CHAPTER - VIII : NORMS

As already mentioned in the previous chapter, a score on the inventory can have meaning only with reference to some group average or scores of groups. The score cannot be said high or low unless the complete picture of the performance of a group is known.

In the present inventory, there are 100 items. The maximum score that one can have is 200. A score of 100 will only mean an achievement of 50 percent and nothing more. Such interpretation of raw scores is inadequate. The problem of interpreting a given score in meaningful terms is fundamental in all measurement. Norms are real aids which help to interpret a raw score. The mean score for the present inventory is 112.0. A teacher scoring marks in the vicinity of 112.0 can be said to have an average achievement of the group to which he belongs. If the total performance of the group changes in course of time, the meaning conveyed by the raw score, would also change. Writing about norms, Ross[1] says, 'It is not unreasonable to assume, human

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1. Ross, C.C. : Measurement in Today's Schools, p 275.

nature being what it is, that average achievement with the facilities now available could be considerably better than exists at the present time'.

According to the nature of the groups, a standardised inventory can have any one or more of the following types of norms :

(1) Age Norms ; (2) Grade Norms; (3) Percentile Norms ; (4) Standard Score Norms.

As the scope of the present inventory is limited to teachers or prospective teachers, it is not possible to fix either age norms or grade norms for this inventory. The only possible norms for an inventory of this type are : (1) Percentile Norms, and (2) Standard Score Norms.

Percentile norms

Percentile norms are widely adaptable and applicable. They can be used whenever an appropriate normative group can be obtained to score as a yardstick. The norms for any test should be considered only in the light of the sample used for the purpose. The sample used for the present inventory is a representative sample of the population of teachers of primary schools of Mysore State. The norms fixed would be valid only if the inventory is used with teachers of the said population.

The percentile norms interpret a teacher's score by describing his position in the group in terms of the percentage of scores which fall below the score made by him. In Table 33, it is seen that $P_{70} = 123$. This means that 70 percent of 500 testees scored below 123 in the distribution of scores obtained on this inventory.

The following formula has been used to compute the percentiles for the scores.

$$P_p = l + \left(\frac{pN - F}{fn}\right) \times i \text{ (~~interval~~)}$$

where p = percentage of the distribution wanted e.g. 10 % , 33 %, etc.

l = lower limit of the class-interval upon which P lies

pN = part of N to be counted off in order to reach P_p

F = sum of all scores upon intervals below l

fn = number of scores within the interval upon which P_p falls

i = length of the class-interval.

The percentile and decile points were calculated with the use of the cumulative frequency given in Table 32.

The scores have been rounded up to the nearest upper integer.

Table 32 - The cumulative frequencies

Class interval	Frequency	Cumulative frequency
160-169	1	500
150-159	10	499
140-149	26	489
130-139	62	463
120-129	85	401
110-119	99	316
100-109	91	217
90-99	60	126
80-89	36	66
70-79	16	30
60-69	9	14
50-59	5	5
	500	

Table 33 shows the percentiles based on the actual raw scores for the whole sample.

