

No. of Pupil	Rank in Latin	Rank in Ethics	No. of Pupil	Rank in Latin	Rank in Ethics
1	1.0	22.5	14	13.0	13.0
2	2.5	17.5	15	13.0	22.5
3	2.5	21.5	16	17.5	1.0
4	5.0	5.0	17	17.5	2.5
5	5.0	8.5	18	17.5	5.0
6	5.0	13.0	19	17.5	24.5
7	8.5	17.5	20	21.0	2.5
8	8.5	21.5	21	21.0	8.5
9	8.5	24.5	22	21.0	17.5
10	8.5	26.0	23	23.5	8.5
11	13.0	8.5	24	23.5	17.5
12	13.0	13.0	25	15.0	5.0
13	13.0	13.0	26	26.0	13.0

Both sets of papers were gone over very carefully and sorted into ten piles each, from the best to the poorest, on the basis of keenness of discrimination manifested in the translation of the Latin and in the analysis of the ethical situations presented.

The following is a summary of the rank comparisons obtained:

The above comparisons yields a correlation of  $-.62$ , when calculated by the formula—Rho equals one minus six times the sum of the rank differences squared, divided by the number of cases times the quantity, the number of cases squared minus one. Since the form of distribution is approximately that of the normal probability curve, the correlation may be inferred from the obtained value of Rho by the use of table No. 36, p. 168, *Mental and Social Measurements*, by Thorndike.

If the formula R equals one minus six times the sum of the plus difference in ranks, divided by the number of cases squared minus one is used and the correlation value inferred from table No. 37 in Thorndike, the result is  $-.93$ .

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## TIME ASSIGNMENT AND RATE OF IMPROVEMENT IN HANDWRITING

There follow a description of the method and a statement of the results of an experiment conducted in grades six A, seven B, and seven A, in three of the white elementary schools of Guthrie, Okla., from January to May, 1915, covering a period of four and a half months, for the purpose of determining the effect upon improvement in handwriting of different amounts of time spent in practice.

*Method.*

The pupils of each school spent in class practice periods fifty (50), seventy-five (75), and one hundred (100) minutes per week, respectively. No attention was given to handwriting other than incidental attention in connection with all written work. There had always been a definite attempt on the part of all teachers concerned with instruction of classes under investigation to secure as good handwriting as possible in all written work, so that in this experiment no extra attention was given to that feature by the teachers of the fifty-minute and seventy-five minute groups.

The first week in January in the middle of the regular penmanship period three copies were made of a short verse which all the children of a room knew, and the best one was picked out; *i. e.* the one the teacher, without reference to any measuring scale, thought the best of the three. Then at the end of the training series, the middle of May, the same procedure was followed, using the same verse, the pupils not knowing at any time that any experiment was being carried out.

These samples of handwriting were all graded or measured the middle of May by the principals of these elementary schools, according to both the Freeman scale and the Ayres scale. One person graded the sixth A specimens of all three schools, both the January and the May specimens; one person, likewise, graded all the seventh B specimens, and one person, all the seventh A specimens. In this way we eliminated any discrepancy that might be due to different judges measuring or grading the work of pupils in some grades and different schools, and different judges measuring beginning and final tests of the same pupil. Beginning papers of the whole group were graded and then final papers, so that the judges, in grading final papers, would have no idea of any particular pupil's score on the beginning paper.

These results were tabulated, and from them the following tables were made, showing the amount of improvement, positive and negative, in each grade in each school, and the number of pupils making each amount of improvement. No attempt has been made to bring out all the possible interpretations of the data here presented, but only some of the general and tentative conclusions.

*RESULTS*

----- In considering results I will confine myself to measurement by the Freeman scale because it, by analyzing handwriting into its elements, makes possible more accurate measurement and diagnosis.

TABLE I  
Amounts of improvement and number of cases of each amount in each grade and each school

Improvement	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	10	Total cases
Seven A.																		
School A.	0	0	0	0	0	0	2	0	3	4	0	1	0	0	1	0	0	11
School B.	0	0	0	0	1	2	5	4	5	5	0	1	3	1	2	0	1	30
School C.	0	0	0	0	1	2	1	0	2	6	2	4	2	1	1	0	0	22
Seven B.																		
School A.	0	0	0	1	0	4	3	5	4	1	1	3	1	1	2	0	0	35
School B.	0	0	0	0	1	0	4	4	1	4	1	1	2	0	1	0	0	19
School C.	1	0	0	0	1	0	1	2	1	2	1	2	0	0	1	0	0	13
Six A.																		
School A.	0	0	0	1	0	0	1	3	4	4	0	1	1	0	0	1	0	16
School B.	0	1	1	1	2	2	2	1	3	1	1	2	2	0	0	0	0	21
School C.	0	0	1	0	0	4	4	3	0	3	1	0	1	0	0	0	0	17
Totals(7A, 7B, 6A).																		
School A.	0	0	0	2	0	4	6	8	11	19	3	3	2	2	1	1	0	62
School B.	0	1	1	1	4	4	11	11	7	12	3	4	6	1	3	0	1	70
School C.	1	0	1	1	1	6	6	5	3	12	4	6	4	1	1	0	0	52
Minutes per week—School A, 50; School B, 75; School C, 100.																		

Comparing improvement of the different practice-period groups and showing per cent of whole group making different amounts of improvement we have

TABLE II.

Improvement	Zero & Neg.	1-3	4-6	7-10	Total	..
School A.	19.35%	61.29%	12.90%	6.45%	99.99%	..
School B.	31.43	42.85	18.57	7.14	99.99	..
School C.	30.77	38.46	26.92	3.84	99.99	..

The weighted average amounts of improvement of the three groups of pupils were as follows:—

School A, 2.37 (Median 2.52)

School B, 2.08 (Median 1.85)

School C, 2.13 (Median 2.70)

These figures show that the fifty-minute group made as a whole the most improvement. The hundred-minute group had, however, more cases of marked improvement. The negative improvement may be accounted for by the following:—1st. Some pupils, entering the schools that year for the first time had bad writing habits (especially bad movement) to be broken up and there was loss while this was being done. Shifting of school population was greatest in School B, and least in School C. 2nd. The stage of physical development of some pupils was undergoing rapid changes, new coordinations, etc., being established, so that there was a noticeable lack of muscular control. This is borne out by the fact that, while the six A group (ages 12-13) constituted but 29.34% of the three groups, 48.14% of the negative improvement was in this grade. 3rd. In some cases there seemed to be a lack of interest in penmanship improvement, and carelessness and inattention resulting from this, led to poorer work. School B had to contend with this condition the most, and School C, the least. If one eliminated negative improvement on the grounds that it (in the first two cases above) is a temporary condition, the weighted average improvement would then be as follows:—

School A, 2.53

School B, 2.42

School C, 2.53

In view of the necessity for economy of time in education it is worth while that more extensive investigations, covering a longer period of time, and including many more pupils and a wider grade distribution of pupils, be made as to the effect of time assignment upon the rate of improvement. This experiment, covering four and a half months time, and including 184 pupils in grades six and seven indicates that (where ordinary care in handwriting is required in all written work) the amount of improvement is not proportional to the amount of time spent in practice; that the fifty-minute-per-week assignment to handwriting practice in these grades gives as good results as the seventy-five-minute or the hundred-minute assignment.

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