21	83.75
13	W	72.16	74.25
16	W	77.38	63.28
21	W	100.00	92.42
23	W	59.09	56.25
25	W	63.04	69.08
27	W	100.00	91.40
36	W	59.09	70.00
40	W	70.31	70.27
50	W	89.13	87.82
52	W	70.00	59.78
55	W	69.30	79.31
56	W	95.00	80.00
57	W	93.47	97.61
59	W	86.95	89.16
69	W	89.28	89.81
76	W	69.23	87.50
79	W	84.77	92.04
82	W	86.25	97.00
89	W	77.17	81.00
92	W	63.46	86.53
109	W	47.82	72.00
110	W	71.25	75.00
126	W	75.22	89.00

Read table thus: Column I designates the student's serial number; Column II, sex; Column III, mathematics-scholarship index; Column IV, second-major-scholarship index.

Results and Conclusions

Table 25 gives the arithmetic means and standard deviation of the mathematics-scholarship indices and the second-major-scholarship indices for the men and women combined.

TABLE 25

MEAN AND STANDARD DEVIATION OF MATHEMATICS-MAJORS IN MATHEMATICS SCHOLARSHIP AND IN SECOND MAJOR SCHOLARSHIP

Group and Measures	Math. Schol.	Second Major Schol.
Science No. 12		
Mean and P.E.	86.99	88.30
S.D. and P.E.	11.75	12.60
Social Science No. 12		
Mean and P.E.	80.88	81.42
S.D. and P.E.	11.85	12.16
Prof. Sub. No. 9		
Mean and P.E.	73.59	82.52
S.D. and P.E.	17.40	11.00
English & Latin No. 5		
Mean and P.E.	79.23	73.31
S.D. and P.E.	16.55	13.09
Total No. 40		
Mean and P.E.	81.99 ± 1.66	82.37 ± 1.48
S.D. and P.E.	15.63 ± 1.02	13.96 ± 1.05

Read table thus: In the science group there were 12 students, the mean for the mathematics scholarship was 86.99, for the second-major scholarship 88.30. The standard deviation for the mathematics scholarship was 11.75, for the second-major scholarship 12.60.

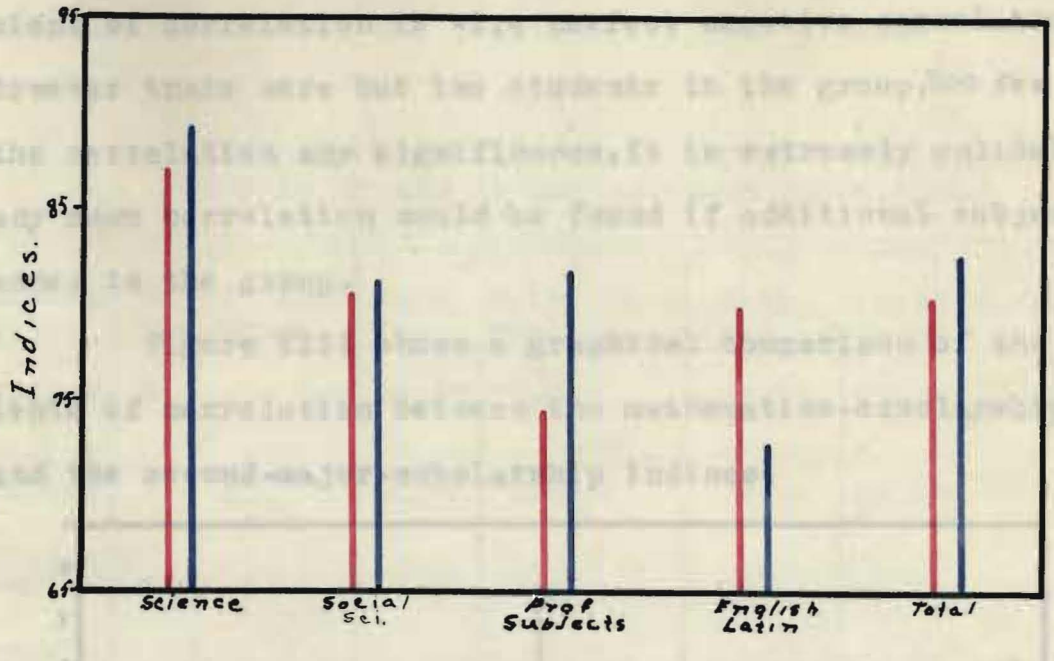
It will be notices that the mean for the second major is higher than the mean for the mathematics scholarship in every case except for the English and Latin group.

Of the four second-major groups, the science group has the highest mean for mathematics scholarship. The science group also has the highest mean for the second-major scholarship.

Probable errors were not considered because each group contained less than 25 cases, the amount necessary to justify a reliability measure.[7]

7 H.E. Garrett. Statistics in Psychology and Education. Longmans Green Company. 1926. pp 142

Figure VII gives a graphical comparison between the means of the mathematics-scholarship indices and the second-major scholarship indices.



Legend: Math.Schol. ——— Second Major Schol. ———
Figure VII.-Distribution of mathematics scholarship and second-major scholarship.

Table 26 gives the coefficient of correlation between the mathematics-scholarship indices and the second-major-scholarship indices for the men students, the women students and for the men and women students combined, in each of the four groups of second majors and for the total of all groups combined.