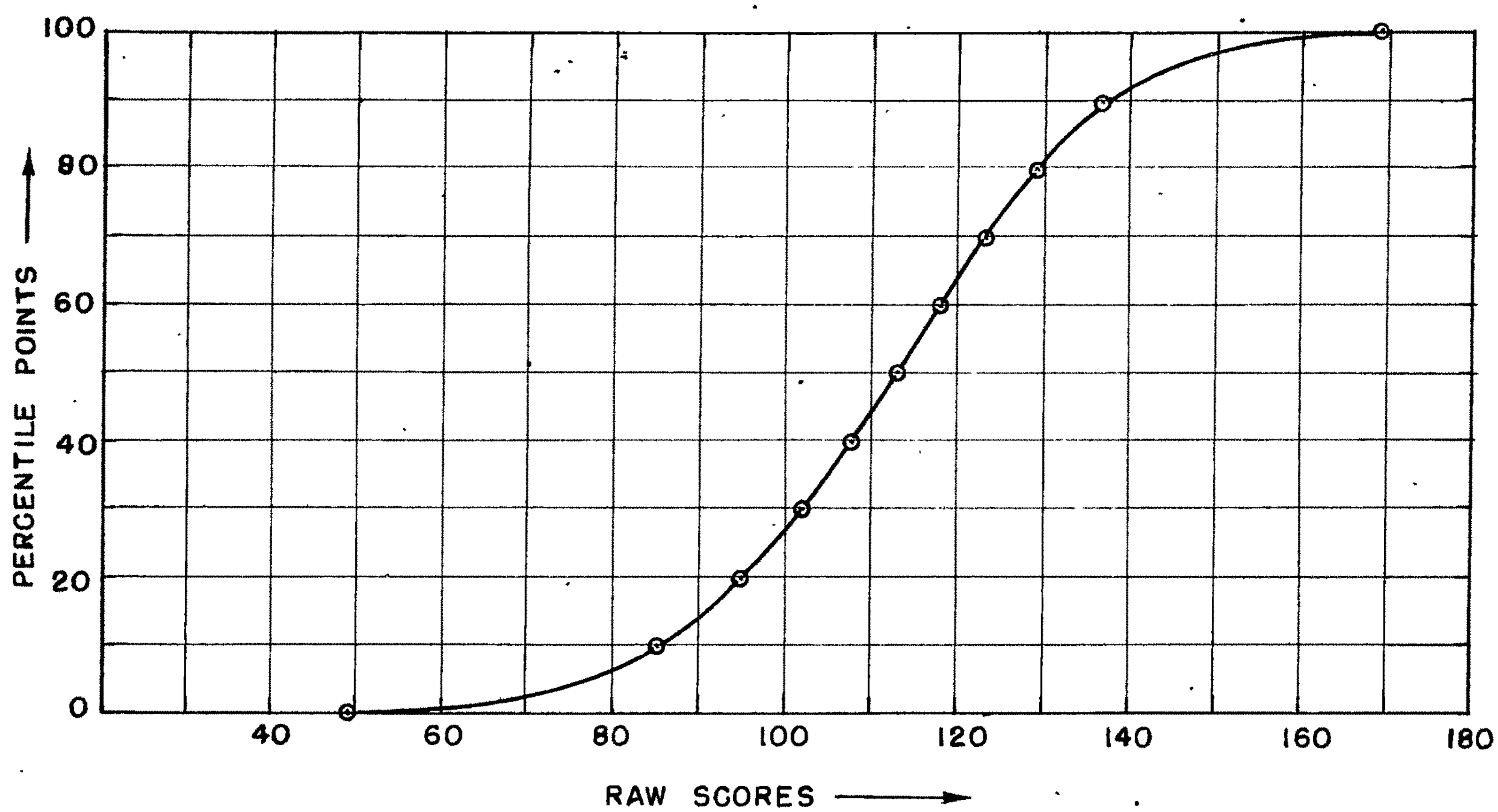
Table 33

Decile point	~~Decile~~ points ~~of raw~~ Raw scores
P 100	169.0
P 90	137.0
P 80	129.0
P 70	123.0
P 60	118.0
P 50	113.0
P 40	108.0
P 30	102.0
P 20	95.0
P 10	85.0
P 0	49.0

