# ACHIEVEMABN OF THE MATHEMATICS MAJORS OF THE KANSAS 

 STATE TEACHERS OOLTEGE OF ERPORIA FOR THE YAARS 1917-1932
## A THECIS

SUBUITTED TO THE DEPARTMENT OF
MATHEMATICS AND THR GRADUATE COUNCIL OF THR KANSAS ERATE TEACHERS COLIEGZ OF EMPORIA IN PARTIAL FULFILJMGNI OF THE REQUIRPMTHNS FOR THE DEGREE OF MASTER OF SGIENCE

## By

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Approved for the Major Department



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## CHAPTER I

## I NIPRODUCTION

The main object of thio investigation was to make a study of the mathematica majors of the Kansar state Teachers College of Bmoria, for the years 1917 to 1932 inclusive, to determine what relationg, if any,exist between the grades made in mathematice and the grades made in various combinatione of college courses, and the effect of age on the grades made in mathematics.

A somewhat similar study was made of the majors in mathematios of the Indiana State Teachers College for the years 1927 to 1932 inclusive, by Hizabeth Higeins. As far as posaible the general outline of this study follown that made by filzabeth Higgins. This makes it possible to oompare 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 Fmporia,for the purpose of disoovering what relationship,if any, exists between the mathematice scholarship,general scholarship, second-major scholarship,intelligence teats, different college groupe and various age groups. Soholarship as used in this study in measured by the school grades. The study is divided into the following headinga: 1. Comparison of general soholarship and mathematics scholarship. 2. Comparis on of academio-mathemation scholarship and profesional. mathematice scholarship
3. Comparison of Junior-oollegemathematios soholarship and eenior-
college-mathematica scholarship.
4. Comparison of mathematics scholarship and scholarship in other majors.
5. Comparis on of intelligence percentiles and mathematios soholarship.
6. A atudy of the effect of age on mathematios scholarship.

GHAPTIR II
GENERAL PROCEDURE
Colleation of Data
The data for this atudy were secured by analyaing 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 etudent majoring in mathematios. 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 $A^{\prime} \mathrm{s}, \mathrm{Bi} \mathrm{s}, \mathrm{G}^{\prime} \mathrm{s}, \mathrm{D}^{\prime} \mathrm{s}$, and F'g for each student had been grouped as shown in this illustration, the sholarship indices were figured(the method used will be explained on $p$ l The students were then listed in order and each given his or her scholarship indioes thus:

| So | Sex | Age | Prof. <br> Math. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| 60 | Acad. |  |  |
| Math. |  |  |  |

Hethod of Caloulating Indioes
the soholarehip index is the ratio between the sohool
grades and the oollege houre and wea found ae followm
The erading ayotem in operation in the Kanone state Tenoh ers College of mporia usee the letcers $A, B, C, D, F$. In fieuing the scholarehip index of a $\begin{gathered}\text { a } u \text { dent the number of hours }\end{gathered}$ of A"m earned wa multiplied by 4 , the houra of $\mathrm{B}^{\prime}$ g by 3 , the hours
 a 0 . These producte were added and the aum divided by the product ecured by multiplying the number of college houre by 4 .

This method can be $111 u e t r a t e d$ by figuring the index for the profecolonalmathematios aholarmip of the atudent ${ }^{\prime}$ record listed above. Thic is the method:

$$
\begin{aligned}
& 4 \times 2 \text { (the houre of } A^{\prime \prime} \mathrm{s} \text { ) }=8 \\
& 3 \times 4 \text { (the hourd of } B^{\prime} E \text { ) }=12 \\
& 2 \times 4 \text { (the hours of Cley }=8 \\
& 1 \times 2 \text { (the hours of } \mathrm{D}^{\prime} \mathrm{e} \text { ) }=3
\end{aligned}
$$

The total number of college hourt in lewhioh multiple ied by 4 given 48. Thin would represent perfeot goore.the acholarbhip is therefore 30 divided by 48 or 62. 50.

Arrangment and Numbering of Casea
The mathematioa majors,130 in all, were arranged in order and each one given a eerial number. These numbers were placed in
arithmetical order with each student's data listed after his or her number. The 49 men atudenta 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 formula a used are listed below:

1. Standard Deviation. (S.D. or ), wan used in connection with all of the general tables. Then formula used tow that purpose was

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

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

$$
M_{x}=\frac{\sum X}{N}
$$

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 ia the well known Pearson product-moment formula: $\begin{array}{r}\frac{\sum X^{\prime} y^{\prime}}{N}-C_{x} C_{y} \\ \sigma_{x} \sigma_{y}\end{array}$
4. Probable Tron. (P.T.), was used in connection with the standard deviationgerithmetic means and coefficient of correlation except in casern where the number of individuals involved in the comparison war leas than 25 in which case the probable error was not considered. Garrett ${ }^{1}$ states that the reliability of the
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 lesa 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:

$$
\begin{aligned}
& P_{1} E_{. M}=.6745 \frac{S . D}{\sqrt{N}} \\
& P_{1} E_{\text {SD }}=.6745 \frac{S . D}{\sqrt{2 N}} \\
& P_{1} E_{. M}=.6745 \frac{\left(1-m^{2}\right)}{\sqrt{N}}
\end{aligned}
$$

5. Probable Error of the Difference. ( P.EA. 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 thin formula was used:

$$
P_{1} E_{1} d_{f f}=\sqrt{\left(P \cdot E_{m}\right)^{2}+\left(P \cdot E_{m_{2}}\right)^{2}-2 \sim\left(P E_{m}\right)\left(P \cdot E_{m_{2}}\right)}
$$

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

$$
P_{1} E_{. \text {diff }=}^{\left(P \cdot E_{m_{1}}\right)^{2}+\left(P . E_{m_{2}}\right)^{2}}
$$

If the two groups are uncorrelated $r \quad 0$ and the third terra under the radical becomes zero and disappears. that then elves the foregoing formula.

In case comparison e were made between coefficient of correlation the formula became:

$$
P_{1} E_{d / f}=\sqrt{\left(P \cdot E_{r_{1}}\right)^{2}+\left(P_{1} E_{r_{2}}\right)^{2}}
$$

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

$$
V=\frac{5 . D \times 100}{M}
$$

## CHAPTDR III

COMPARISON OF GHNERAL SCHOL AFSHIP AND MATHEMATICS SOHOT AREHIP

Presentation of Material
Table $I$ gives a comparison of the general-sohalarship and mathematics-acholarship indioes of the mathematice majors. The table gives the data for 49 men and 81 women students, a total of 130. The data given oonsists of each atudent e eerial number, sex, general-scholarship index and mathemati os-scholarship index.

## Results of Caloulations

Table 1 which contains all of the cases included in this study shows that:
(1) The range of the general soholarehip indices was 47.81, of the mathematios indices 58. 34.
(2) The highest general-scholarship index,97.81, was made by a man, student number 14.
(3) The lowest general-acholarship index, 50.00, was made by a man, student number 26.
(4) The highest mathemetioa-scholarship index, 100.00, was made by five men and five women, atudent numbers $14,19,49$, 123, 129, 21, 27, 74, 102, 108.
(5) The lowest mathemation wcholnrship index,41.66, was made by a woman, student number 115.

$$
\text { MABIE } 1
$$

TABIW GHOWING GFNERAL-ECHOLARGHIP INDICBS AND MATHFMATICSSGHOTARSHIP INDICHE OF MATHMMATICS MAJORG

| Student | Sex | General Sohol. <br> Index | Math. Sohol. <br> Index |
| :--- | :--- | :--- | :--- |
| 3 | $M$ | 53.92 | 59.37 |
| 7 | $M$ | 76.31 | 78.40 |

Table 1 （continued）

| Student | gex | $\begin{aligned} & \text { General Gohol. } \\ & \text { Index } \end{aligned}$ | Math．Schol． Index |
| :---: | :---: | :---: | :---: |
| 8 | 4 | 78.74 | 71．42 |
| 11 | 臨 | 85.34 | 86.90 |
| 14 | H | 97.81 | 100.00 |
| 18 | 迷 | 60.89 | 59．72 |
| 19 | H | 81.91 | 100.00 |
| 20 | H | 78.53 | 85.00 |
| 22 | H | 58.59 | 86.90 |
| 26 | W | 50.00 | 42.10 |
| 28 | M | 79.30 | 84.09 |
| 29 | 3 | 61.68 | 77.77 |
| 31 | M | 65．96 | 85.00 |
| 34 | 遃 | 67.22 | 73.61 |
| 35 | H | 67.35 | 76.92 |
| 37 | 近 | 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 | 3 | 77.31 | 85.71 |
| 47 | H | 65.25 | 50.00 |
| 48 | M | 79.62 | 68.42 |
| 49 | M | 93.40 | 100.00 |
| 53 | \％ | 85.33 | 96.66 |
| 54 | M | 69.17 | 93.18 |
| 61 | M | 70.35 | 85.00 |
| 62 | H | 79.70 | 92．50 |
| 66 | 3 | 87.00 | 80.43 |
| 67 | H | 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 | H | 61．97 | 70.83 |
| 93 | M | 72.13 | 91.12 |
| 96 | 3 | 65.51 | 57.95 |
| 104 | M | 58.09 | 44.00 |
| 106 | u | 84.17 | 94.56 |
| 107 | 3 | 85.64 | 78.00 |
| 111 | 1 | 77.10 | 72.22 |
| 112 | 1 | 88.40 | 91.66 |
| 119 | M | 77.60 | 96.66 |
| 120 | T | 77．56 | 91.07 |