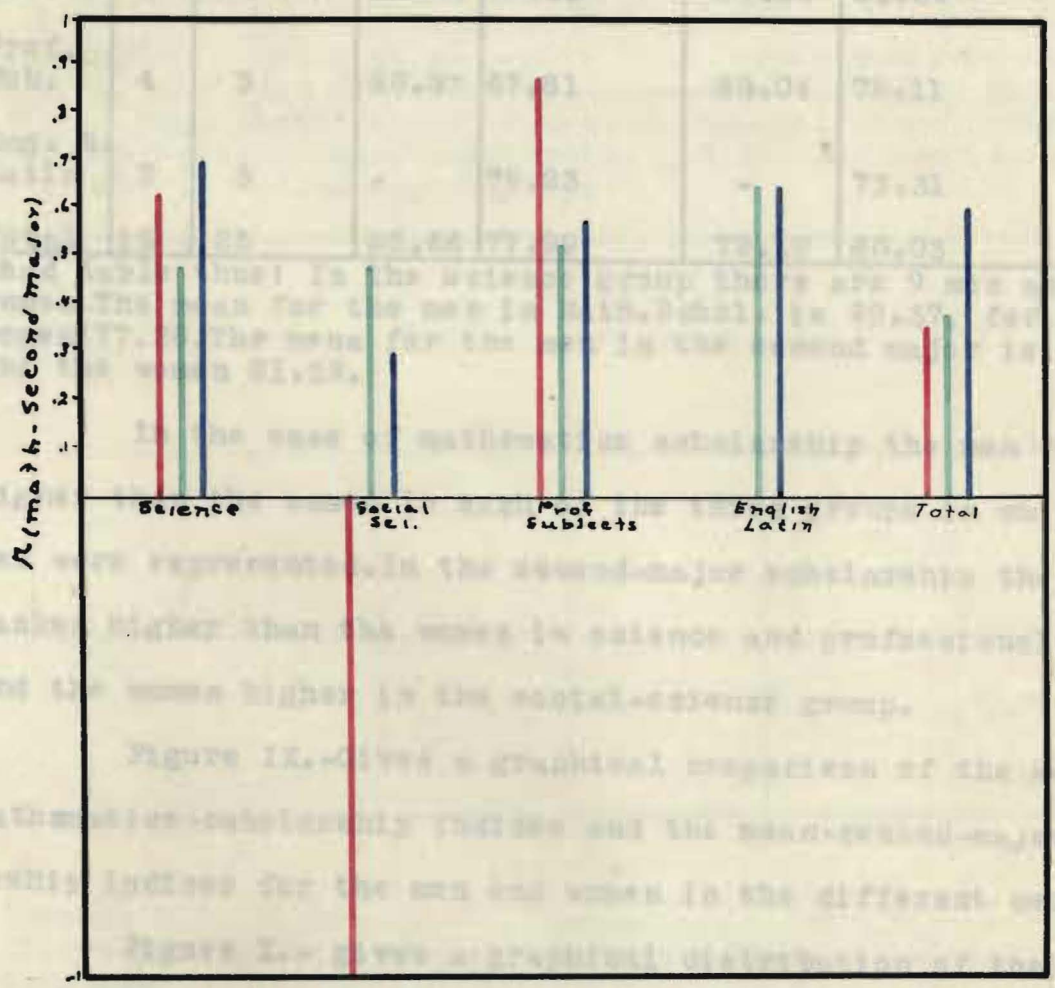
TABLE 26

COEFFICIENTS OF CORRELATION IN MATHEMATICS SCHOLARSHIP AND SECOND MAJOR SCHOLARSHIP

	Math.&. Science	Math.&. Soc.Sc.	Math.&. Prof.Sub.	Math.&. Eng.-Lat.	Math.&. Total
Men	.640	−1	.861	0	.357
Women	.457	.452	.568	.656	.379
Total	.696	.293	.589	.656	.598

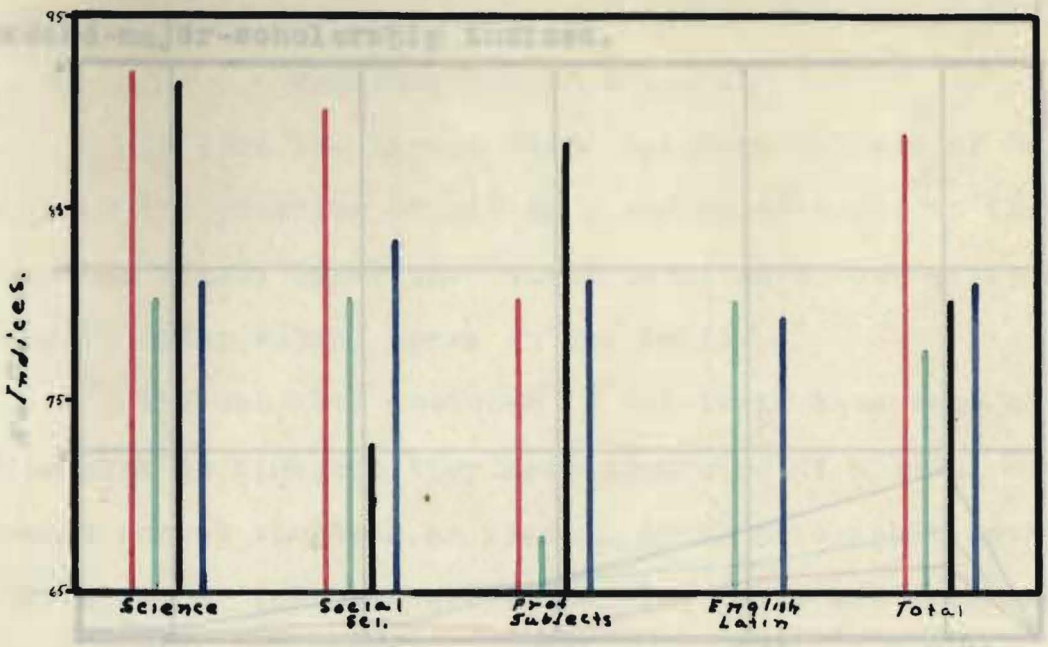
The number of students in each of the four groups was too small to make the comparison reliable. It will be noted in the case of the men, in the social science group, that the coefficient of correlation is -1, a perfect negative correlation. However there were but two students in the group, too few to give the correlation any significance. It is extremely unlikely that any such correlation would be found if additional subjects were added to the group.

Figure VIII shows a graphical comparison of the coefficients of correlation between the mathematics-scholarship indices and the second-major-scholarship indices.

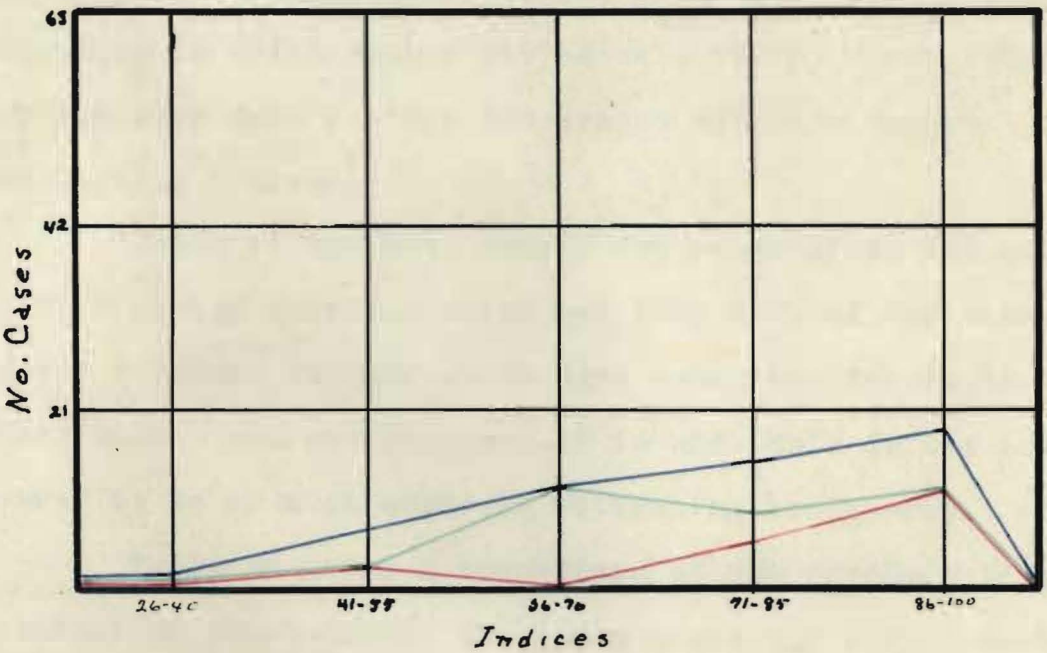


Legend: Men ——— Women ——— M. & W. ———

Figure VIII.-Distribution of coefficients of correlation between mathematics-scholarship indices and second-major-scholarship indices.



Legend: Men Math. ——— Women Math. ———
Men Second Major. ——— Women Second Major. ———
Figure IX.- Distribution of mean-mathematics-scholarship indices and mean-second-major-scholarship indices for men and women students in second-major groups.



Legend: Men ——— Women ——— M.&.W. ———
Figure X.- Distribution of academic-mathematics-scholarship indices.

Table 27 gives a comparison of the mean between the men and women for the mathematics-scholarship indices and the second-major-scholarship indices for each of the four groups of second majors, and also for the total of all four groups.