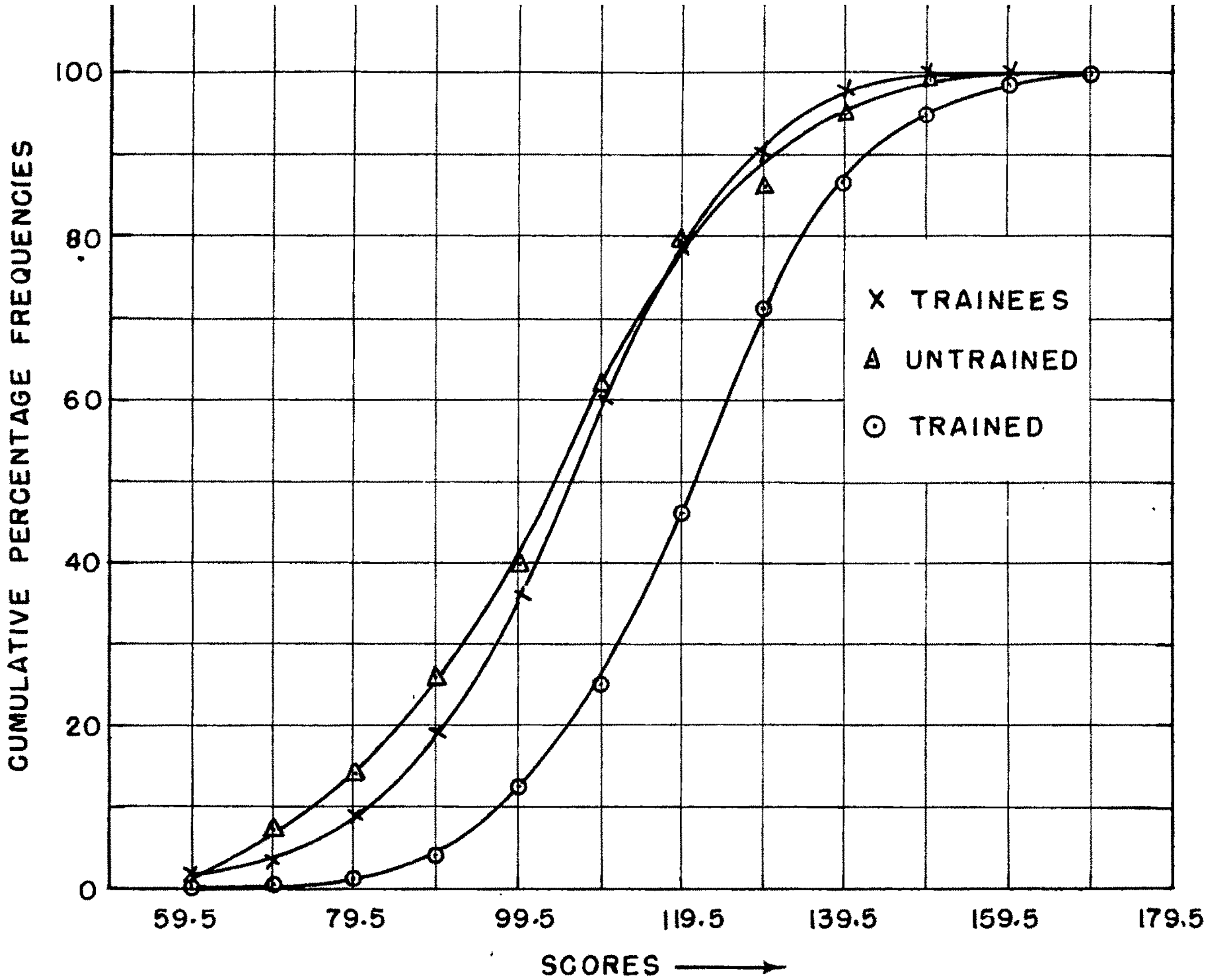
The percentiles or percentile ranks can also be calculated graphically. Graph IV has been drawn with scores as abscissa and percentile norms as ordinates. As the distribution of the scores is normal, the ogive is very smooth. This curve can be utilised to read scores, corresponding to given percentiles or vice-versa. From Table 33, it can also be seen that there is no overlapping of scores from one decile point to the other.

As mentioned in Chapter 10, it was found that there was not significant difference between the performances of rural and urban teachers as also men and women teachers. In the light of this no separate norms have been computed for these groups. It was also found that there were significant differences in the mean scores of trained and untrained teachers, experienced and inexperienced teachers, graduate and non-graduate teachers, government and non-government school teachers. Hence separate norms have been established in each of these cases. As this inventory is more likely to be used in selection of teachers in general or trainees to teacher training institutions, the norms established for untrained and inexperienced teachers will be specially useful. These norms are based on the performance of teachers prior to their being trained or experienced. Appendix N gives the percentile norms for raw scores on this inventory.