Table 2 (continued)

| Student | Sex | General schol. | Mathaschol. |
| :---: | :---: | :---: | :---: |
|  |  | Index | Index |
| 123 | M | 95.00 | 100.00 |
| 124 | M | 64.74 | 91.66 |
| 128 | M | 79.21 | 78.40 |
| 129 | H | 95.64 | 100.00 |
| 1 | w | 62.03 | 70.23 |
| 2 | V | 78.91 | 90.17 |
| 4 | W | 75.35 | 90.21 |
| 5 | W | 55.45 | 75.00 |
| 6 | W | 88.03 | 76.92 |
| 9 | V | 64.12 | 75.00 |
| 10 | 唖 | 70.56 | 94.56 |
| 12 | W | 77.87 | 69.04 |
| 13 | W | 65.17 | 72.16 |
| 15 | W | 86.59 | 88.88 |
| 16 | \% | 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 |
| 26 | 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 | 7 | 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 | 7 | 90.90 | 93.47 |
| 58 | W | 73.85 | 86.17 |
| 59 | W | 85.40 | 86.95 |
| 60 | W | 68.0 告 | 81.25 |
| 63 | W | 66.81 | 91.66 |
| 64 | V | 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 | gex | General Schol. Index | $\begin{aligned} & \text { Math Sohol. } \\ & \text { Indeg } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 70 | W | 59.90 | 76.08 |
| 71 | W | 85.94 | 95.23 |
| 72 | W | 80.55 | 73.84 |
| 73 | V | 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 | V | 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 | V | 69.04 | 77.17 |
| 92 | \% | 75.46 | 63.46 |
| 94 | \% | 85.22 | 86.95 |
| 95 | V | 78.64 | 90.47 |
| 97 | W | 79.94 | 92.70 |
| 98 | W | 71.71 | 80.64 |
| 99 | W | 66.53 | 60.86 |
| 100 | \% | 80.57 | 90.38 |
| 101 | 网 | 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 | 47.32 |
| 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 | 81.69 |
| 117 | $V$ | 73.49 | 90.17 |
| 318 | W | 77.66 | 96.73 |
| 121 | W | 88.14 | 97.32 |
| 122 | V | 83.25 | $83.3{ }^{3}$ |
| 185 | V | 68.00 | 92.50 |
| 126 | \% | 73.23 | 75.22 |
| 127 | W | 82.42 | 93.75 |
| 130 | $\vartheta$ | 86.52 | 95.58 |

Read table thus: Column $I_{s}$ student's eerial number; Column II, Gex; Column III, General scholerahip index; Column IV, Mathematios scholarship index.

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

## TABLE 2

mban and gtandard deviation of Mathelatios MAJORS IN MATHEMATICE ECHOLARGHIP AND IN GBNBRAL SCHOLARSHIP

| Group and Measure | General schol. | Math. Schol. |
| :---: | :---: | :---: |
| Men students <br> Mean and P.E. <br> S.D. and P.E. | $\begin{aligned} & 74.91 \pm .98 \\ & 13.18 \pm .89 \\ & \hline \end{aligned}$ | $\begin{aligned} & 81.25 \pm 1.17 \\ & 12.20 \pm .83 \\ & \hline \end{aligned}$ |
| Women students <br> Mean and P.B. <br> S. D. and P. F. | $\begin{aligned} & 73.38 \pm .78 \\ & 10.40 \pm .55 \\ & \hline \end{aligned}$ | $\begin{aligned} & 80.90 \pm 1.16 \\ & 15.55 \pm .82 \\ & \hline \end{aligned}$ |
| Wen and women <br> Mean and P. F. <br> B.D. and P.E. | $\begin{aligned} & 73.95 \pm .68 \\ & 17.60 \pm .48 \end{aligned}$ | $\begin{aligned} & 81.21 \pm .92 \\ & 15.61 \pm .65 \\ & \hline \end{aligned}$ |

Fead table thus: The mean for the men studenta in general scholarship is 74.91 with a probable error of 98, in mathematios scholarEhip the mean is 81.25 with a probable error of 1.17 . The standard deviation for the men etudenta in general acholarehip is 23.18 with a probable error of 89, in mathematica acholarship the mean deviation is 12. 20 with a probable exror of 83.

Table 3 gives the coefficient of correlation between seneral acholarship and mathematio acholarship for the men students, the women atudents, snd for the men and women students combined.

## TABLE 3

 AND MATHEMATICS EOHOLAREHTP

|  | r（gen．math．） | P．E．r |
| :--- | :---: | :---: |
|  | .730 | .045 |
| Women | .506 | .055 |
| Wen and Women Combined | .563 | .040 |

Nead table thus：The ooefficient of correlation between general scholarship and mathematios soholarahip for the men otudents is .730 with a probable error of ．045．

## Analysis of Resulte and Conclusion

1．Centrel Tendency－Feferring to Table 2 it will be noticed that there iq a difference between the mean of the general soholarship and the mean of the mathematioe soholarship for any particular group of atudenta．For example，the mean of the general acholarship for the men studente is 74.91 while the mean of the mathemetice scholarship for the men etudenta is 81．25．The difference between the two ig 6．34．Table 4 is a study of the reliability of thia difference．

## TABL形 4

HELIABILITY OF THE DI BYERENCE BRTMESN GDNERAL SCHOLARGHIP AND MATHBMATICS SCHOLARSHIP OE MATHEMATICS MAJORS

| Mean Gen．Schol． | Hean Math．Sonol． | Difit． | Pevor | P．E．diff | $\begin{aligned} & \text { aign } \\ & \text { Ratio } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Men $74.91 \pm 98$ | 81．25 21.17 | 6.34 |  | .80 | 7.92 |
| Women 73．38土．78 | $80.90 \pm 2.16$ | 7．52 | Wath． | 1.02 | 7.37 |
| M．8．7．75．95士．68 | 81．21 $\pm .92$ | 5.86 | Math． | .78 | 6.74 |

Gead table thus the mean for the men otudente in general bcholarahip is 74.91 with a P．Fi of． 98 ，the mean for the Math．Schoz．is 81.25 with a E．E．of 1.17 ，the diff．is 6.34 in favor of Math．Pg diff． 80 sign ratio ia 7．92．

In Table 4 the difference between the mean of the general scholardaip for the men otudents.6.34, when divided by
 According to Garrett ${ }^{2}$ a bignificant ratio of four or over indicatea complete reliability.

In each of the cases given in Table 4, the gignifioant ratio is greater than four, hence it is safe to conclude that the mathematica scholarship of the mathematice majore of the Kanaas State Teachers College of mporia $k$ higher than their general acholarship. Thia conclusion is exactly opposite to that found in a similar study of the mathematice majors of the Indiana state Teachers College by Elizabeth Hiesine ${ }^{3}$.
2. Variability. Table 5 Efves the coefficient of
variation of the men studente, the women stidente and the men and women students combined in general soholarship and in mathematica ocholarehip.

## TABIE 5

COEFPICIENI OF VARIATION IN GENERAL SCHOLARSHIP AND MATHEMATIOS SMOLARSHIP.

|  |  |
| :--- | :---: | :---: | :---: |
|  |  |

Read table thumsthe coefficient of V. for the men btudente in Gen.


2 H. E. Garrett. Btgtictios in payohology and Iducatione
Longmans Green Company. 1926.pp.133-135.
3. Blizabeth Higejne. Study of the Achievement and Relpted Factors
of Mathematios Majorgat Indiana State Tenchers Coliege for the
Years 1926-1932. Contributiona of the Graduate School Indiana state Teachers Col lege. Number 76.1932. pp.17.

The figures show that the men are more variable in general scholarship than in mathematios eoholarehip, while the women are more variable in mathematice soholarship than in general acholarship.

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 mathemation acholarehip 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 acholarship. In the same way it is found that the women are $73 \%$ as variable in general soholarship as in mathematios soholarship, while the men and women combined are $81 \%$ as variable in general scholarship as in mathematice soholarship.

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 acholarship and $78 \%$ as variable in mathematics scholarship.
3. Correlation. - The coerficient of correlation between Eeneral scholarship and mathematios soholarship 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 coerficient of correlation plus four times itb probable error and the obtained coefticient and minus four times its probable error. That is the true coefficient for the men students 1 iea somewhere between $.910,(.730+4 \times .04$ E) and . 550.(.730-4×.045). Likewige the true coefficient of correlation for the women students lies somewhere between .726, (.506 $+4 X .055$ )
 for the men and women studenta combined lies somewhere between $.723,(.563+4 \times .040)$ and $.403,(.563-4 \times .040)$.

These figures indioate that there io aloge relationship exiditag between general scholarthip and mathematioe scholarbhip. According to Gerrett ${ }^{4}$ the coefficient of correlation of. 730 for the men students mould be classed $e s h i g h$ and the coeffioient of correlation for the wornen atudenta of . 506 would be olassed as marked.
4. Sex Differences.-Table 6 show the difference in central tendenoy between the men and women students in general scholarship and mathematios aholarehip.

TABTif 6
HBASURES OM RELIABILITY OF THE DIFERRENCES BET WQES MEN AND WOMBN IN GBNERAL AND MEATHMATICS SOHOLARSHIP

|  | Mean of men | Mean of women | Ditf. | $\begin{aligned} & D: E . \\ & D i f . \end{aligned}$ | $\begin{aligned} & \text { aicn } \\ & \text { Ratio } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| General schol. | $74.91 \pm .98$ | $73.38 \pm .68$ | .53 | 1.19 | . 44 |
| Exath. Schol. | $81.25 \pm 1.17$ | $81.21 \pm .92$ | . 04 | 1.48 | . 02 |

Fead table thus the mean general soholarahip for the men 1B 74.91



In the gage of generalacholarahip the mean for the men Wan 74.9 with a probable errox of. 88. Ine mean for the women was 73.38 with a probable error of 6 . G . The difference of 53 wab in finvor of the men. The D. D . differemae wan 1.19 and the significant
 in mathematice soholarehip was. O4 in favor of the men and the Gienificant ratio was.02, The algnificant ratio is neither ogee 4.H. E. Garrett. Statistics in Psychology and Education. Longmans Green Company.1926.pp.298.
gignificant 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 Hepresentation of the General Giholarentp Indioes and Mathematios Scholarshin Indices.- The formulas in which the etandard deviation ( $B . D$. ) is made use of impli es that the curve be nomal. However, in many casee, it is found that the curve is skewed. Rugg ${ }^{5}$ atater that in the ase of a bkwed ourve, the measures included in a unit distence on the scale can be atated only approximately.

Figure I end II show the distribution of the generalw scholarship indices and the mathenatics-echolarship indices respeatively. In each graph the red line shows the distribution for the men atudents, the ereen line fox the women atudents, and the blue line for the men and women oombined.