TABLE 27

CENTRAL TENDENCY OF MEN AND WOMEN MAJORS IN MATHEMATICS SCHOLARSHIP AND IN SECOND-MAJOR SCHOLARSHIP

Second Major	No. of Cases		Mean Math. Schol.		Mean Second Major	
	Men	Women	Men	Women	Men	Women
Science	9	5	92.37	77.28	92.14	81.39
Social Science	2	10	87.64	79.53	72.54	83.20
Prof. Sub.	4	5	80.83	67.81	88.04	78.11
Eng. & Latin	0	5	-	79.23	-	73.31
Total	15	25	88.66	77.99	79.12	80.03

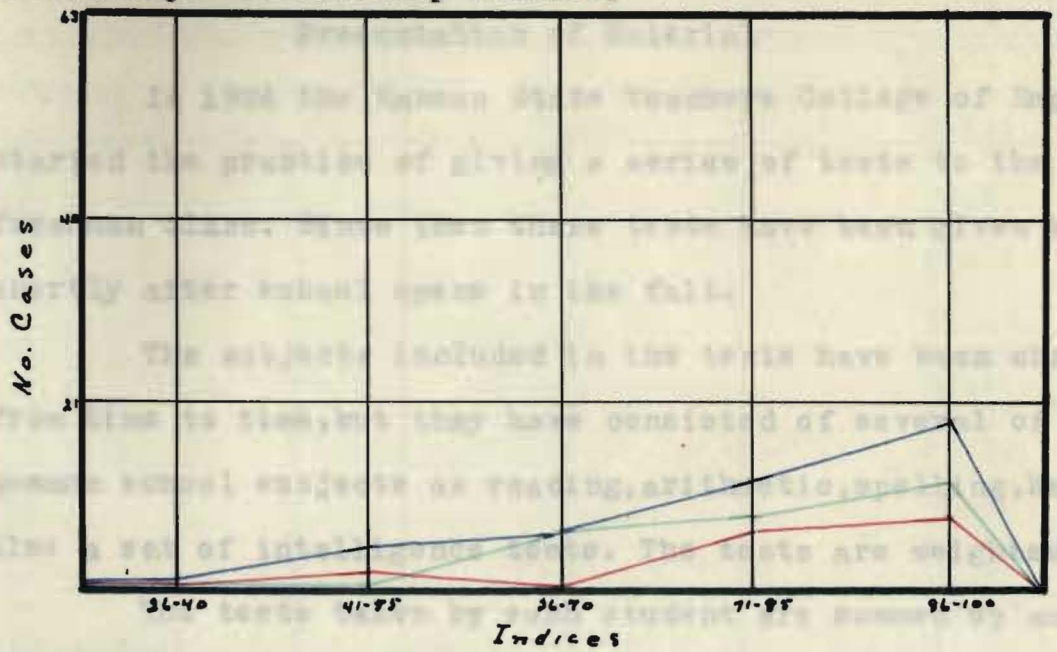
Read table thus: In the science group there are 9 men and 5 women. The mean for the men in Math. Schol. is 92.37, for the women 77.28. The mena for the men in the second major is 92.14, for the women 81.39.

In the case of mathematics scholarship the men ranked higher than the women in each of the three groups in which the men were represented. In the second-major scholarship the men ranked higher than the women in science and professional group and the women higher in the social-science group.

Figure IX.-Gives a graphical comparison of the mean-mathematics-scholarship indices and the mean-second-major-scholarship indices for the men and women in the different second majors.

Figure X.- gives a graphical distribution of the mathematics scholarship.

Figure XI.- Gives a graphical distribution of the second-major-scholarship indices.



Legend: Men ——— Women ——— M.&.W. ———

Figure XI.-Distribution of second-major scholarship indices.

CHAPTER VII

COMPARISON OF FRESHMAN TESTS AND MATHEMATICS SCHOLARSHIP

Presentation of Material

In 1924 the Kansas State Teachers College of Emporia started the practice of giving a series of tests to the incoming freshman class. Since then these tests have been given each year, shortly after school opens in the fall.

The subjects included in the tests have been changed from time to time,but they have consisted of several of the common school subjects as reading,arithmetic,spelling,English and also a set of intelligence tests. The tests are weighted.

The tests taken by each student are summed up and the student is given a mark representing his score.Then the entire group taking the tests are divided into ten divisions according to rank,that is into deciles. The student's final mark simply indicates in which decile his score appears. These final marks are the ones used in this comparison with the mathematics-scholarship indices.

Since it has been only a few years since the school started giving freshman tests not very many of the mathematics majors included in this study have taken the tests. In the group there were 4 men and 14 women,18 in all. This is too small a number to be of much value,in estimating tendencies.

Table 28 gives a comparison of the freshman tests and mathematics scholarship. The table gives the serial number,sex, freshman-test mark and mathematics-scholarship index of each student.

TABLE 28

COMPARISON OF FRESHMAN TESTS AND MATHEMATICS SCHOLARSHIP

Student	Sex	Freshman Tests	Math. Schol.
37	M	10	87.00
53	M	8	96.66
81	M	7	73.07
83	M	3	97.72
5	W	8	75.00
23	W	2	59.09
30	W	2	93.18
32	W	8	50.00
76	W	8	69.23
77	W	10	59.70
78	W	10	63.75
80	W	9	95.53
84	W	10	63.63
85	W	10	77.88
86	W	4	81.52
99	W	9	60.86
110	W	7	71.25
113	W	9	79.00

Read table thus: Column I indicates the student's serial number; Column II, Sex; Column III, Freshman tests; Column IV, Mathematics scholarship.

Results and Conclusions

Table 29 gives a comparison between the freshman-test marks and the mean of the mathematics-scholarship indices.

In the freshman tests the women outranked the men. The mean for the women being 7.57 compared with 7 for the men.

In the mathematics scholarship the men outranked the women. The mean for the men being 88.61 compared with 71.61 for the women.

TABLE 29

MEANS OF FRESHMAN TESTS AND MATHEMATICS-SCHOLARSHIP INDICES

Group and Measure	Freshman Tests	Math. Schol.
Men - Mean	7	88.61
Women-Mean	7.57	71.40
M. &. W.-Mean	7.44	76.33

Read table thus:The mean for the men in freshman tests is 7 ,in mathematics scholarship 88.61.

Table 30 gives the coefficient of correlation between the the freshman tests and mathematics scholarship for the men students,the women students and for the men and women combined.The coefficients of correlation are low and in each case negative. The number of cases involved in the correlations is too small to make the results very significant.

TABLE 30

COEFFICIENTS OF CORRELATION IN FRESHMAN TESTS AND MATHEMATICS SCHOLARSHIP

Group	r(acad.)(math.)
Men	- .276
Women	- .198
Men and Women	- .234

Read table thus: The coefficient of correlation between freshman tests and mathematics scholarship for the men is - .276.

CHAPTER VIII

A STUDY OF THE EFFECT OF AGE ON MATHEMATICS SCHOLARSHIP

Presentation of Material

The purpose of Chapter VIII is to find the effect, if any, of age on mathematics scholarship.

In checking over the list of students if was found that the age limits were 19 years and 57 years, with an average age of 26.5 years.

Various age groupings were made for the purpose of comparison. First the students were divided into divisions, those under the average age of 26.5 years and those over the average age. A second grouping was then made into the following groups:

1. Those under 20 years of age.
2. Those from 20 to 24 years of age.
3. Those from 25 to 29 years of age.
4. Those from 30 to 34 years of age.
5. Those over 35 years of age.

Table 31 gives an age group of those under the average age of 26.5 years. The table gives the students serial number, sex, age and mathematics-scholarship index. The youngest person in the list was a woman, number 102. The age was 19 years.