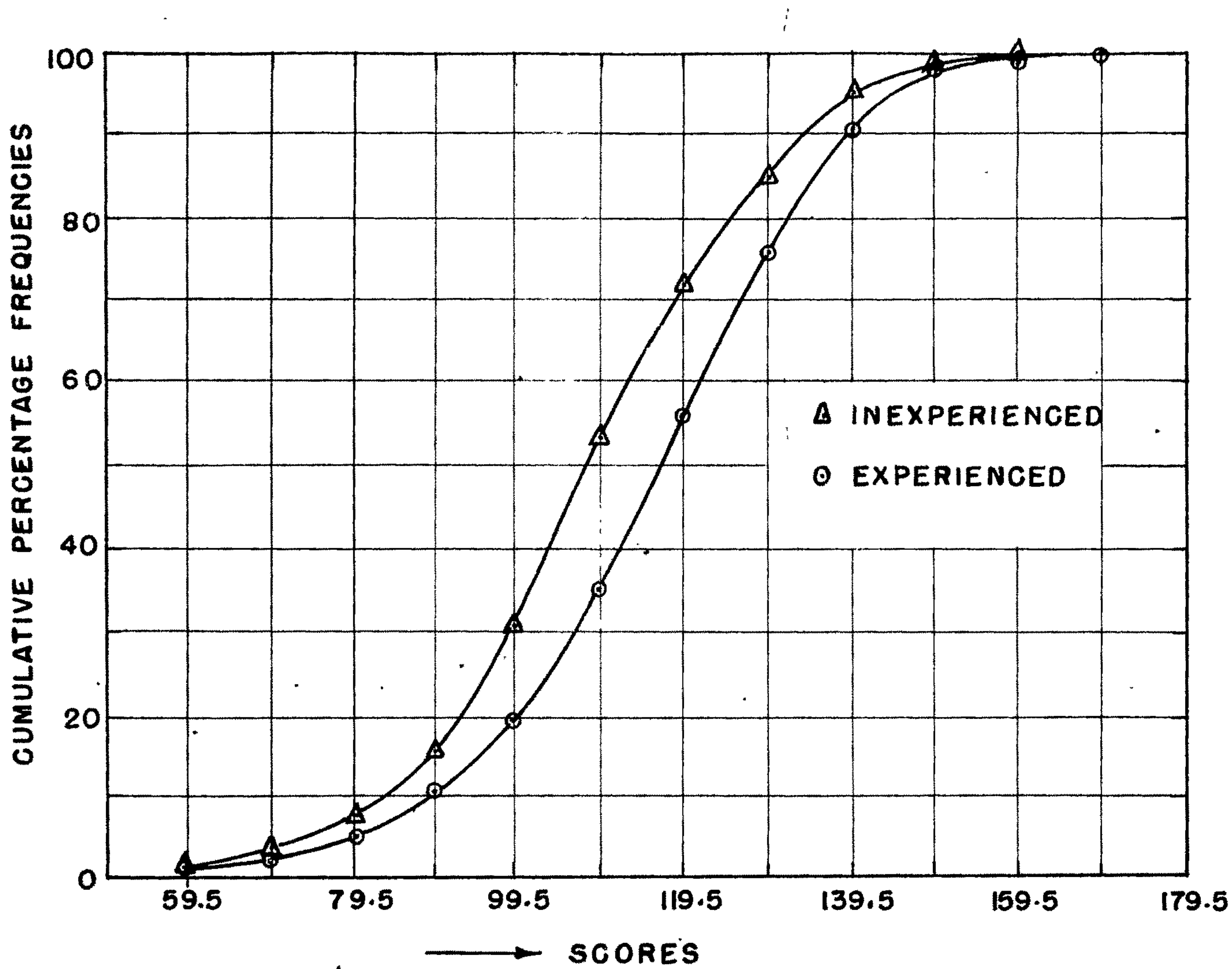
In additon to these norms, ogives (vide Graphs V, VI,