It will be notioed in Hegure $I$ for the general scholarEhip that the three curyea are quite regular, but in Figure II for the mathematios acholarship the three ourves are badly gkew.

Therefore, when formules are uad, involving the otandard deviation of mathematiog goholership, the resulte obtained cen not be relied on completely.


Legend: Men Women M. M. W.
Figure $I_{\text {. }}$ - Diatribution of General-Scholarship Indices.


Legend:
Hen $\qquad$ Women
M. \& . W.

Bigure II.- Distribution of Mathematice-Scholarship Indices.

## CHAPTER IV

COMPARISON OF AQADHMIC-MATHEMATIOS SCHOTAREFIP AND PROFRESIONAL-MATHEMATIOS GOHOLARSHID

Presentation of Material
This ohapter contains a compariaon of academic-mathematics scholarship and professional-mathematics soholarship, as indicated by marks given by instructore.

The professional-mathematios coursea, as here considered, consiat of all practice-teaching courses in mathematics and all mathematics courses that can be olaseed as method courses. All other mathematios courses not included in the professionalmathematics classification are considered as belonging to the academic-mathematios clasalfication.

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

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

TABLE 7
TABLE SHOWING ACADEMIC MATHWMATICS SGHOLAREHID
INDICES AND PROHESSIONAL WATHEMATICS
INDICEE

| Student | Sex | Aoad.Math. <br> Index | Profolath. <br> Index |
| :--- | :---: | :---: | :---: |
| 3 | $M$ | 59.37 | 50.00 |
| 8 | $M$ | 81.42 | 83.33 |
| 11 | $M$ | 100.90 | 100.00 |
| 14 | $M$ | 59.72 | 54.16 |

Table 7 (continued)

| student | Sex | Acad. Math. Index | $\begin{aligned} & \text { Prof Math } \\ & \text { Index } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 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 | H | 96.66 | 100.00 |
| 54 | M | 93.10 | 90.00 |
| 61 | N | 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 | H | 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 | V/ | 70.23 | 60.00 |
| 2 | W | 90.17 | 75.00 |
| 4 | V | 90.21 | 80.00 |
| 5 | W | 75.00 | 64.28 |

Table 7 (continued)

| Student | Sex | Acad. Math. Index | $\begin{aligned} & \text { Prof.Math. } \\ & \text { Index } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 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 | \% | 93.18 | 83.33 |
| 32 | w | 50.00 | 75.00 |
| 33 | W | 84.37 | 62.50 |
| 36 | W | 59.09 | 81.25 |
| 40 | 奖 | 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 | $55.001:$ |
| 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 | 50.09 |
| 69 | W | 89.29 | 84.00 |
| 70 | W | 76.08 | 75.00 |
| 71 | ${ }^{\text {Y }}$ | 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 | W7 | 84.77 | 75.00 |

Table 7 (oontinued)

| Student | $\operatorname{sex}$ | $\begin{aligned} & \text { Aoad.Math. } \\ & \text { Index } \end{aligned}$ | 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 | \% | 63.46 | 75.00 |
| 94 | W | 86.95 | 75.00 |
| 95 | W | 90.47 | 87.50 |
| 97 | W | 92.70 | 87.50 |
| 98 | \% | 80.64 | 81.25 |
| 99 | W | 60.68 | 75.00 |
| 100 | $1 /$ | 90.38 | 100.00 |
| 1.01 | 景 | 96.41 | 100.00 |
| 102 | W | 100.00 | 83.33 |
| 103 | Y | 94.73 | 100.00 |
| 105 | W | 65.78 | 50.00 |
| 108 | V | 100.00 | 100.00 |
| 109 | \% | 47.82 | 62.50 |
| 110 | 誛 | 71.25 | 87.50 |
| 113 | W | 79.00 | 75.00 |
| 114 | W | 95.00 | 100.00 |
| 115 | W | 41.66 | 50.00 |
| 116 | \% | 81.89 | 90.00 |
| 117 | W | 90.17 | 81.25 |
| 118 | W | 96.73 | 93.95 |
| 121 | W | 97.32 | 90.90 |
| 122 | V | 83.33 | 85.71 |
| 125 | W | 92. 50 | 68.75 |
| 126 | W | 75.22 | 100.00 |
| 127 | "1 | 93.75 | 100.00 |
| 130 | W | 95.37 | 69.37 |

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

Table 8 gives the arithmetio means and standard deviation of the academicmathematics-scholarship indioes for the men students, for the women students and for the men and women students combined.

MEANS AND GTANDARD DEVIATION OF MLATHEMATICS MAJORE IN AOADEMIC-MATHEPATICG SCHOI, ARSHIP AND PROHESSIONALMATHEMATICG GOHOLARSHIP

| Group and Measure | Academic Math. Gchol. | Prof. Math. Sohol. |
| :---: | :---: | :---: |
| Men Studento |  |  |
| Mean and P.E. | $81.58 \pm 1.58$ | $80.19 \pm 1.16$ |
| S.D. and P.E. | $15.63 \pm 1.11$ | $17.80 \pm 1.26$ |
| Women Students |  |  |
| Mean and P.E. | $81.19 \pm .85$ | $78.25 \pm 1.26$ |
| S.D. and P.E. | $11.38 \pm .60$ | $16.80 \pm .89$ |
| Men and Women |  |  |
| Mean and P.E. | $81.34 \pm .97$ | $78.94 \pm 1.05$ |
| S. D. and P.E. | $16.23 \pm .69$ | $17.65 \pm .76$ |

Read table thus: The mean for the men students in academicm mathematics soholarship is 81.58 with a probable error of 1. 58,in professional-mathematics coholarship 80.19 with a probable error of 1.16. The atandard deviation for the men studente in academicurathematice scholarehip 1815.63 with a probable error of l.11, in professional-mathematios scholarship 17.80 with a probable error of 1.26.

Table 9 gives the coefficient of correlation between academíc-mathematios soholarehip and profeseional-mathemation scholarship, for the men gtudents, for the women students and for the men and women students oombined.

TABI画 9
COMPFIOIENT OF CORPDIATION IN ACADEIIOMMTHEMATICS SOHOLARSHIP AND PROELSSIONAI-MATHESATI CS SCHOT AREHIP

|  | r (acad. $)($ prof. $)$ | P. A .r |
| :---: | :---: | :---: |
| Men | 7374 | . 086 |
| Women | . 595 | .048 |
| Men and Women Combined | . 516 | .004 |

Read table thus:The coefficient of correlation, for the men etudents, between the academi c-mathematics scholarship and profeseional-mathematios sholarshíp is. 374 with a probable error of. 086.

Analysis of Results and Conolusion
1.-Central Tendency - Table 10 ghows the reliability of the difference between academic-mathematios acholarghip and professional-mathematice scholarship for the men studente, the women students and the men and women students combined.

TABIE 10
REITABITITY OT THE DIFBTRENCE BBTWEEN ACADEPAC-MATHEMATICS


SCHOTARRSHIP

|  | Hean Acad. Math. | $\begin{aligned} & \text { Mean. Prof. } \\ & \text { Math. } \end{aligned}$ | Diff. | Favor | $\begin{aligned} & \text { R. }{ }^{2} \text {. } \\ & \text { Diffe } \end{aligned}$ | Sign <br> Ratio |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Men | 81.58 51.57 | $80.19 \pm 1.16$ | 1.39 | Acad. | 1.55 | .89 |
| Women | $81.19 \pm .85$ | $78.25 \pm 1.26$ | 2.94 | Acad. | 1.01. | 2.91 |
| 桩, \& | $81.34 \pm .97$ | $78.94 \pm 1.05$ | 2.40 | Acad. | . 98 | 2.45 |

Fead table thus: The mean for the men students in acedemicm mothematios scholarship is 81.58 with a probable error of 1.57, in profeesional-mathematice scholarahip 80.19 with a probable error of 1.16. The difference 1 s 1.39 in favor of the academio-mathematiog acholarahp. The probable error aifference is 1.55 and the sign ratio is. 89.

Since the aignificant ratio in each case is lear than four, the difference between the mean-acedemic-mathematica soholarship and the mean-profeseional-methematios soholarship is not entirely reliable. The significant ratio. 89 of the men students, according to Garrett's Table ${ }^{6}$ indioates about 73 chanoes in 100 of a true difference greater thar zero and the Eignificant ratio 2.91 of the women studente indiaster about 97 ohances in 100 of a true differenoe greater than zero while

6 H. ${ }^{\text {Garrett. Statistics in Pgyohology and Hducation. }}$ Longmans Green Company.1926. pp 135.
the aignifioant ratio of the men and women students combined, 2.45, indiates about 95 chances in 100 of a true difference greater than zero.
2. Variability.- Table 11 gives the coefficient of variability of the men students, the women studenti, and the men and women students combined in academicmathematics scholarship and professionalmathematice scholarship.

TABIE 21
COHFPICIEMT OF VARIATION IN AOADEMIC-MATHEMATIOS AND PROEHS GIONAL MATHEMATICS SCHOI ARSHIP

|  | Acad.Math. <br> Schoi. | Prof.Math. <br> Scho1. | 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 vaxiation of the men in academio-mathematics scholarship is 19.15,1n professionalmathematios acholarm ship 22.19 with a ratio of variation of $86 \%$.

The table shows that both men and women are more variable in professionalmathematios cholarship than in aoad-emic-mathematics acholarship.

The ratio of variation obtained by dividing the coeffiolent of variation of one by the coefficient of variation of the other show that the men are $86 \%$ ag variable in academicmathematics soholarship as they are in professional-mathematios scholarahip. The women are $65 \%$ ar variable in academio-mathematics soholarship as they are in profegsional-mathematios soholarghip and the men and women combined are $89 \%$ ag variable. In comparing the men and women together the men are $136 \%$ as variable as the women in academio-mathemation oholarahip and 103\% as Variable in professionalmathematics scholarship.
3. Correlation.- The ooeffioient of correlation between academic-mathematics scholarship and profeseionalmathemation scholarship (see Table 9) for men studenta is .374 with a probable error of .086. The true coefficient of correlation lies somewhere between $.718,(.374+4 \times .086)$ and .030 , (.374-4 $\times .086$ ). The true ooefficient of correlation for the women lies between .787, (.595 + 4 X.048) and .403, (.595-4X.048). The true coefficient of correlation for the men and women combined lies between. 532, (.516 $+4 \times .004$ ) and .500, (.516-4 $\times .004$ ).