TABLE 31

AGE GROUP UNDER THE AVERAGE, 26.5

Student	Sex	Age	Math. Schol Index
8	M	26	71.42
11	M	22	86.90
19	M	25	100.00
20	M	26	85.00
26	M	22	42.10

Table 31 (continued)

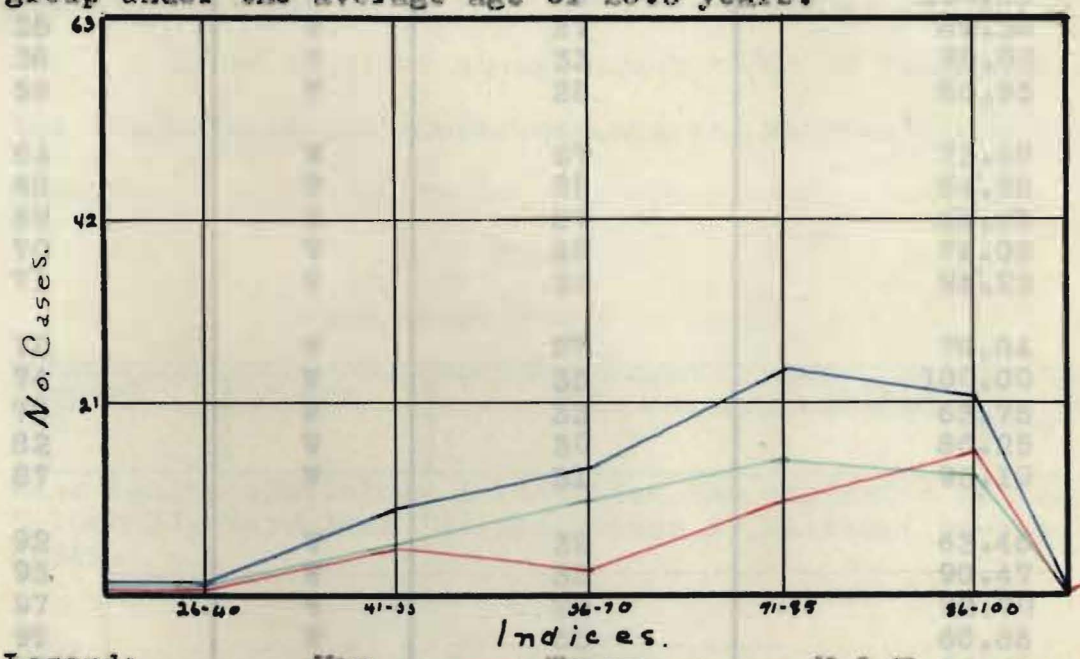
Student	Sex	Age	Math.Schol. Index
29	M	22	77.77
31	M	22	85.00
37	M	26	87.00
38	M	24	95.23
39	M	26	94.04
43	M	26	61.25
45	M	25	85.71
47	M	23	50.00
49	M	21	100.00
54	M	26	93.18
66	M	26	80.43
75	M	25	77.88
81	M	22	73.07
83	M	20	97.72
91	M	25	70.83
93	M	25	91.12
106	M	22	94.56
111	M	26	72.22
112	M	22	91.66
120	M	23	91.07
124	M	21	91.66
1	W	25	70.23
5	W	23	75.00
6	W	22	76.92
9	W	25	75.00
12	W	25	69.04
25	W	20	63.04
30	W	25	93.18
36	W	26	59.09
40	W	21	70.31
42	W	26	83.69
46	W	22	85.57
50	W	20	89.13
52	W	23	70.00
57	W	23	53.47
60	W	21	81.25
63	W	22	91.66
65	W	24	72.50
73	W	25	85.86
76	W	22	69.23
77	W	23	59.70

Table 31 (continued)

Student	Sex	Age	Math.Schol. Index
79	W	26	84.77
80	W	22	95.53
85	W	25	77.88
86	W	25	81.52
88	W	21	79.16
94	W	24	86.95
98	W	25	80.64
100	W	23	90.38
102	W	19	100.00
105	W	25	65.78
109	W	22	47.82
110	W	20	71.25
113	W	21	79.00
114	W	24	95.00
117	W	23	90.17
121	W	21	97.32
126	W	22	75.22
127	W	22	93.75
130	W	20	95.58

Read table thus: Column I indicates the student's serial number; Column II, Sex; Column III, Age; Column IV, Mathematics scholarship index.

Figure XII.-gives a graphical representation of the age group under the average age of 26.5 years.



Legend: Men —— Women —— M.&.W. ——

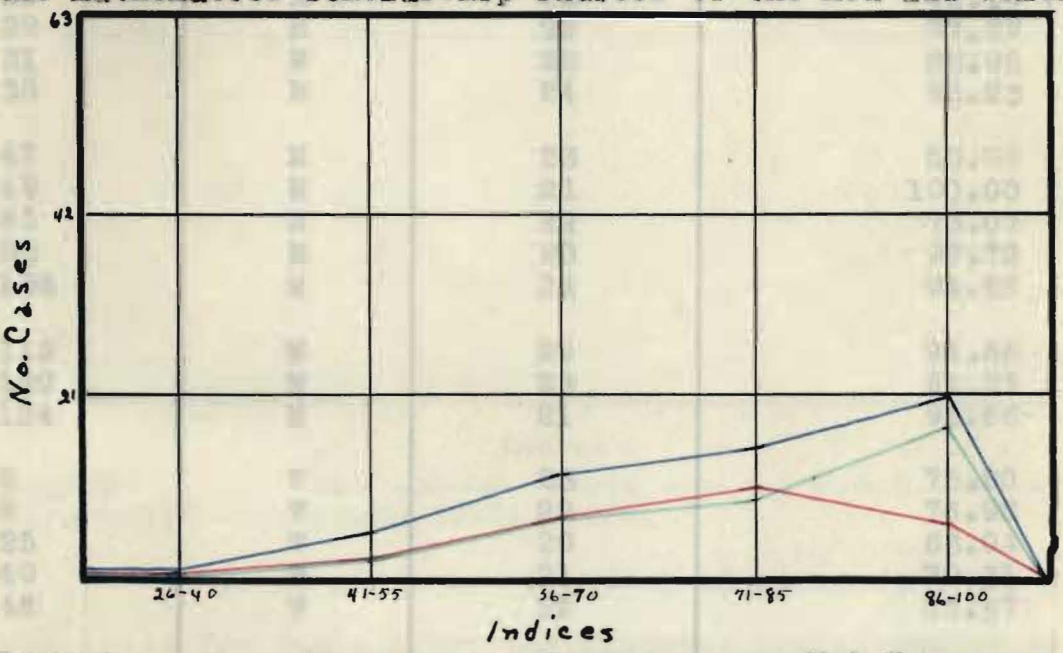
Figure XII.-Age group below the average age.

Table 32 (continued)

Student	Sex	Age	Math.Schol.Index
103	W	34	94.73
115	W	30	41.66
116	W	27	81.89
122	W	30	83.33

Read table thus:Column I indicates the student's serial number; Table II,Sex;Table III,Age;Table IV,Math.Schol.Index.

Figure XIII.-Gives a graphical representation of the age group over the average age of 26.5 years,giving a comparison of the mathematics-scholarship indices of the men and women students.



Legend: Men —— Women —— M.&.W. ——

Figure XIII.-Age group over the average age.

Table 33 gives an age group under 20 years.The table gives the students serial number,sex,age and mathematics-scholarship index.