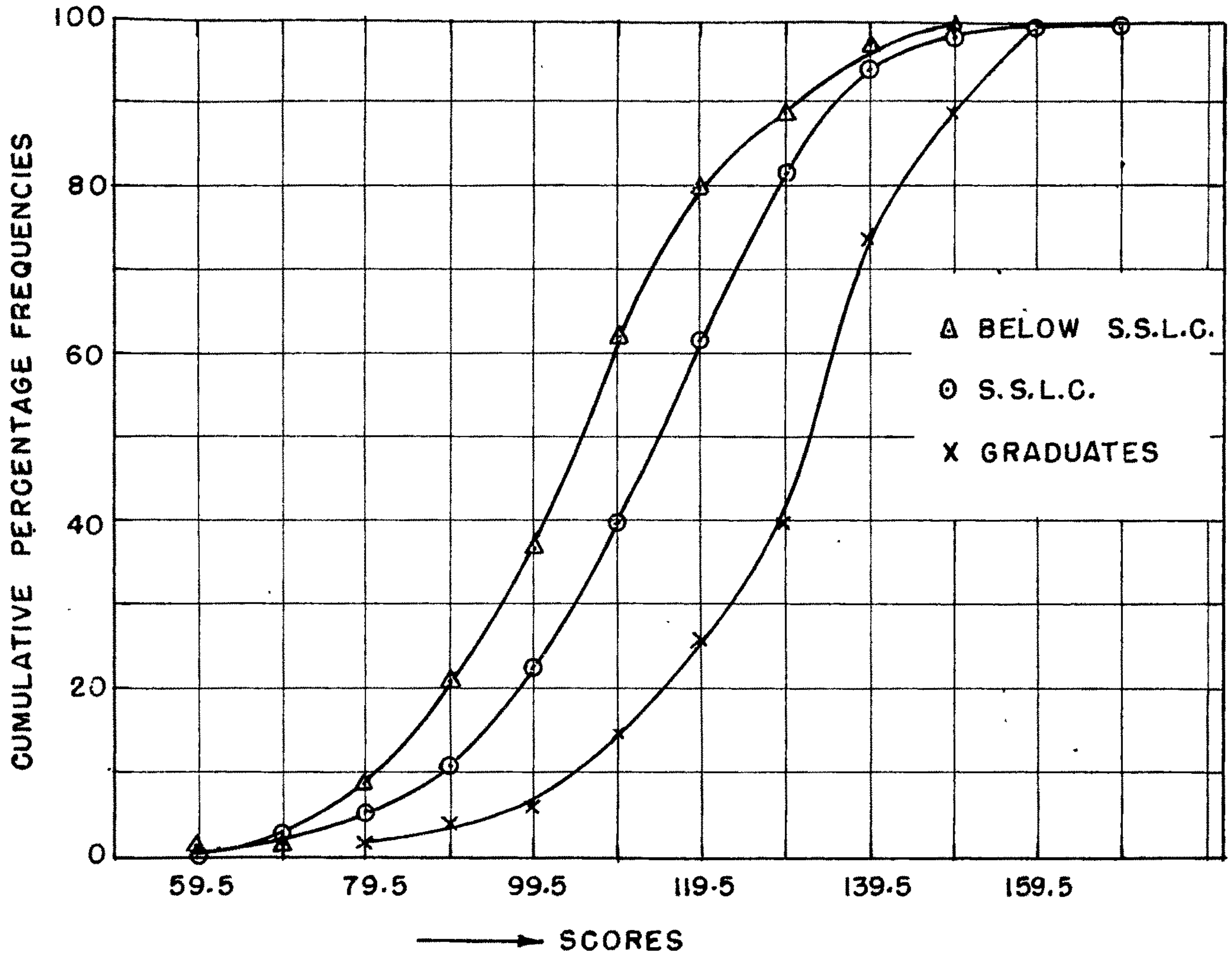
GRAPH IV THE PERCENTILE CURVE.