The coefficient of correlation of the men atudents of . .374 shows that the relationship between the academic-mathematice echolarship and professtonal-mathematios scholarehip is Blighe. The relationohip in the oase of the women ia marked. Wh th the men and women combined it is also marked.
4. Dex Differencee.- Table 12 showe the difference in central tendency between the men and women etudents in academiomathematice acholarghip end professional-mathematios acholarehip.

## TABLE 12

MEASURE OF THE RELIABLITY OF THE DTFTERENOE BETSEEN MEN AND WOMIN IN ACADEMIC-MATHTMATICB GQHOLARSHIP AND PROHESSIONAL MATHDAATICS SCHOLARSHIE

|  | $\begin{aligned} & \text { Mean of } \\ & \text { Men } \end{aligned}$ | Mean of Women | Diff. | Favor | $\begin{aligned} & \mathrm{P} . \mathrm{E} . \\ & \mathrm{DIf} . \end{aligned}$ | $\begin{aligned} & \text { Sign } \\ & \text { Ratio } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Acad. Math. Schol. | $81.50 \pm 1.57$ | $81.19 \pm .85$ | . 39 | Men | 1.17 | . 33 |
| Prof.Math, Schol. | $80.19 \pm 1.16$ | $78.94 \pm 1.25$ | 1.25 | Men | 1.56 | 80 |

Read table thus: The mean for the men in academic-mathematios echolarship is 81,58 with a probable orror of 1.57, for the women in aoademic-mathematios echolarship ia am. 19 with a probable error of 85 .The difference, 39 , is in favor of the men. The probable error differenoe is 1.17. The gign ratio is. 33.

In the case of the aondemiomathemation scholarship the mean for the men was 81.58 with a probable error of $1.5 \%$.

The mean for the women was 81.19 with probable error of 85. The difference of 39 was in favor of the men.In profesaionalmathematios soholarehip there was a diference of 1.25 in favor of the men. The aignificant ratio in neither came is large enough to assure complete reliability. In academicmathematios scholarship the ratio indicater about 59 chances in 100 of a true difference greater than zero, and in profesejonal-mathematios scholarship the ratio indicates ebout 71 oknaces in 100 of a true difference greater than zero.
5. Graphical Representation of Academic-Mathematice Scholarship and Profesgional-Mathemptics Soholarshie- Figuree III and IV give a graphical dietribution of the academicmath-ematios-scholarehip indices. the red ifne represents the men etudents, the green Iine the women students and the blue if ne both the men and women atudents.

The ourven in each case are skewed, eapecially those in Hgure III. This fact should therefore be kept in mind in any data given in Chapter IV in which the etandard deviation is considered.


Legend:
Men
Bigure III.-Distribution of Academic-Mathemation Scholarship.


Legend:
Men Tromen
M. R. W.
$\begin{aligned} & \text { Figure IV. - } \text { Distribution of Profeseional-Mathematios Schol- } \\ & \text { arship. }\end{aligned}$

COMPARESON OF JUNIOR-OOTHCTDMATHEMATIGS SOHOTAREHIP AND GENIOR-GOILEGE-HATHETATIOS SOHOL, ARGHIP

## Presentation of Material

This chapter compares junior-college-mathematica scholarship and senior-collegemathematica acholarahizas indicated by the marks given by the instructors.

In this part only the academic-mathemation coursea are conaidered. In dividing the mathematios courges into junior-college mathemation and enior-college mathematios, plane analytio geometry and all mathemation couraea below it In clapsification were considered an belongine to the jundorcollege group while all mathemation courses with a olassification above planemanalytic geometry were placed in the seniorcollege group.

There are 42 men and 80 womena totnl of 122 included in this part of the stady

Table 13 givea a onparison of the funior-oollege mathemetios-scholarship indioes and the senior-colleze mathemat-ice-eoholarship indicess The table gives the serial number, sex, junior-college-mathematiog-E cholarehip indices and the senior-college-mathemation-acholareht pindicea of the atudenta.

TABLE 13
TABIH SHOWING JUNIOR-COLTEGE-HATHEMSTICS-GCHOLARSHID INDIOES AND SENIOR-COIJTHG-HATHEMATICSSCHOTaRRGITP I MDI CHES

| Student | Sex | Jumior-Col.基th. Gohol. | Genior-Col. Merthiohol |
| :---: | :---: | :---: | :---: |
| 7 | H | 85.00 | 64.28 |
| 11 | 15 | 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 | H | 81.23 | 62.50 |
| 37 | M | 87.50 | 85.71 |
| 38 | M | 93.33 | 100.00 |
| 39 | H | 94.23 | 93.75 |
| 41 | M | 86.37 | 75.00 |
| 43 | M | 65.38 | 53.57 |
| 44 | M | 83.75 | 89.28 |
| 45 | H | 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 | 近 | 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 | 75.0 ) | 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 | 7 | 69.23 | 100.00 |
| 10 | W | 97.05 | 87.50 |

Table 13 （oontinued）

| Student | Sex | Junior Col． Math．Schol． | Senior Col． Math．Schod． |
| :---: | :---: | :---: | :---: |
| 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 | \％ | 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 | 棋 | 90.62 | 100.00 |
| 32 | W | $50.0)$ | 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 | 毣 | 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 | 雨 | 80.76 | 92.50 |
| 74 | W | 100.01 | 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 | Ser | Junior Col. <br> Math. Echol. | Senior Col. Math. Schol |
| :---: | :---: | :---: | :---: |
| 87 | V | 100.00 | 88.62 |
| 88 | W | 81.81 | 75.00 |
| 89 | V | 91.66 | 50.00 |
| 92 | W | 52.50 | 100.00 |
| 94 | \% | 91.17 | 75.00 |
| 95 | T | 93.05 | 75.00 |
| 97 | W | 93.75 | 90.62 |
| 98 | W | 82.60 | 75.00 |
| 99 | W | 90.00 | 25.00 |
| 100 | 将 | 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 | WI | 77.27 | 85.71 |
| 117 | W | 88.33 | 92.30 |
| 11.8 | 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, Juni or Col. Hath. Schol. © Column IV, Senior Col. Math. Schol.

Table 14 giver the arithmetioal mean and standard deviation of the junior-college-mathematica-scholarghip indiaes and the senior-college-mathematice-scholarship indices, for the men students, the women studenta and for the men and women combined.

MEAN AND STANDARD DEVIATION OF MATHEBATICS IMAJORS IM JUNI OR－COILEGW－MATHEMATICS SCHOJARSHIP AND

SPITOR－COLLEGE－MATHENATICS SOHOXARSHID

| Group and Measure | Junior Col． Math。 | Seniar Col． Math． |
| :---: | :---: | :---: |
| Wen Students |  |  |
| Mean and P．${ }^{\text {H }}$ | 82． $60 \pm 1.23$ | $81.35 \pm 2.04$ |
| S．D．and P．E． | $11.90 \pm .87$ | $19.62 \pm 1.44$ |
| Women Students |  |  |
| Mean and P．T． | $83.23 \pm 1.07$ | $77.60 \pm 1.64$ |
| S．D．and P．E． | $14.27 \pm .76$ | $21.78 \pm 1.16$ |
| Men and Women Studenta |  |  |
| Mean and P．E． | $83.01 \pm .96$ | $78.89 \pm 1.37$ |
| S．D．and P．E． | $15.65 \pm .77$ | 32．38土．96 |

Read table thus：The mean for the men tudents in junior－college－ mathematics acholarship 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 atandard deviation for the men atudenta in Junior－college－mathematics scholarship is 11.90 with a probable error of 87 ，in senior－college－mathematios－scholarship 19.62 with a probable error of 1.44.

Table 15 gives the coefficient of correlation between Junior－collegemathematios acholarghip and senior－college－ mathematics scholarship，for the men atudents，for the women atudents and for the men and women otudentr combined．

## 策ABLill 15

OOHEFICIENT OF CORRFLATION IN JUNIOR－COITIGGH－RATHENATICS SCHOLARSHIP AND SENIOZ－COTIHGF－MATHEXATICS SCHOTAREHIP

|  | $r(\sqrt{r} \times 01).(8 r . c 01$. | P．E．$n$ |
| :---: | :---: | :---: |
| Men | ． 664 | ． 060 |
| Women | ． 462 | ． 059 |
| Men and Wornen | ． 645 | .035 |

Read table thus: The coefficient of correlation for the men students betwe en the junior-college-mathematios scholarship and seniar-college-mathematias soholarahipie. 664 with a probable error of .060 .

Analysis of Results and Conclusions

1. Central Tendency.- Table 16 show the reliability of the difference between junior-collegemathematios soholarship and senior-oollege-mathematics scholarship for the men students, the women students and the men and women students combined,

## TABI用 16

RELIABIIITY OF THE DIEBEREHCE BETYEEN JUNIOR-OOLTEGE-
 MATHHMATICS SCHOIJARSHIP

|  | $\begin{aligned} & \text { Mean Jr.Col. } \\ & \text { Math. } \end{aligned}$ | Mean Sr.Col. Math. | Diff. | Favor. | $\begin{aligned} & \text { P. F. } \\ & \text { Difi. } \end{aligned}$ | Sign <br> Ratio |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Men | $82.60 \pm 1.23$ | $81.35 \pm 2.04$ | 1.25 | Jr.CaI. | . 81 | . 60 |
| Women | $83.23 \pm 1.07$ | $77.60 \pm 1.64$ | 5.63 | Jr.Col. | . 57 | - 10 |
| M. \& . W. | $83.01 \pm .96$ | $78.89 \pm 1.37$ | 4.12 | Jr.Col. | .41 | . 09 |

Read table thus: The mean for the men atudenta in junior-college-mathematics scholarship is 82.60 with a probable error of l .23 , in senior-college-mathematios soholarghip 81. 35 with a probable error of 2.04 , the difference $1 日 1.25$ in favor of the junior college.The probable error difference is .8l and the sign ratio is. 60.