TABLE 33

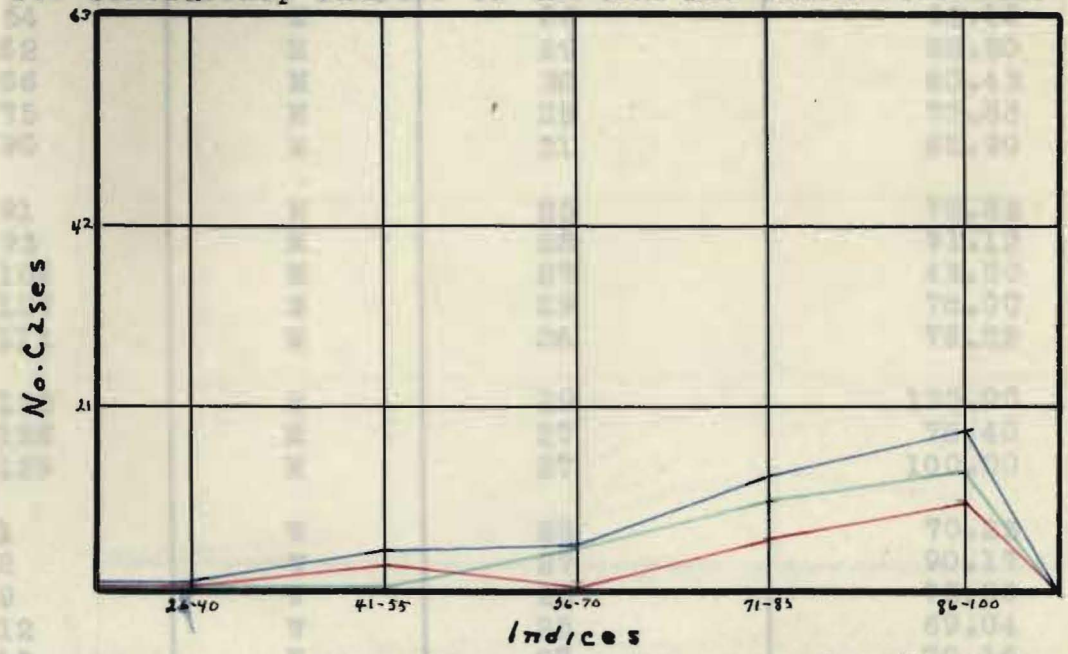
AGE GROUP UNDER 20 YEARS

Student	Sex	Age	Math.Schol. Index
102	W	19	100.00

Read table thus:Column I indicates the student's serial number; Column II,Sex;Column III,Age;Column IV,Mathematics-scholarship index.

Read table thus:Column I indicates student's serial number; Column II,Sex;Column III,Age;Column IV,Math.Schol.Index

Figure XIV.-Gives a graphical representation of the age group 20-24 years inclusive,giving a comparison of the mathematics-scholarship indices of the men and women students.



Legend: Men —— Women —— M.&.W. ——
Figure XIV.-Age group 20-24 years.

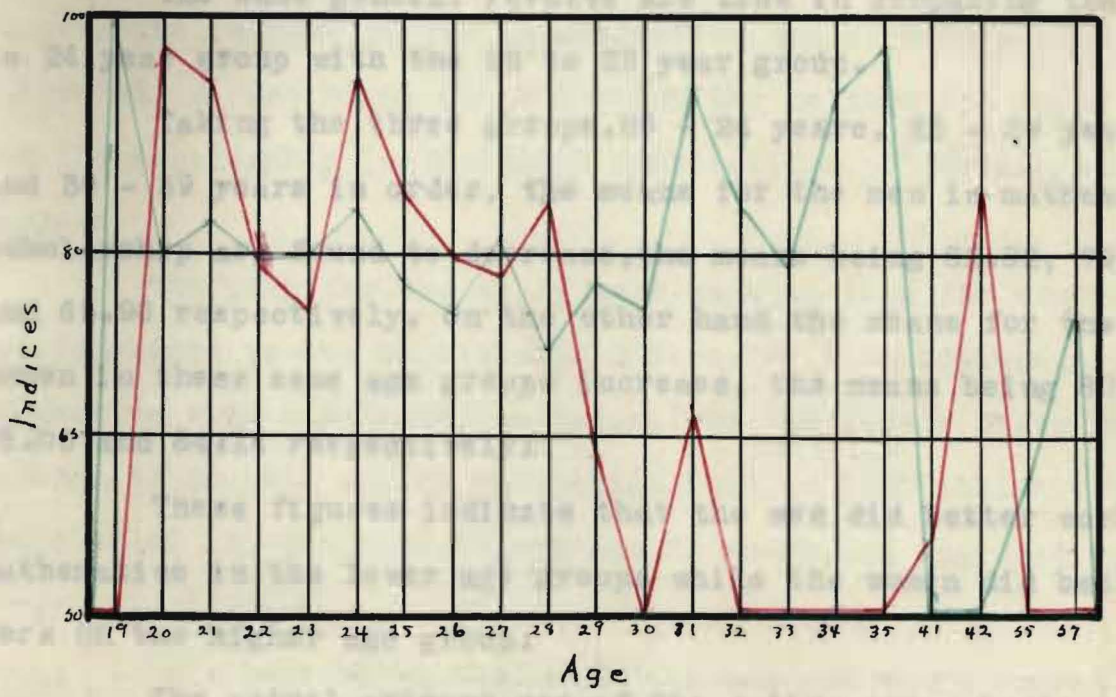
Table 35 gives an age group of those from 25-29 years inclusive.The table gives the students serial number,sex,age and mathematics-scholarship index.

TABLE 35

AGE GROUP 25 - 29 YEARS

Student	Sex	Age	Math.Schol. Index
3	M	29	59.37
8	M	26	71.42
14	M	27	100.00
18	M	29	59.72
19	M	25	100.00
20	M	26	76.92
28	M	28	84.09
34	M	29	73.61
37	M	26	87.00
39	M	26	94.04
41	M	29	82.81
43	M	26	61.25

Figure XVI.-Gives the mean of the mathematics-scholarship indices of each age year for the men students and for the women students.



Legend: Men ——— Women ———
Figure XVI.-Mean-mathematics-scholarship indices for each age year.

Summary and Conclusions

The data given in the tables show a number of interesting comparisons.

In comparing the number of students in the different groups more men are found in the 25 to 29 year group,there being 28 compared to 13 for the next largest group,the 20 to 24 year group. On the other hand the women have as many in the 20 to 24 year group as in the 25 to 29 year group,each having 26.

In comparing the mean of the mathematics-scholarship indices,the men of the group under 26.5 years have an average of 82.57 compared with 77.30 for the men over 26.5 years. The women under 26.5 years have an average mean of 80.04 compared with an average mean of 82.80 for the women over 26.5 years. That is the