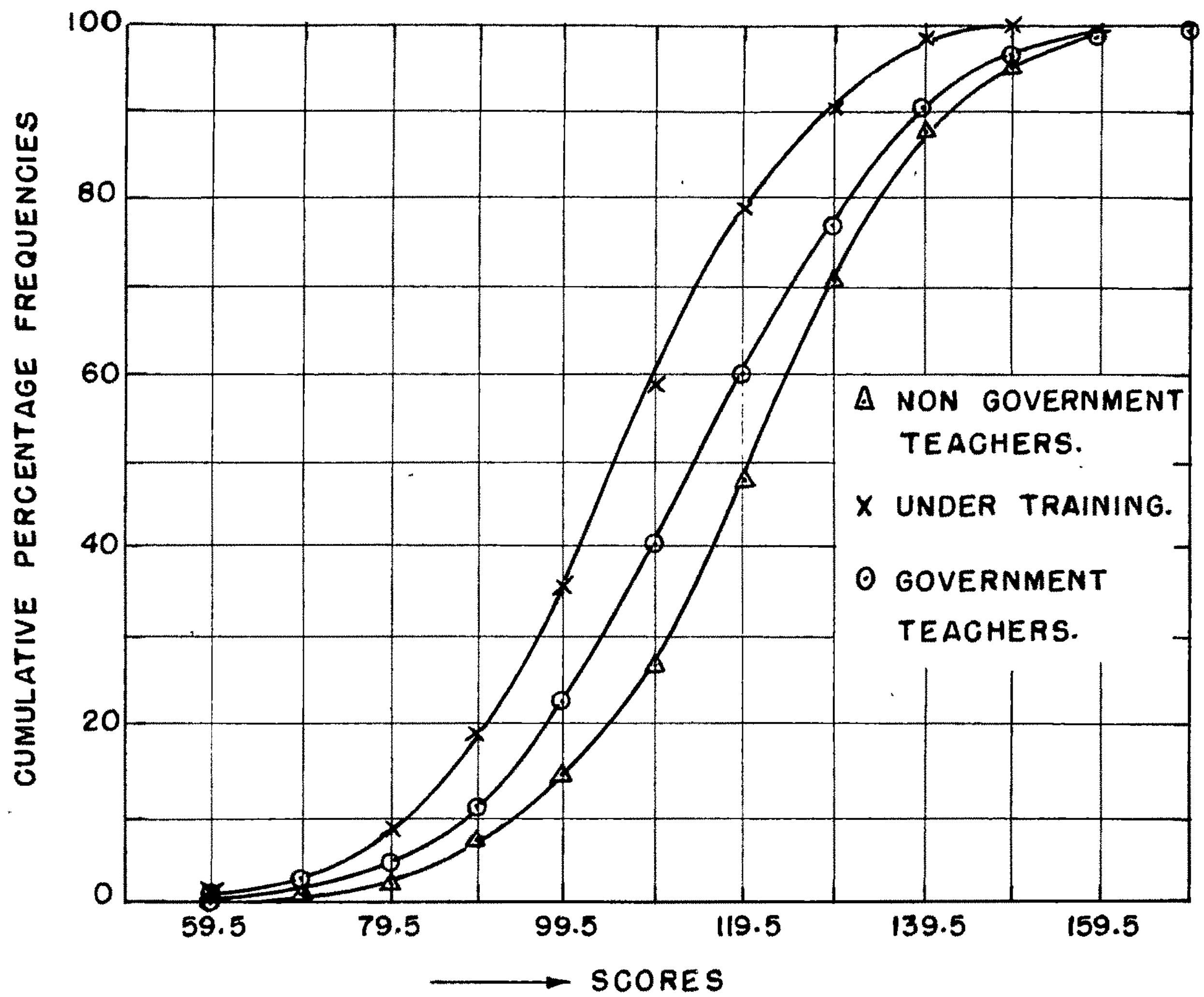
GRAPH V OGIVES OF THE SCORES OBTAINED BY 248 TRAINED 108 UNTRAINED AND 144 TRAINEE TEACHERS.



GRAPH VI · OGIVES OF SCORES OBTAINED BY 265 EXPERIENCED & 235 INEXPERIENCED TEACHERS.



GRAPH VII OGIVES OF SCORES OBTAINED BY 137 NON-S.S.L.C., 309 S.S.L.C., AND 54 GRADUATE TEACHERS.



GRAPH VIII OGIVES OF SCORES OBTAINED BY 243 GOVERNMENT TEACHERS 113 NON GOVERNMENT TEACHERS AND 144 TRAINEES.

VII, VIII) have been drawn for the distribution of scores of different groups mentioned above. These ogives can be utilised to read the percentiles corresponding to the obtained raw scores or vice-versa.