The aignificant ratio in each dase is lea than four
hence the difference between the mean-junior college-mathematics acholarship and the mean-aenior-college-mathematios acholarahip is not entirely reliable. The significant ratio of 60 for the men atudents indicates about 66 chances in 100 of a true difference greater than zero. The aignificant ratio for the men and women students combined, 09 , indicates about 53 chances in 100 of a true difference greater than zero.
2. Variabilityo- Table 17 gives the coefficient of variation for the men students, the women students and the men and women
students combined in the funior-college-mathematios eoholarehip and aenior-college-mathematice echolarehip.

## TABTLI 17

COEFFIGIENT OF VARIATION IN JUNIOR-COLLEGE-MATHENATICS GGHOLARSHIP AND SEMIOR-COLU FGEMATHBMATICS scholarship

|  | Jr.002. Matr. | Sr.Col. Math. | Ratio of Vari. |
| :---: | :---: | :---: | :---: |
| V. Men | 14.40 | 24.11 | 59\% |
| V. Women | 17.39 | 28.06 | 61\% |
| Y. Men and Women | 18.85 | 28.36 | 66\% |

Fead table thus: The coefficient of variation for the men students in junior-college-mathematics acholarship is 14.40, in senior-college-mathematics scholarship 24.11. The ratio of variation is $59 \%{ }^{\circ}$

The table shows a greater variation in the senior-oollege-mathematias scholarship than in the junior-collegemathematios scholarship in eaok 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 juniorm college-mathematice echolarship as in senior-college-mathematies soholarship.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 womenit is found that the men are $82 \%$ as variable as the women in Junior-aollege-mathematice scholarship and 27 䈍 as variable in senior-collegemathematios soholarehip.
3. Correlation.- The coefficient of correlation between Junior-college-mathematios acholarship for the men atudente is . 664 with a probable error of .060. (Table 15) The true coeffi-
olent of correlation must lie somewhere between $.804,(.664+4 \times .06)$ and .424, (.664-4×.060). The true coeffiolent of correlation for the momen students must lie between $.898,(.462+4 X .059)$ and $226,(.462-4 X, 590)$. The true coeffiaient of correlation for the men and women oombined liea gomewhere between. 785 , $(.645+4 \times .035)$ and $.505,(.645-4 \times .035)$. The limite 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 Mifferences. Table 18 shows the difference in central tendenay between the men and women studenta in juniorcollegemathemation scholarship and senior-collegemathematios ocholarehtp.

In junior-college-mathematics acholarehip, the mean for the men 1882.60 with a probable exror of $1.0 \%$. The difference of 63 im in favor of the wonen. In aenior-collegemathematios echolarship the mean for the men 1881.35 with 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.

## TABT 218

MEAEURE OF THE RELIABITINY OF THE DIFFERBNOE BETMEEN MBN AND WOMEN IN JUNIOR-COTHEGE-KATHEYATIOS SGHOTAREHIP AND SENIOR-GOLLEGH= MATHEMATIOS SOHOT,ARSHIP

|  | Mean of Men | Mean of the Women | Diff. | Favor | $\begin{aligned} & \text { P. } \mathrm{B} \\ & \mathrm{DH} \mathrm{ff} . \end{aligned}$ | SLEn <br> Ratio |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Jr.Col.Math. | $82.60 \pm 1.23$ | $83.23 \pm 1.07$ | . 63 | Women | .16 | .25 |
| Sr.Col.Math. | $81.35 \pm 2.04$ | $77.60 \pm 1.64$ | 3.75 | Men | . 40 | 810 |

Read table thus: The mean for the men in Junior-college mathemation 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.Ti.Diffis. 16, the aien ratio ie. . 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 mathematice the significant ratio of .10 indicates about 53 chances in 100 of a true difference greater than zero.
5.Graphical Representation of Junior-College-Mathematies Scholarship and Senior-College-Mathematics Scholarship.Figurea $V$ and VI give a graphical distribution of the Junior-college-mathematics-scholarship indices and the senior-college-nathematics-scholarship indices.The red line represente the men students, the green line the momen studenta, and the blue line the men and women students combined. The curve ineach case is badly Ekewed, hence the data in which the standard deviation for these comparisons are ueed can not be entirely relied on.


Legend:
Men $\qquad$ Women M. W. W.
Figure V.- Distribution of the Junior-College-Mathematice Scholarship.


Legend: Men Women M.\&.v.
Figure VI. - Distribution of the Senior-College-Mathematica Echolarehip.
 sCHOLARGHP IN ORHLR MAJORE

Presentation of Material
It was found in a number of cases that the student, in adoition to his mathematice major, had a second major in aome other subject.

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

This partioular division of the aubject will be given over to a study of these 40 aecond majors and the various eomparisons existing between them and their ooresponding mathematios major.

Table 19 givea liat of the different subjecte 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 subjeot.

As there were but 40 gtudents in all haviag a seoond major and as these 40 were diatributed over 15 different subjecte, the number selecting any one subject was necessarily mall. For this reason the subjects are grouped into four different divisions ad followe:

1. The first group 18 the saience group and is omposed of biology, agrioulture,physics and chemiatry.
2. The geoond group will be classed as the gocial soience group and is made up of history, social ogy, paychology nnd education
3. The third group consists of commerce,physioal eduoation, art, apeeoh and manual training. Thim group will henceforth we spoken of as the profersional group.
4. Fourth group composed of English and Latin.

##  IN othar ams thors

| nubjeot | Wen | Women | cotal |
| :---: | :---: | :---: | :---: |
|  | 9 | 2 | 11 |
| Hixatoxy | 1 | 6 | 7 |
| Trug 11 日h | 0 | 4 | 4 |
| 31010gy | 0 | 3 | 3 |
| Commerce | 0 | 3 | 3 |
| Feychology | 0 | 2 | s |
| Education | 1 | 1 | 2 |
| Etyedaal \%a. | 1 | 0 | 1 |
| Astioulture | 1 | 0 | 1 |
| Jatin | 0 | 1. | 1 |
| anemitatry | 1 | 0 | 1 |
| A2t | 0 | 1 | 1 |
| soololagy | 0 | 1 | 1 |
|  | 0 | 1 | 1 |
| Mantatana | 1. | 0 | 1 |

Read table thus: Column I, desienates the bubjectssColumn I I, the number of men gtudentes CoIumn III, the number of womer etudente; column IV, the total number of studente.

It will be noticed from rable 19 that out of the 25 combinations used in aeleoting a aeoond major, 22 made their selection from the three combinations, 解thematioemoience, mathemathes-himtory and mathemation-englith.There were ll gecond ratare or 27.50 of all found in the mathemtios-phybios group, 7 or $17.5 \%$ of all in the methemntlos-hietory group and 12.5 of all in the mathemstios-Einglich group. The others were eattered
over the remaining 12 aubjects with not more than 2 found in any one mubjeat. The fact that $27.5 \%$ of all the second majors were found in the mathemationmpates oombinetion would geem to indicate thet phymion in more ologely aseooiated with mathematioe than are the other mubjecta.

A separate table was made for each of the four groups and one for a comblnation of all four together. Theae tablen show the number, gex,mathematiogmboholarship index, and the second-mafor-scholarehip index for each mathematics major appearing In the partidular list.

Table 20 gives a comparizon of the mathematicsmoholarm whip indices and the acience-scholarship indioes.

TABLE 20
WABLE SHOWING MATHBMATIOSWMAJOR-BCTOLAREHTP INDTCEG AND SCIBNCH MAJOR SCHOLARGFIP INDICES

| student | gex | Bath. Sohol. Index | Ecience Schol. Index |
| :---: | :---: | :---: | :---: |
| 14 | M | 100.07 | 100.00 |
| 19 | M | 100.00 | 85.41 |
| 22 | M | 86.90 | 82.95 |
| 29 | 近 | 77.77 | 88.75 |
| 37 | 䞨 | 87.00 | 83.00 |
| 44 | M | 85.18 | 91.37 |
| 49 | N | 100.00 | 100.00 |
| 1.06 | M | 94.56 | 97.82 |
| 129 | H | 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 |

Head table thue Column I, indiames the students serial number; Column IJ, the sex; Column IXI, the mathematice-maholarehip inden; Column IV, the soienoe-soholarship index.

Table 21 give a comparian of the mathemationmsholm
arship indices and the cooial-soience-soholarohip indices. The
table gives the serial number，sex，mathematicemeholarahip indioes and the gocial－soiencemeholarghip indices for ench etudent．

TABLE 21
TABLE SHOWING MATHEMATICS－MAJGR－SCHOLARGHIP INDICHK AND SOCIAL GOIEAREE－NAJOR－DCTCNARGHID INDICEE

| Student | Sex | Math．Schol． Index | Sooinl Solence Index |
| :---: | :---: | :---: | :---: |
| 67 | M | 84．21 | 75.92 |
| 280 | M | 91． 07 | 70.16 |
| 13 | \％ | 72.16 | 74．25 |
| 16 | \％ | 77.38 | 63.28 |
| 36 | 多 | 59.09 | 70.00 |
| E6 | 翏 | 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 |
| 88 | W | 86.25 | 97.00 |
| 126 | 道 | 75.28 | 89.00 |

Read table thua：Column I designates the atudent＇s eerial number Column $I I_{\text {，the }}$ aex；Column III，mathematios－echolarship index；Column IV：aciga－acienoe index．

Mavle 22 eives a comparion of the mathematicemenolar－ ship indioes and the profeasional－group－acholarehtp indices＊ The table giver the aexinl numbergex，mathematicescholarship indices and the profesaional－group－scholarship indices for sach atudent．

## TABLE 22

TABLE BHOWT WG MATHEMATICS－MAJOR－BOHOTAROITP I NDI ORS AND PROTESSIONAI－MAJOR GGROUP－GCHOLARSITTD IMDI CHS

| Student | Sex | Meth．Sohol．Index | Prof．Group．In dex |
| :---: | :---: | :---: | :---: |
| 47 | H | 50.00 | 78.88 |
| 61 | M | 85.00 | 86.95 |
| 112 | 3 | 91． 66 | 90.53 |
| 119 | M | 96.64 | 00.83 |
| 25 | \％ | 63.04 | 69.08 |
| 27 | W | 68.75 | 91.40 |
| 40 | V | 70.31 | 70.127 |
| 50 | W | 89.13 | 87.89 |
| 109 | W | 47.82 | 72.00 |