TABLE 32

AGE GROUP OVER THE AVERAGE AGE, 26.5

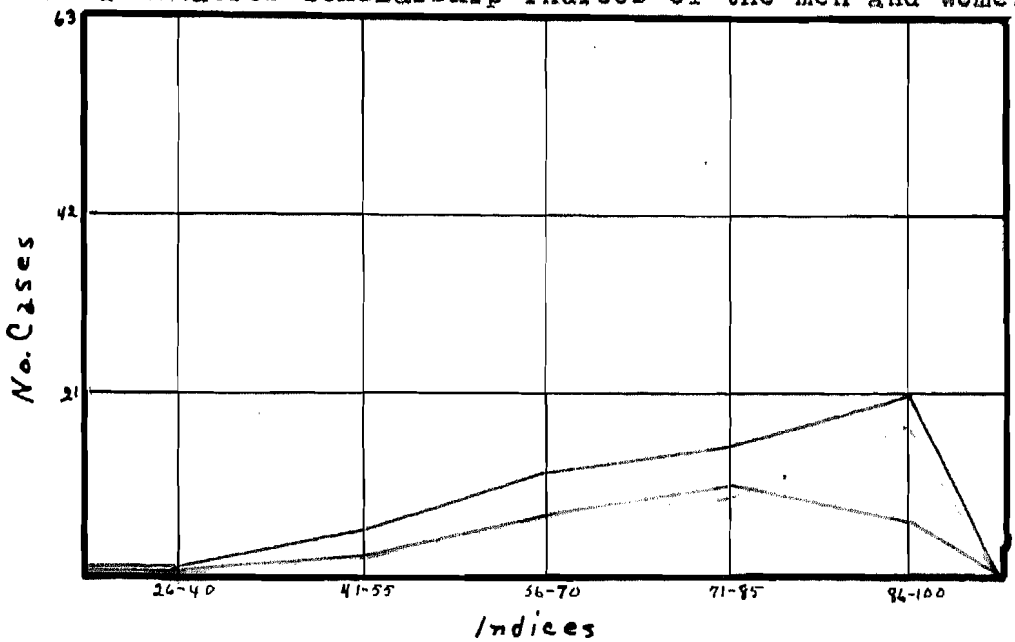
Student	Sex	Age	Math.Schol. Index
3	M	29	59.37
14	M	27	100.00
18	M	29	59.72
28	M	28	84.09
34	M	29	73.61
41	M	29	82.91
44	M	28	85.18
48	M	27	68.42
62	M	29	92.30
67	M	42	84.21
90	M	31	65.90
96	M	41	57.95
104	M	27	44.00
107	M	29	78.00
123	M	29	100.00
128	M	27	78.40
129	M	27	100.00
2	W	27	90.17
4	W	30	90.21
10	W	35	94.56
13	W	27	72.16
15	W	29	88.88
17	W	27	86.11
27	W	28	100.00
55	W	27	69.30
56	W	33	95.00
59	W	28	86.95
64	W	57	73.68
68	W	29	64.28
69	W	27	89.28
70	W	28	76.08
71	W	32	95.23
72	W	27	78.84
74	W	35	100.00
78	W	33	63.75
82	W	30	86.25
87	W	31	95.19
92	W	32	63.46
95	W	32	90.47
97	W	28	92.70
99	W	55	60.86
101	W	28	96.42

Table 32 (continued)

Student	Sex	Age	Math.Schol.Index
103	W	34	94.73
115	W	30	41.66
116	W	27	81.89
122	W	30	83.33

Read table thus:Column I indicates the student's serial number; Table II,Sex;Table III,Age;Table IV,Math.Schol.Index.

Figure XIII.-Gives a graphical representation of the age group over the average age of 26.5 years,giving a comparison of the mathematics-scholarship indices of the men and women students.



Legend: Men ——— Women - - - - M.&.W. ———
Figure XIII.-Age group over the average age.

Table 33 gives an age group under 20 years.The table gives the students serial number,sex,age and mathematics-scholarship index.

TABLE 33

AGE GROUP UNDER 20 YEARS

Student	Sex	Age	Math.Schol. Index
102	W	19	100.00

Read table thus:Column I indicates the student's serial number; Column II,Sex;Column III,Age;Column IV,Mathematics-scholarship index.

Table 34 gives an age group of those from 20 - 24 years inclusive. The table gives the student's serial number, sex, age, and mathematics-scholarship index.

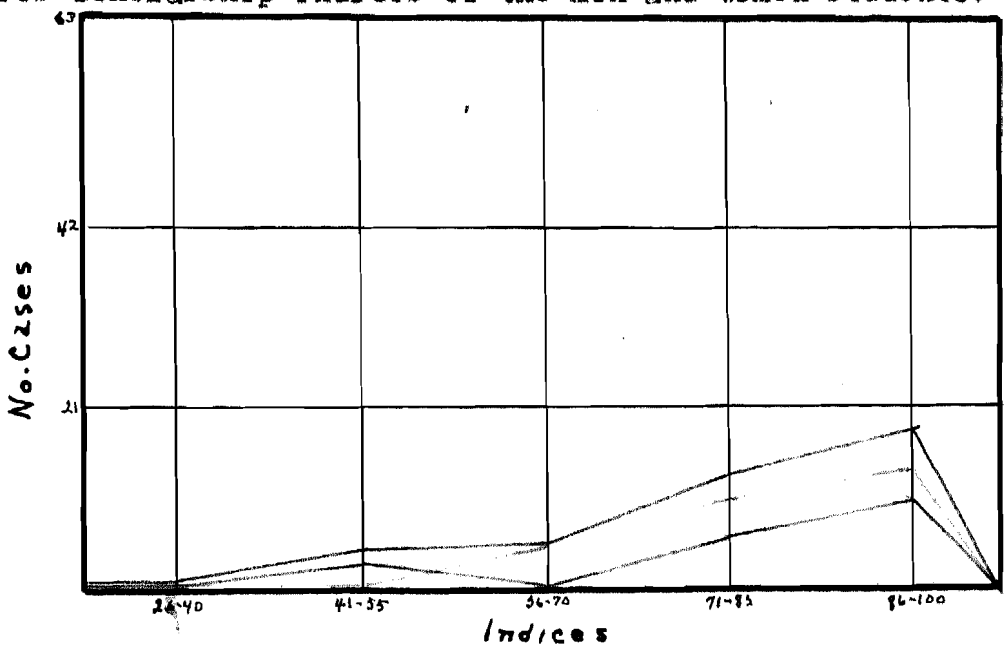
TABLE 34

AGE GROUP 20 - 24 YEARS

Student	Sex	Age	Math. Schol. Index
11	M	22	86.90
26	M	22	42.10
29	M	22	77.77
31	M	22	85.00
38	M	24	95.23
47	M	23	50.00
49	M	21	100.00
81	M	22	73.07
83	M	20	97.72
106	M	22	94.56
112	M	22	91.66
120	M	23	91.07
124	M	21	91.66
5	W	23	75.00
6	W	22	76.92
25	W	20	63.04
40	W	21	70.31
46	W	22	35.57
50	W	20	89.13
52	W	23	70.00
57	W	23	93.47
60	W	21	81.25
63	W	22	91.66
65	W	24	72.50
76	W	22	69.23
77	W	23	59.70
80	W	22	95.53
88	W	21	79.16
94	W	24	86.95
100	W	23	90.38
109	W	22	47.82
110	W	20	71.25
113	W	21	79.00
114	W	24	95.00
117	W	23	90.17
121	W	21	97.32
126	W	22	75.22
127	W	22	93.75
130	W	20	95.58

Read table thus:Column I indicates student's serial number; Column II,Sex;Column III,Age;Column IV,Math.Schol.Index

Figure XIV.-Gives a graphical representation of the age group 20-24 years inclusive,giving a comparison of the mathematics-scholarship indices of the men and women students.



Legend: Men ——— Women ——— M.&.W. ———
Figure XIV.-Age group 20-24 years.

Table 35 gives an age group of those from 25-29 years inclusive.The table gives the students serial number,sex,age and mathematics-scholarship index.