Standard score norms

For ordinary purposes, the percentile norms are useful to compare individuals. However, the units of score system based on percentiles assume that the percentile differences are the same throughout the scale. This assumption holds strictly only when the distribution of scores is in the form of rectangle rather than in the form of normal curve. To be accurate, standard score norms have therefore been developed so that each unit would have the same meaning throughout the whole range of values. Standard scores or Z scores as they are often called, are in reality deviations from the mean expressed in terms of standard deviation units. Moreover, the Z-scores have the same form of distribution as the original scores. In order to avoid decimal points and to get rid of sometimes possible minus signs, the σ deviations are multiplied by 10 and to this product, a constant number, say 50 has been added. The mean of the scores in the present inventory is 112.0. If X is any raw score, then $\frac{X - \text{mean}}{\sigma}$ represents the standard score. This is then multiplied by 10 and to the product, 50 is added. Thus, all the Z scores obtained are positive as can be seen in the table (vide

Appendix O). If the raw score is 50, 50 is substituted for X. Thus, Z scores corresponding to different raw scores varying from 50 to 160 have been calculated and tabulated. The scores are approximated to the nearest whole number to avoid difficulties of interpretation.

T-scores or the normalised standard scores

It has been noted that Z-scores obtained exhibit the same form of distribution as original test scores, which as obtained may or may not be exactly normally distributed in the tested sample though the trait tested may be normally distributed in whole population. T-scaling has been developed primarily to reduce the scores to a normal distribution and as such T-scores have the advantage over other scores. The Z-scores correspond fairly closely to T-scores, and the more 'normal' the original distribution, the closer is the correspondence. But the two kinds of scores are not interchangeable. Table in Appendix O gives T-scores corresponding to raw scores varying from 50 to 162. The Z-scores and T-scores in the present case correspond to a great extent, as the original distribution is nearly normal. This can be seen from the table given in Appendix O.

Letter scores or grade assignments

Many educationists, now-a-days, are replacing the system of evaluation through numerical points by the system of evaluation through letter grades. If the evaluation is on a five-point scale, then the grades are A, B, C, D and E. If it is on a seven-point scale, it will be A, B, C, D, E F and G. But what is 'A' to one may not be 'A' to another. In order to make the system of assigning grades as objective as possible, some logical principle should be evolved.

In the present inventory, the grades have been determined on the basis of the normal distribution of the scores.

The scores of the 500 teachers to whom the present inventory was administered show a very near normal distribution. In a normal distribution almost all the cases lie between $\pm 3\sigma$ from the mean of the distribution. If the whole range is to be divided into 5 sub-divisions, each sub-division will have 1.2σ as its length. If the whole range is to be divided into 7 sub-divisions each sub-division will be about 0.86σ in length. Grading on a seven-point scale is more desirable and better than on a 5-point scale. But usually most of the tests have been graded on a 5-point scale. This inventory is not to be used in isolation. It is to be used along with other evaluating systems. Comparison will be made easy if the system of grading is used in all the tests. Hence, here also a five-point grading is tried for the scores[1].

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1. Johnson Palmer, O. and Jackson Robert, W.B. : Introduction to Statistical Methods, Prentice-Hall Inc, N.Y. 1955, Ch.VIII, pp 212-213.

The mean score of the distribution is 112.0. The standard deviation is 20.2. Those scoring between M + 8.0 σ and M + 1.8 σ have been assigned grade 'A'.

Those scoring between M + 1.8 σ and M + 0.6 σ have been assigned grade 'B',

Those scoring between M + 0.6 σ and M - 0.6 σ have been assigned grade 'C'.

Those scoring between M - 0.6 σ and M - 1.8 σ have been assigned grade 'D'.

Those scoring between M - 1.8 σ and M - 3.0 σ have been assigned grade 'E'.

Table 34 gives the limits of raw scores for the different grades.

Table 34

Grade	Limitations of corresponding class interval in terms of	Limitations of corresponding class intervals in terms of scores
A	M + 3.0 σ to M + 1.8 σ	173 - 149
B	M + 1.8 σ to M + 0.6 σ	148 - 125
C	M + 0.6 σ to M - 0.6 σ	124 - 100
D	M - 0.6 σ to M - 1.8 σ	99 - 76
E	M - 1.8 σ to M - 3.0 σ	75 - 51

Again Table 35 shows the number of cases that fall in each of the grades :

Table 35

	Grade and class interval	No. of cases out of 500 in each of the grade	Percentage of cases
A	149-173	12	2.4
B	125-148	120	24.0
C	100-124	242	48.4
D	76-99	103	20.6
E	51-75	23	4.6

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