Read table thus：Column I designates the atudente serial nuraber； Column II，the sex；Column III，Ma，hematios－scholarship index； Column IV，professional－group－baholarship index．

Table 23 giver a conpartson of the mathematice－soholarship indioes and the Rngiteh－Latin－saholarmip indiaes．The table giver the serial number，sex，mathemation scholarship index and the Inclith－Latin－scholarship index for ench student．

TABI政 23
TABLE SHOWT MO MATHBMATIOS－MAJOR－BCHOLARSHIP INDIORS AND WNGTIEH－LAHIK－MATOR－SOHOLARSHII INDIOEE

| Student | Sex | Math．Bohol． <br> Index | Mag．Intin Sanol．Index |
| :---: | :---: | :---: | :---: |
| 2 | W | 90.17 | 66.66 |
| 23 | W | 59.09 | 56.25 |
| 21 | W | 100.00 | 87，67 |
| 89 | \％ | 77.17 | 81.00 |
| 210 | W | 71.25 | 75.00 |

Fend table thue：Column I desfenetes the student＇s eerial number： Column II，gex；Oolumn III，methematicemecholarship index；
Column IV，thelinh－Latin－scholarehip index．
Table 24 Eives a comparison of the mathematiob－scholar－ ship indices and the sedondmajor－scholarehip indices．The table Giver the meriad number，sex，mathematiog－soholarghip index and the second－mejor－acholarship index for each student．

$$
\text { TABIA } 24
$$

TABIE SHOWIMG WATHEMATTCS－HAJOR－GCHOI MREHIP INDI OBK AND GECOND－ MAJOR－GCHOLAREHIP INDIOES

| Student | 3ex | Math．Schol． <br> Index | Becond Majox Bohol．Index |
| :---: | :---: | :---: | :---: |
| 14 | \％ | 100.00 | 100．00 |
| 10 | 鲑 | 100.00 | 85.41 |
| 2\％ | H | 86.90 | 82.41 |
| 28 | 留 | 77.77 | 55.45 |
| 37 | 退 | 87．00 | 93.00 |
| 4． 4 | U | 85.14 | 91．37 |
| 47 | 㛵 | 50.00 | 78.88 |
| 49 | M | 200.00 | 200．00 |
| 61 | H | 85.00 | 86.95 |
| 67 | K | 85.27 | 75.92 |

Table 24 (continued)

| Student | Sex | Math. Schol. <br> Index | Second Major Behol. Index |
| :---: | :---: | :---: | :---: |
| 106 | M | 94.56 | 97.82 |
| 112 | M | 91.66 | 95.53 |
| 119 | M | 96.66 | 90.83 |
| 120 | H | 91.07 | 76.16 |
| 129 | H | 100.0) | 100.00 |
| 2 | V | 90.17 | 66.66 |
| 4 | T | 90.21 | 83.75 |
| 13 | W | 72.16 | 74.25 |
| 16 | V | 77.38 | 63.28 |
| 21 | W | 100.00 | 92.42 |
| 23 | W | 59.09 | 56.25 |
| 25 | W | 63.04 | 69.08 |
| 27 | \# | 100.00 | 91.40 |
| 36 | W | 59.09 | 70.00 |
| 40 | \% | 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 | 鹥 | 89.28 | 89.81 |
| 76 | W | 69.23 | 87.50 |
| 79 | W | 84.77 | 92.04 |
| 82 | W | 86.25 | 97.00 |
| 89 | * | 779.17 | 81.00 |
| 92 | * | 63.46 | 86.53 |
| 109 | Vi | 47.82 | 78.00 |
| 110 | 4 | 71.25 | 75.00 |
| 126 | W | 75.22 | 89.00 |

Read table thus: Column I designates the atudent's serial number; Column II, sex;Column II, mathematice-echolarehip index; Column IV, esecond-major-scholarship index.

Resulte and Conclusions
Table 25 givea the arithmetio meana and etandard deviam tion of the mathematios-acholership indices and the second-major-acholarahip indicee for the men and women cornbined.

HEAN AND STANDARD DEVIATION OF MATHEMATICS-MAJORS IN MATHEMATICS SCHOTAREMIP AND IN SECOND MAJOR SCHOLAHGHIP


Read table thus In the oience group there were 12 studente, the mean for the mathematics acholarehip was 86.99 for the second-major acholarship 88.30. The standard deviation for the mathematics acholarship 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 mathematice acholarahip in every case exoopt for the English and Iatin group.
of the four gecondmajor groups, the soience group hat the higheat mean for mathemation aoholarenip. The coience froup alao has the highest mean for the aecond-major goholarghip.

Probable errora were not conad dered beaune ench group contained leas than 25 caees, the amount neceenary to juatify a reliability messure. ${ }^{7}$
7 H. H. Garrett. Statiatice in peychology and Eduontion.
Longmans Green Company. 1926.pp 142

Figure VII gives a eraphical comparison between the means of the matheratice-scholarship indices and the secondmajor scholarship indices.


Legend:
Math. Schol.
Second Major Schot
Figure VII.-Distribution of mathematice scholarship and second-major scholarehip.

Table 26 gives the coefficient of correlation between the mathematics-scholarship indices and the second-majorecholarship 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 groupe combined.

## TABLE: 26

COEFFICIENTS OF CORRBLATION IN MATHENATICS SCHOLARSHIP AND SECOND MAJOR SCHOLARSHIP

|  | Math.\&. <br> Science | Math.\&\&. <br> Soc.Sc. | Math.\&\&. <br> Prof.Sub. | Math.\&. <br> Kng.-Lat. | Math.\&c. <br> 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 studente 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.

Tigure VIII showe a graphical comparieon of the coefficiente of correlation between the mathematice-scholarship indices and the second-major-scholarship indices.


I.egend:

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


Legend:
Men
M.\&. W.

Figure K. - Distribution of academic-mathematice-scholarship indices.

Table 27 gives a comparison of the mean between the men and women for the mathematios-soholarehip 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.

TABCi 27
CGNTRAL TENDHNCY OF MEN AND WOMEN MAJORS IN MATHMATICS GGHOLARGHIP AND IN GECOND-MAJOR SGHOT, ARSIIP

| Second Major | No. of Cases Men Women |  | Mean Men | Math. Schol Wonen | Mean Men | Second Major Women |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| soienos | 9 | 5 | 92.37 | 77.28 | 92.14 | 81.39 |
| Social Science | 2 | 10 | 87.64 | 79.53 | 72.54 | 83.20 |
| Praf. Sub. | 4 | 5 | 80.83 | 67.81 | 88.04 | 78.11 |
| $\begin{aligned} & \text { Eing o } \\ & \text { Latin } \end{aligned}$ | 0 | 5 | - | 79.23 | - | 73.31 |
| Total | 15 | 25 | 88.66 | 77. 99 | 79.12 | 80.03 |

Read table thus: In the ecience 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 mathematios acholarship the men ranked higher than the women in each of the three groups in which the men were represented. In the secondmajor scholarship the men ranked higher than the women in soienoe and professional group and the women higher in the social-bcience group.

Figure IX -Gives a graphion oomparison of the mean-mathematios-scholarship indices and the mean-econdmajor-scholarship indioes for the men and women in the different second majore.

Figure $\mathrm{X}_{\mathrm{*}}$ - gives a graphical diatribution of the mathematios scholarship.

Figure XI.- Gives a eraphical diatribution of the second-ma.jor-scholarship indices.


Legend:
Men
Fomen
Figure XI.-Dietribution of second-major scholarehip indices.

## Chapter VII

COMPARISON ON ERENHMAN TGETE AND MATHMMATICS SCHOLAREHID Presentation of Material

In 1924 the Kansas state Teachers College of Paporin started the pratice of giving a series of tente to the incoming freshman class. Since then these testa have bean eiven each year, shortly after school opens in the fall.

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

The teata taken by each student are aumed up and the student is given a mark representing his soore. Then the entire group taking the teata are divided into ten diviaiona according to rank, that is into deciles. The atudent's final mark simply indicates in which deotle his score appears. These final make are the ones used in this comparison with the mathematiossoholarship indices.
since it has been only a few years since the school started giving freshman teste not very many of the mathematice majors included in this atudy have taken the teste. In the group there were 4 men and 14 women, 18 in all. this is too amall a number to be of much value,in etimating tendencies.

Table 28 givea a comparison of the freshman teate and mathemation soholarship. The table gives the serial number, sex, freshman-test mark and mathematios-moholarehip index of ex oh student.

| Student | Sex | Freshman Tests | Math。 <br> Sohol. |
| :---: | :---: | :---: | :---: |
| 37 | H | 10 | 87.00 |
| 53 | M | 8 | 96.66 |
| 81 | M | 7 | 73.07 |
| 83 | W | 3 | 97.72 |
| 5 | V | 8 | 75.00 |
| 23 | V7 | 2 | 59.09 |
| 30 | W | 2 | 93.18 |
| 32 | V | 8 | 50.00 |
| 76 | W | 8 | 69.23 |
| 77 | W | 10 | 59.70 |
| 78 | 7 | 10 | 63.75 |
| 80 | V | 9 | 95.53 |
| 84 | W | 10 | 63.63 |
| 85 | W | 10 | 77.88 |
| 86 | W | 4 | 81.52 |
| 99 | V | 9 | 60.86 |
| 110 | \% | 7 | 71.25 |
| 21.3 | V | 9 | 79.00 |

Read table thus Column I indioates the atudent'a serial number; Column II, SexiColumn III, Freshman teete; Column IV, Hathemation soholarship.