TABLE 35

AGE GROUP 25 - 29 YEARS

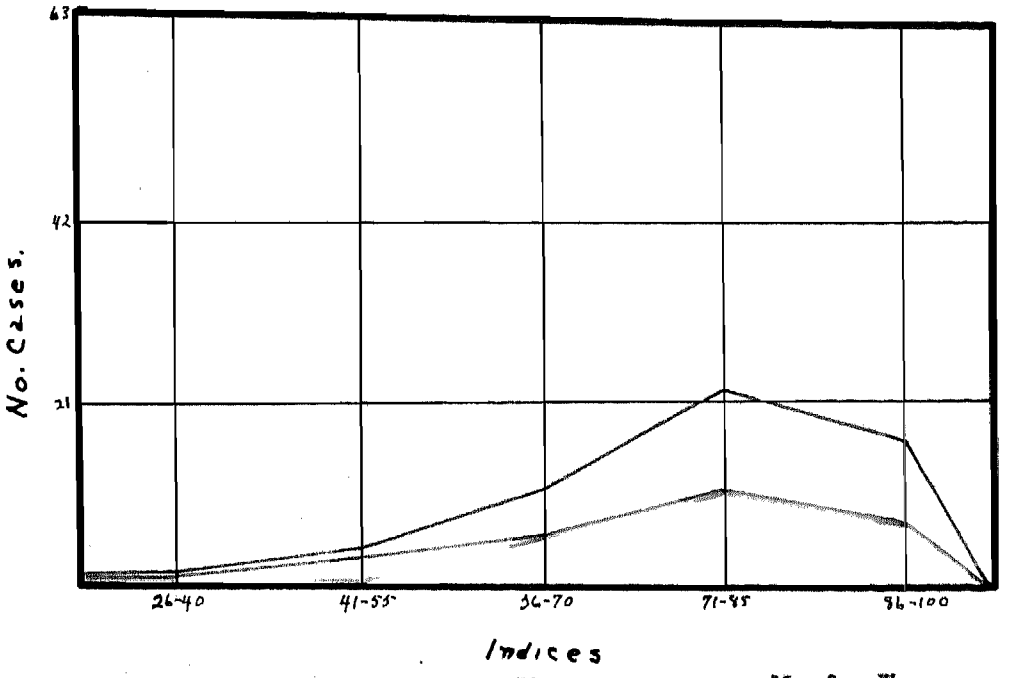
Student	Sex	Age	Math.Schol. Index
3	M	29	59.37
8	M	26	71.42
14	M	27	100.00
18	M	29	59.72
19	M	25	100.00
20	M	26	76.92
28	M	28	84.00
34	M	29	73.61
37	M	26	87.00
39	M	26	94.04
41	M	29	82.81
43	M	26	61.25

Table 35 (continued)

Student	Sex	Age	Math. Schol. Index
44	M	28	85.18
49	M	25	81.71
48	M	27	68.42
54	M	26	93.18
62	M	29	92.50
66	M	26	80.43
75	M	25	77.88
90	M	31	65.90
91	M	25	70.83
93	M	25	91.12
104	M	27	44.00
107	M	29	78.00
111	M	26	72.22
123	M	29	100.00
128	M	27	78.40
129	M	27	100.00
1	W	25	70.23
2	W	27	90.17
9	W	25	75.00
12	W	25	69.04
13	W	27	72.16
15	W	29	88.88
17	W	27	86.11
27	W	28	100.00
30	W	25	93.18
36	W	26	59.09
42	W	26	83.69
55	W	27	69.30
59	W	28	86.95
68	W	29	64.28
69	W	27	89.28
70	W	28	76.08
72	W	27	78.84
73	W	26	85.86
79	W	26	84.77
85	W	25	77.88
86	W	26	81.52
97	W	28	92.70
98	W	25	80.64
101	W	28	96.42
105	W	25	73.46
116	W	27	81.89

Read table thus: Column I indicates the student's serial number; Column II, Sex; Column III, Age; Column IV, Math. Schol. Index.

Figure XV.-Gives a graphical representation of the age group 25 - 29 years inclusive,giving a comparison of the mathematics-scholarship indices of the men and women students.



Legend: Men ——— Women ——— M. &. W. ———
Figure XV.- Age group 25 - 29 years.

Table 36 gives an age group of those from 30 to 39 inclusive.The table gives the student's serial number,sex,age and mathematics-scholarship index.

TABLE 36

AGE GROUP 30 - 39 YEARS

Student	Sex	Age	Math.Schol. Index
90	M	31	65.90
4	W	30	90.21
10	W	35	94.56
56	W	33	95.00
71	W	32	95.23
74	W	35	100.00
78	W	33	63.75
82	W	30	86.25
87	W	31	95.19
92	W	32	63.46
95	W	32	90.47

Table 36 (continued)

Student	Sex	Age	Math. Schol. Index
103	W	34	94.73
115	W	30	41.66
122	W	30	83.33

Read table thus: Column I indicates the student's serial number; Column II, Sex; Column III, Age; Column IV, Math. Schol. Index.

Table 37 gives an age group of those above 39 years. The table gives the student's serial number, sex, age and mathematics-scholarship index.

TABLE 37

AGE GROUP ABOVE 39 YEARS

Student	Sex	Age	Math. Schol. Index
67	M	42	84.21
96	M	42	57.95
64	W	57	73.68
99	W	55	60.86

Read table thus: Column I indicates the student's serial number; Column II, Sex; Column III, Age; Column IV, Math. Schol. Index.

Table 38 gives a summary of the age groups. The table gives the number and the mean index for the men, for the women and for the men and women combined for each of the age groups.

TABLE 38

SUMMARY OF AGE GROUPS

Age Group	Number in Group	Means
Under Average Age, 26.5	26	82.57
Men	26	82.57
Women	39	80.04
Men and Women	65	81.05
Over Average Age Group		
Men	17	77.30

Table 38 (continues)

Age Group	Number in Group	Means
Women	29	82.80
Men and Women	46	80.77
Under 20 years		
Women	1	100.00
20 to 24 years		
Men	13	82.82
Women	26	80.32
Men and Women	39	81.32
25 to 29 years		
Men	28	79.64
Women	26	91.05
Men and Women	54	80.32
30 to 39 years		
Men	1	65.90
Women	13	84.14
Men and Women	14	82.83
Over 39 years		
Men	2	71.08
Women	2	67.27
Men and Women	4	69.17

Read table thus: There were 26 men under the average age of 26.5 years. Their mean index was 82.57.

Table 39 gives the mean-mathematics-scholarship indices, by years, for the men, the women and both combined.