## Resurts and Conclusians

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

In the freshman testa the women outranked the men. The mean for the women being 7.57 compared with 7 for the men. In the mathemation soholarenip the men outranked the women. The mean for the men being 88.61 oompared with 71.61 for the women.
mians of hreghman tesig and mathmmaticsGCHOLARSHIP INDICES

| Group and Measure | Freahman Teate | Math. Schol. |
| :--- | :---: | :---: |
| Men-Mean | 7 | 88.61 |
| Women-Mean | 7.57 | 71.40 |
| M. \&. Wo-Mean | 7.44 | 76.33. |

Read table thus fhe mean for the men in freshman terts is 7 , in mathemation scholarship 88.61.

Table 30 gives the coefficient of corxelation between the the freshman tests and mathematios 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 resuite very bignificant.

TABIE 30
QOBFFIOIENPS OG CORRDLATTON IN HRESHMAN TESTS AND MATHOMATIGS SCHOLARSHIT

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

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

## CHAETKR VIII

A STUDY OF THE BPYeOT ON ag on Mathemation scholaremp

## Presentation of Material

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

In cheoking over the ifet of studente if was found that the age limite 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 divielons, those under the average age of 26.5 years and those over the average age. A second grouping was then made into the folloving groups: 1. Those under 20 years of age. 2. Those from 20 to 24 years of age. 3. Those from 25 to 29 yeari of age. 4. Those from 30 to 34 yeara 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 muber, sex, age and mathematics-scholarship index. The youngest person in the list was a woman, number 102. The age was 19 years.

$$
\text { TABIE } 31
$$

AGE GROUP UNDER THIL AVERAGE, 26.5

| Student | Sex | Age | Math. Sohol <br> Index |
| :--- | :---: | :---: | :---: |
| 8 | $M$ | 26 | 71.42 |
| 11 | $M$ | 22 | 86.90 |
| 19 | $M$ | 25 | 100.00 |
| 20 | $M$ | 26 | 85.00 |
| 28 | $M$ | 22 | 42.10 |

Table 31 (oontinued)

| Student | Sex | Age | $\begin{aligned} & \text { Math. Soho2. } \\ & \text { Index } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 29 | M | 22 | $\frac{77.77}{}$ |
| 31 | M | 22 | 85.00 : |
| 37 | H | 26 | 87.00 |
| 38 | M | 24 | 95.23 |
| 39 | M | 26 | 94.04 |
| 43 | M | 26 | 61.25 |
| 45 | 1 | 25 | 85.71 |
| 47 | M | 23 | 50.00 |
| 49 | M | 21 | 100.00 |
| B4 | 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 | 26 | 94.56 |
| 111 | \% | 26 | 72.22 |
| 212 | 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 | Y | 25 | 69.04 |
| 25 | W | 20 | 63.04 |
| 30 | 7 | 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 | V | 24 | 72.50 |
| 73 | W | 25 | 85.80 |
| 76 | W | 22 | 69.23 |
| 77 | W | 23 | 59.70 |

Table 31 (continned)

| Student | Sex | Age | Math. Schol. |
| :---: | :---: | :---: | :---: |
| 72 |  |  | Index |
|  | \% | 26 | 84.77 |
| 80 | \% | 22 | 95.53 |
| 85 | \% | 25 | 77.88 |
| 86 | V | 25 | 81.52 |
| 88 | v | 21 | 79.16 |
| 24 | * | 24 | 36.95 |
| 98 | W | 25 | 80.64 |
| 100 | \% | 23 | 90.38 |
| 102 | W | 19 | 100.00 |
| 105 | W | 25 | 65.78 |
| 109 | w | 22 | 47.82 |
| 110 | * | 20 | 71.25 |
| 123 | W | 21 | 79.00 |
| 114 | w | 24 | 95.00 |
| 117 | w | 23 | 90.17 |
| 121 | \% | 21 | 97.32 |
| 236 | \% | 22 | 75.22 |
| 127 | * | 22 | 93.75 |
| 2.30 | W | 20 | 95.53 |

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

Tigure XII.-gives a graphical representation of the age Eroup under the average age of 26.5 years.


> Legend: Men $\quad$ Migure XII-AGe group below the average age.
> Ti

Table 32 (continued)

| Student | Sex | Age | Mnth. 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


Indices
Legend:
Nen
Women M. 象. W.

Pigure XIII.-Age group over the average age.
Table 33 gives an age group under 20 years. The $t_{n} b l e$ gives the students serial number, sex, age and mathematice-scholarship index.

## TABLE 33

AGE GROUP UNDER 20 YEARS

| Student | Sex | Age | Math.Schol. Index |
| :--- | :---: | :---: | :---: |
| 102 | $W$ | 19 | 100.00 |

Read table thusscolumn i indicates the student's serial number; Column II, Sex; Column III, Age; Golumn IV, liathematics-echolarship index.

Read table this: Column ? indicates student'e serial number; Colunn 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 mathemat-ics-scholarship indices of the men and women studente.


Indices
Legend:
Men Women
 Figure XIV.-Age group 20-24 years.

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

## TABLS 35

## AGE GROWP 25-29 YRARS

| Student | Sex | Age | Wath. Index |
| :---: | :---: | :---: | :---: |
| 3 | 11 | 29 | 59.37 |
| 8 | M | 26 | 71.42 |
| 14 | M | 27 | 100.00 |
| 18 | H | 29 | 59.72 |
| 19 | \% | 25 | 100.00 |
| 20 | 15 | 26 | 76.92 |
| 25 | M | 23 | 84.08 |
| 34 | 3 | 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
3igure XVI.-Mean-mathematice-scholarship indices for each age
year. 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 largeet 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 mathematice-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

AGE GROUP OVER THE ATARAG月 AGH， 26.5

| Student | Sex | Age |  Index |
| :---: | :---: | :---: | :---: |
| 3 | W | 29 | 59.37 |
| 14 | 畺 | 27 | 1.00 .00 |
| 18 | \％ | 29 | 69.72 |
| 23 | M | 28 | 84.09 |
| 34 | W | 29 | 73.61 |
| 41 | 1 | 29 | 82．91 |
| 44 | \％ | 28 | 85.18 |
| 48 | 超 | 27 | 68.42 |
| 62 | M | 29 | 92.30 |
| 67 | 迷 | 42 | 84.21 |
| 90 | M | 31 | 65.90 |
| 96 | H | 41 | 87.95 |
| 104 | 慮 | 27 | 44.00 |
| 107 | M | 29 | 78.00 |
| 123 | M | 29 | 100.00 |
| 128 | M | $2{ }^{77}$ | 78.40 |
| 129 | N | 27 | 100．00 |
| 2 | W | 27 | 90.17 |
| 4 | ＊ | 30 | 90.21 |
| 10 | \％ | 35 | 24．56 |
| 13 | W | 27 | 72.16 |
| 45 | W | 29 | 88.88 |
| 17 | W | 27 | 86.11 |
| 27 | W | 28 | 100.00 |
| 55 | V | 27 | 69.30 |
| 56 | W | 33 | 95.00 |
| 59 | W | 28 | 86.95 |
| 64 | W | 57 | 73.68 |
| 68 | W | 29 | 64.28 |
| 69 | ＊ | 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 | 86.26 |
| 87 | W | 31 | 98.19 |
| 92 | w | 32 | 63.46 |
| 95 | W | 32 | 90.47 |
| 97 | W | 28 | 92．70 |
| 99 | W | 55 | 60.86 |
| 101 | 4 | 28 | 96.42 |

Table 32 (oontinued)

| Student | Sex | Age | Mrth, Sohol. Index |
| :--- | :---: | :---: | :---: |
| 103 | $W$ | 34 | 94.73 |
| 115 | $W$ | 30 | 41.66 |
| 116 | $W$ | 27 | 81.80 |
| 125 | $W$ | 30 | 83.33 |

Read table thus:Column I Indicates the etudent serial number; Table II, Sex;Table III, AgesTable IV, Math. Sohol.Index.

Hegure XIII. $G I v e B$ a graphical representation of the age group over the average age of 26.5 yeare, giving a comparison of the mathematics-scholarship indices of the men and women students


Legend:
Hen
Women
H. $\mathrm{B}, \mathrm{W}$. Figure XIIIa-Age group over the average age.

Table 33 gives an age group under 20 years. The $t_{\text {gble }}$ gives the students serial number, eex,age and mathematice-scholarship index.

## TABLE 33

AGE GROUP UNDER 20 YEARE

| Btudent | Sex | Age | Math. Soho1. Index |
| :--- | :---: | :---: | :---: |
| 10n | T | 19 |  |

Read table thusicolumn I Indicatas the otudent serdsl number; Colunn II, Bex;Column III, Agef Column IV, Hathemation-moholarehip index.

Table 34 gives an age group of thome from 20.24 yeare incluoive. The table gives the student'n serial number, bex, age, and mathematiosmscholarship index.

TABIS 34
AGE GROUP 20-24 YEARS

| Student | Sex | Age | Math. ©chol. Index |
| :---: | :---: | :---: | :---: |
| 11 | M | 23 | 86.90 |
| 26 | 3 | 22 | 42.10 |
| 29 | 1 | 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 | H | 22 | 94.58 |
| 11.2 | M | 22 | 91.66 |
| 120 | W | 2.3 | 91.07 |
| 124 | M | 21 | 91.66 |
| 5 | W | 23 | 75.00 |
| 6 | W | 2.2 | 76.92 |
| 25 | w | 20 | 63.04 |
| 40 | \% | 21 | 70.31 |
| 46 | W | 22 | 35.57 |
| 50 | w | 20 | 89.13 |
| 52 | \% | 23 | 70.00 |
| 57 | \# | 23 | 93.47 |
| 60 | T | 21 | 81.25 |
| 63 | W | 22 | 91.66 |
| 65 | W | 24 | 72. 50 |
| 76 | W | 22 | 69.23 |
| 77 | W | 23 | 59.70 |
| 80 | V | 22 | 95.53 |
| 88 | 习 | 21 | 79.16 |
| 94 | W | 24 | 86.95 |
| 100 | $v$ | 23 | 90.38 |
| 109 | W | 22 | 47.82 |
| 110 | V | 20 | 71.25 79.00 |
| 113 | W | 21 | 79.00 |
| 11.4 | 䈡 | 24 | 95.00 |
| 117 | W | 20 | 90.17 |
| 121 | V | 21. | 97.32 |
| 126 | W | 22 | 75.22 |
| 127 | W | 22 | 93.75 |
| 130 | \% | 20 | 95.58 |

Read table thas: Dolumn i indioater etudent'o perial number; Column II, Sex; Column III, Agey Column IV, Math. sohol. Incex

Figure XIV.-Gives a graphioal representation of the nge group 20-24 yeare inclusive,giving a compmison of the mathemat-1ca-soholarship indices of the men and women tudente.


Legend:
Hen Women M. B. M . FiEure XIV.-Age group 20-24 years.

Table 35 gives an age group of those irom 25.29 yeare Incluaive. The table givea the studenta serial number, aex, age and mathematios-acholarship index.

TABLE 36
AGE AROUP 25-29 YEARB

| Student | sex | Age | $\begin{aligned} & \text { Math. Sohol. } \\ & \text { Index } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 3 | 12 | 29 | 59.37 |
| 8 | H | 26 | 71.42 |
| 14 | M | 27 | 100.00 |
| 18 | 1 | 29 | 59.72 |
| 19 | M | 25 | 100.00 |
| 20 | M | 26 | 76.82 |
| 28 | M | 28 | 84.00 |
| 34 | \% | 88 | 73.61 |
| 37 | H | 26 | 87.00 |
| 39 | M | 26 | 94.04 |
| 41 | M | 29 | 82.81 |
| 43 | M | 26 | 61.25 |

Table 35 (oontinued)

| Student | Sex | Age | Math. Schol. |
| :---: | :---: | :---: | :---: |
|  |  |  | Index |
| 44 49 | M | 28 | 85.18 |
| 48 | M | 25 | 81.71 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 | \% | 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 | V | 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 | \$ | 26 | 83.69 |
| 55 | w | 27 | 69.30 |
| 59 | W | 28 | 86.95 |
| 68 | W | 29 | 64.28 |
| 69 | W | 27 | 89.28 |
| 70 | V | 28 | 76.08 |
| 72 | W | 27 | 78.84 |
| 73 。 | W | 25 | 85.86 |
| 79 | W | 26 | 84.77 |
| 85 | w | 25 | 77.88 |
| 86 | W | 26 | 82.62 |
| 97 | W | 28 | 92.70 |
| 98 | W | 25 | 80.64 |
| 101 | V/ | 28 | 96.42 |
| 105 | W | 25 | 73.45 |
| 116 | W | 27 | 81.89 |

Read table thuascolumn 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 studenta.


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.

TABIE 36
AGE GROUP $30-39$ YEARS

| Student | Sex | Age | Math. Sohol. <br> 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 (oontinued)

| Student | Sex | Age | $\begin{aligned} & \text { Matho BhnI. } \\ & \text { Index. } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| 103 | W | 34 | 94.73 |
| 115 | W | 30 | 41.66 |
| 122 | W | 30 | 83.33 |

Read table thuss Column I indiontes the student's serinal number; Column II, Sex; Column III, Age;Column IV, Math. Scho 1 . 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 GHOUP ABOVE 39: YEABS

| Student | Sex | Age | Math. Shol. |
| :--- | :--- | :--- | :--- |
| 67 | $M$ | 42 | Index |
| 96 | $W$ | 42 | 54.21 |
|  | $W$ | 57 |  |
| 64 | $W$ | 55 | 73.68 |
| 99 | $W$ | 60.86 |  |

Read table thus:Column I indioates the student's serial number; Column II, Sex; Column III, Age; Column IV, Math. Sohol.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 GROUPG

| Age Group | Number in <br> 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 |  |  |


| Age Group | $\begin{aligned} & \text { Number in } \\ & \text { Groun } \end{aligned}$ | Meann |
| :---: | :---: | :---: |
| Women | 29 | 82.80 |
| Men and Women | 46 | 80.77 |
| Under 20 yearm |  |  |
| Women | 1 | 100.00 |
| 20 to 24 yeara |  |  |
| Men | 13 | 82.82 |
| Women | 26 | 80.32 |
| Men and Women | 39 | 81.32 |
| 25 to 29 years |  |  |
| 䞨en | 28 | 79.64 |
| Women | 26 | 91.05 |
| Men and Women | 54 | 80.32 |
| 30 to 39 yeara |  |  |
| Men | 1 | 65.90 |
| Women | 13 | 84.14 |
| Men and women | 14 | 82.83 |
| Over 39 yeara |  |  |
| Men | 2 | 71.08 |
| Women | 2 | 67.27 |
| Man and Women | 4 | 69.17 |

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

Table 39 give the meanmathemation-moholarship indioes, by years, for the men, the women and both oombined.

MEAN MATHEMATIOS-SCHOLARSHIP INDIORS BY YEARE

| 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 | 80.5\% | 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 | 57.93 | 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 thust There was one person, a woma, 19 yeare old with an index of 100.00

Figure XIF-alven the mean of the mathemation-acholarehty indioes of each age year for the men studente and for the vonen atudents.


Legend:
Hen Women
Figure XVI. -Mean-mathematics-scholarship indices for eaoh age year.

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

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

In oomparing the mexn of the mathematiog-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 yeare. 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 mathemation sonolarghip than do the women, but the women in the group over the average age do better than the men.

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

Taking the three groups, $20-24$ yeara, $25-29$ years and 30-39 years in order, the means for the men in mathemation Boholarship are found to decrease, the meang being 82.82, 79.64 and 65.90 respeotively. On the other hand the means for the women in these same age groups inorease, the means being 80.57, 81.05 and 84.14 respectively.

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

The actual average age of the entire group indioates that the women of the mathematios 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 mone women than men which raises the average age for the wom. In the 30 to 34 year group there is only one man compared with 13 women.

The investigation recorded in this thesis deals with the mathemation majors of the Kanser State Tenohers College of Fmporia. The purpose of the investigation was to make a study of the relation that might exist between the mathematioe soholarehip and the scholarship in different combinations of certain sohool courses.

The data for the atudy were secured from the students' reoord sheets in the istrar's Offige. The data include all studente graduating with a mathemation major, from the Kansas state Teaohers College of mporia during the period 1917 to 1932 incluaive. The data of 130 students, 49 men and 81 women, are included in the atudy.

The etudy shows that both the men and women ranked higher in mathematice scholarehip than in academic soholarship. The coefficient of correlation being . 563 .

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

The Indiana Teachers College atudy gives very different. results in comparing the rankine between general geholarehtp and mathematios soholarship of the Indian teachers College. This gtudy ${ }^{8}$ how that the men and women ranked higher in general soholarship than in mathematios cholarship. Likewise the women ranked higher than the men in both general acholarehip and 8 Elizabeth Higgine. Study of the Aohievement and Related Factors of Kathematios Majors at Indiang State Teaohers college for the Yeare 1926-1932. Contributiona of the Graduate Sohool Indina State Teachers College. Number 76, 1932.
mathematios aholarship.
In a otudy at Beownilnivereity, Mophai $1^{9}$ found a correlation of voo betwoen mathematiom soholaranip and soholarehip in other branches

Both the men and women rank higher in aoademicmathomatioa soholarship than in profeseionalmathematios soholarenip.

The men rank higher than the women in both aoademicmathematios ocholarship and profeasionalmathemation soholarship.

The men areI36 as variable as the women in profeselonal scholarehip and $\mathbb{Z} 03 \%$, as variable as the women in profeerionalm Mathematics acholarghip.

Comparing the result of the Emporia study of academio scholarship and professional-mathemation scholarship with the Indians atudy, students of the Indiana Teachers College ranked higher in academiomathamation aholarahip than in profesanalmathematios cholarshipoIn oomparine the men with the women $1 t$ was found that the womenranked higher than the men in both academiomathematics scholarship and professional-mathematice acholarship. $1^{0}$

Both the men and women in the gmporia inteatigation rank higher in funior-collegemathematics soholarship than in genior-college-mathematios acholarchip. In junior-collegemathematica soholarship the wonen rank higher than the men, while in seniox-oollege-mathematios soholarohip the men rank higher than the women.

The men are $82 \%$ as rariable ab the women in Junior-oollege
Mathematicagand ziog an variablo as women in cenior ooliege 9. H. Mophail.The Intelligence of College Btudenta. Warwiok York. 1924.pp. 146.

10 N11 qabeth Hisginu Study of the Achievement and Helated Fatore of Mathemat of Majore ot Indians Btate Penoher collefe for the venre 1926 - 1932 . Contributione of the Graduate sohool Indiana Etate peachere College. itumber 76,1932.
mathematios.
Of the mathematios majors who majored in some other aubject also,it was found that more of them seleoted phyaios as their second major than any other aubject.

The men and women combined ranked higher in their secondmajor scholarehip than in mathematice acholarahip.

The men ranked higher than the women in both mathematios and aecond-major scholarship.

The men ranked higher than the women in soience scholarehip
The women ranked higher than the men in sooial matonoe scholarahip.

The men ranken higher than the women in professionalsubjects scholarship.

The men and women combined in the soience group ranked higher than the other secondmajor groups in woth mathematioa acholarship and second-major scholarship. There was also a closer correlation between the mathemation scholarship and the seondmajor scholarahip in this exroup than in the case of the other groupa.

This would seem to indicate that the group who select acience as a major are better students than thoge who geleot other subjects as a aecond major also that baience fits in with mathematios better than do the other aubjecte.

In the Indiana Study if was found that more second majors Belected polence for the seaond major than any other aubject. In most of the oombinations the women ranked hither than the men. 11 11 HIIzabeth Higeins Study of the Achievement and Heleted Factorg of Mathematios Majors at Indiana State Teachers Coliege for the Yearg $1926-32$ contributione of the Graduate Gchool Indiana Etate Teaohere Oollege. Number 76,1932.

The number in the Emporin-freahmen teat eroup wat too amall for drawing any general conalusione. However, the women ranked higher than the men in the freghman tests and the men ranked higher than the women in mathemation soholarship.

In the age group is was found that in the group under the arerage age of 26,5, the men ranked higher than the women in mathematios soholarship while of those over the average age the women ranked higher than the men.

Taking the age groups 20-24, 25-29 and $30 \sim 39$, 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.

## 2"aL* OORAMTX

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