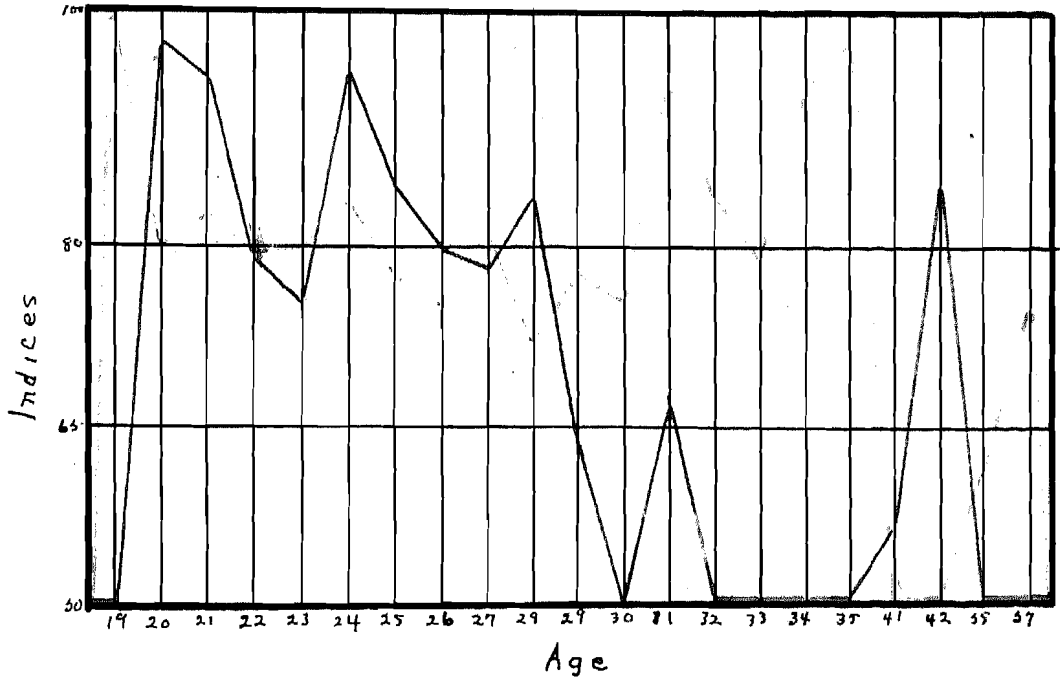
TABLE 39

MEAN-MATHEMATICS-SCHOLARSHIP INDICES BY YEARS

Year	Men		Women		Total	
	No	Mean	No	Mean	No	Mean
19	0	0	1	100.00	1	100.00
20	1	97.72	4	79.75		83.34
21	2	95.83	5	81.40	7	85.53
22	7	78.72	8	79.46	15	79.11
23	2	70.53	6	79.78	8	77.47
24	1	95.23	3	84.81	4	87.42
25	5	85.10	9	77.68	14	80.33
26	8	80.57	3	75.85	11	79.28
27	5	78.16	7	81.10	12	79.63
28	2	84.63	5	70.43	7	77.53
29	7	63.68	2	78.58	9	70.13
30	0	0	4	75.36	4	75.36
31	1	65.90	1	95.19	2	80.54
32	0	0	3	83.05	3	83.05
33	0	0	2	79.36	2	79.37
34	0	0	1	94.73	1	94.73
35	0	0	2	97.28	2	97.28
41	1	57.95	0	0	1	57.95
42	1	84.21	0	0	1	84.21
55	0	0	1	60.86	1	60.86
57	0	0	1	73.68	1	73.68

Read table thus:There was one person,a woman,19 years old with an index of 100.00

Figure XVI.-Gives the mean of the mathematics-scholarship indices of each age year for the men students and for the women students.



Legend: Men ——— Women - - - -
Figure XVI.-Mean-mathematics-scholarship indices for each age year.

Summary and Conclusions

The data given in the tables show a number of interesting comparisons.

In comparing the number of students in the different groups more men are found in the 25 to 29 year group, there being 28 compared to 13 for the next largest group, the 20 to 24 year group. On the other hand the women have as many in the 20 to 24 year group as in the 25 to 29 year group, each having 26.

In comparing the mean of the mathematics-scholarship indices, the men of the group under 26.5 years have an average of 82.57 compared with 77.30 for the men over 26.5 years. The women under 26.5 years have an average mean of 80.04 compared with an average mean of 82.80 for the women over 26.5 years. That is the

men under the average age do better in mathematics scholarship than do the women,but the women in the group over the average age do better than the men.

The same general results are true in comparing the 20 to 24 year group with the 25 to 29 year group.

Taking the three groups,20 - 24 years, 25 - 29 years and 30 - 39 years in order, the means for the men in mathematics scholarship are found to decrease,the means being 82.82, 79.64 and 65.90 respectively. On the other hand the means for the women in these same age groups increase, the means being 80.57, 81.05 and 84.14 respectively.

These figures indicate that the men did better work in mathematics in the lower age groups while the women did better work in the higher age group.

The actual average age of the entire group indicates that the women of the mathematics majors are older than the men when they graduate from the Kansas State Teachers College of Emporia.The average for the men is 26.09 years and for the women 28.13 years. These two averages are not so significant when they are analyzed for the higher age groups have more women than men which raises the average age for the women. In the 30 to 34 year group there is only one man compared with 13 women.

CHAPTER IX

GENERAL SUMMARY AND CONCLUSION

The investigation recorded in this thesis deals with the mathematics majors of the Kansas State Teachers College of Emporia. The purpose of the investigation was to make a study of the relation that might exist between the mathematics scholarship and the scholarship in different combinations of certain school courses.

The data for the study were secured from the students' record sheets in the Registrar's Office. The data include all students graduating with a mathematics major, from the Kansas State Teachers College of Emporia during the period 1917 to 1932 inclusive. The data of 130 students, 49 men and 81 women, are included in the study.

The study shows that both the men and women ranked higher in mathematics scholarship than in academic scholarship. The coefficient of correlation being .563.

The men ranked higher than the women in both general scholarship and mathematics scholarship. The coefficient of correlation for the men was .730 compared with .506 for the women.

The Indiana Teachers College study gives very different results in comparing the ranking between general scholarship and mathematics scholarship of the Indiana Teachers College. This study[8] shows that the men and women ranked higher in general scholarship than in mathematics scholarship. Likewise the women ranked higher than the men in both general scholarship and

8 Elizabeth Higgins. Study of the Achievement and Related Factors of Mathematics Majors at Indiana State Teachers College for the Years 1926-1932. Contributions of the Graduate School Indiana State Teachers College. Number 76, 1932.

mathematics scholarship.

In a study at Brown University, McPhail[9] found a correlation of .700 between mathematics scholarship and scholarship in other branches.

Both the men and women rank higher in academic-mathematics scholarship than in professional-mathematics scholarship.

The men rank higher than the women in both academic-mathematics scholarship and professional-mathematics scholarship.

The men are 136% as variable as the women in professional scholarship and 103% as variable as the women in professional-Mathematics scholarship.

Comparing the results of the Emporia study of academic scholarship and professional-mathematics scholarship with the Indiana study, students of the Indiana Teachers College ranked higher in academic-mathematics scholarship than in professional-mathematics scholarship. In comparing the men with the women it was found that the women ranked higher than the men in both academic-mathematics scholarship and professional-mathematics scholarship.[10]

Both the men and women in the Emporia investigation rank higher in junior-college-mathematics scholarship than in senior-college-mathematics scholarship. In junior-college-mathematics scholarship the women rank higher than the men, while in senior-college-mathematics scholarship the men rank higher than the women.

The men are 82% as variable as the women in Junior-college Mathematics, and 27% as variable as women in senior college

9 A. H. McPhail. The Intelligence of College Students. Warwick & York. 1924. pp. 146.

10 Elizabeth Higgins. Study of the Achievement and Related Factors of Mathematics Majors at Indiana State Teachers College for the years 1926 - 1932. Contributions of the Graduate School Indiana State Teachers College. Number 76, 1932.

mathematics.

Of the mathematics majors who majored in some other subject also,it was found that more of them selected physics as their second major than any other subject.

The men and women combined ranked higher in their second-major scholarship than in mathematics scholarship.

The men ranked higher than the women in both mathematics and second-major scholarship.

The men ranked higher than the women in science scholarship

The women ranked higher than the men in social-science scholarship.

The men ranken higher than the women in professional-subjects scholarship.

The men and women combined in the science group ranked higher than the other second-major groups in both mathematics scholarship and second-major scholarship.There was also a closer correlation between the mathematics scholarship and the second-major scholarship in this group than in the case of the other groups.

This would seem to indicate that the group who select science as a major are better students than those who select other subjects as a second major,also that science fits in with mathematics better than do the other subjects.

In the Indiana Study if was found that more second majors selected science for the second major than any other subject. In most of the combinations the women ranked higher than the men.[11]

11 Elizabeth Higgins.Study of the Achievement and Related Factors of Mathematics Majors at Indiana State Teachers College for the Years 1926-32. Contributions of the Graduate School Indiana State Teachers College.Number 76,1932.

The number in the Emporia-freshman test group was too small for drawing any general conclusions.However,the women ranked higher than the men in the freshman tests and the men ranked higher than the women in mathematics scholarship.

In the age groups is was found that in the group under the average age of 26.5,the men ranked higher than the women in mathematics scholarship while of those over the average age the women ranked higher than the men.

Taking the age groups 20-24, 25-29 and 30-39, the men ranked higher than the women in the 20-24 group but the women ranked higher than the men in each of the other age groups.

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