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EDUCATIONAL MEASUREMENTS IN A SMALL SCHOOL SYSTEM

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Really to know how the results of teaching fundamental subjects in their school system compared with the work of other organizations over the country became the desire of the teachers of Anoka city schools. They had been told that the schools were the best in the land by patrons and by school board members. The state inspectors who spent from half a day to a day each year with them said that the instruction was good. But these snap judgments hardly sufficed to give any satisfaction in the face of present day educational science.

The desire to know caused these teachers to measure their work by standards which were being used in other school systems. They made a study of many tests and school surveys in order to secure means for testing and data for comparison. They used as texts *Educational Tests and Measurements* by Monroe, DeVoss, and Kelly, and *The Scientific Measurement of Classroom Products* by Chapman and Rush. The instructions and directions for all tests were studied very carefully. It was finally decided that the school work should be measured by the following scales and tests:

1. Ayres Handwriting Scale, "Gettysburg Edition"
2. Ayres Spelling Scale
3. Nassau County Supplement to the Hillegas Composition Scale
4. Thorndike Scale Alpha 2 for Measuring the Understanding of Sentences
5. Kansas Silent Reading Tests
6. Courtis Standard Research Tests in Arithmetic
7. Stone Reasoning Tests
8. Trabue Completion-Test Language Scales.

In order to make the giving and grading of the tests as uniform as possible and in order that the burden should not be too great upon any group of individuals, a number of teachers' meetings were conducted. These served to familiarize all the teachers with the giving and scoring of tests and papers. In every case the

teachers' results were checked by one to four competent persons. The board of education thought the work of so much worth that it secured extra clerical help for checking and tabulating.

The work began in March, 1919, and ended early in May. It consumed a great deal of time and energy but the satisfaction of knowing where we were weak and where we were strong more than repaid us for all our pains.

Because spelling tests were the easiest to correct, we began with that branch of the work. We found that the Springfield, Butte, and Elyria school surveys used those word columns which demanded a spelling ability of 73. Accordingly, words were taken from those lists. Table I shows the median scores made by grades II to VIII. It also gives the scores made by other school systems. We find by comparison that Anoka stands a little better in almost every grade (except the third) than three other systems and worse than two. That is, the teaching of spelling may be characterized as average except in the third-grade classes. In these classes, the results were poor.

The fact that the third-grade classes fell so far below the rest of the system demanded explanation and caused investigation. From the age-grade table we found that the average age for the fourth-grade classes at the beginning of the year was nine years and five months. The average of the third-grade classes was nine years and eight months. This indicated retardation. Upon investigation with the opposites and the Binet-Simon tests, eleven subnormal individuals were found in this grade. This may have been the cause of the poor spelling. However, other causes were found to be the lack of suitable lists of words and poor teaching methods. There was too little individual attention, too much repetition of easy words, too little repetition of difficult words, too much oral spelling, and not enough sentence dictation.

The tests brought to us better methods of teaching spelling. The sixteenth and eighteenth yearbooks of the National Society for the Study of Education, all other available material upon the teaching of spelling, and word lists were brought into use. Numerous tests and contests were undertaken. During September, 1919, tests were given again. Another sampling will be taken in March, 1920, in order to measure improvement.

TABLE I. AYRES SPELLING SCALE—MEDIAN SCORE

GRADE	ANOKA			SPRING-FIELD	BUTTE	COLUMBIA	ELYRIA	PORTLAND	AYRES
	Franklin School	Washington School	Mean						
II...	77	89	83	70	86	69	48	90	73
III...	59	37	48	65	82	66	64	79	73
IV...	65	81	73	70	79	70	67	88	73
V...	74	82	78	72	85	68	69	87	73
VI...	80	75	78	68	75	74	75	87	73
VII...	77	81	79	73	76	69	72	82	73
VIII...	74	.....	74	75	89	67	67	86	73

Because we could secure results for comparison from the various sources and because of the ease of scoring, we adopted the Kansas Silent Reading Tests to measure our results in silent reading. Table II gives the median results for the two Anoka grade buildings. With the exceptions of one third grade, one seventh and one eighth grade, the scores stand well above the average. This third-grade score is low because the whole group had been divided into divisions upon an intelligence basis. The section which made the low marks was the slowest moving division. The low record made by the Washington seventh grade may be accounted for by the fact that the regular teacher was called home on account of sickness. She and her substitute were going over the week's plans while the youngsters were taking the tests. We could in no way account for the work done on this test by one eighth grade. In order to find further proof for poor reading ability in the two grades mentioned, we administered the Thorndike Scale Alpha 2 for Measuring the Understanding of Sentences. The score made by the children was that standard of "8" given by Thorndike for the second year in high school. However, as we know nothing about the correlation of these tests, one with another we cannot say anything concerning the reading ability of these children other than that they stood low according to the Kansas standard and high according to the Thorndike standard. We did derive a great deal of satisfaction from the fact that the youngsters could read well according to Thorndike.

TABLE II. KANSAS SILENT READING TEST—MEDIAN SCORES

GRADE	ANOKA			KANSAS	IOWA	FAR WEST	SOUTH-ERN	AUTHOR
	Franklin School	Washington School	Mean					
II.....	5.2	4.75	5.0	.....	.....	.....	.....	.....
III.....	{ 2.3							
	9.5	10.6	7.8	4.9	6.2	6.1	4.7	5.3
IV.....	14.6	13.0	13.8	9.0	9.5	10.6	8.4	9.5
V.....	14.6	16.3	15.4	13.4	14.6	14.4	12.3	13.2
VI.....	13.0	14.9	14.0	13.7	14.8	15.0	11.8	13.9
VII.....	22.3	13.5	17.9	16.1	17.7	18.0	15.4	16.2
VIII.....	{ 19.7							
	15.8	.....	17.7	20.1	20.6	20.6	19.2	19.2

Even though our scores were high throughout, our teachers were not satisfied with their teaching of reading. They are endeavoring to learn the most scientific methods of teaching this subject. Silent reading now gets more emphasis. This fact is evidenced by the use made of lists of supplementary readers, the requisitions for new material, the increased use of the various libraries, the call for much more new library material (both books and magazines), and the lists of outside reading posted and used in each grade room.

Table III gives the median results for the Stone Reasoning Tests. These tests were corrected and graded by three people. In giving the tests, the teachers were especially careful to follow directions. The results obtained were the most gratifying of all. The scores no doubt demonstrate the reading ability of the pupils as well as their reasoning power. The median accuracy scores are higher than the median reasoning scores of all the other cities except those of Salt Lake City. The scores may indicate that in the study of arithmetic, too much emphasis has been placed upon this type of work. The results for the Curtis Standard Research Tests in Arithmetic, Series B, also suggest that perhaps too much time and emphasis are devoted to reasoning problems and not enough to habit formation in the four fundamentals. While the speed and accuracy scores are not the lowest within the lists of comparisons, they fall far short of the author's standards and the better work of some of the schools listed. Table IV shows the

TABLE III. STONE REASONING TESTS—MEDIAN SCORES

GRADE	REASONING SCORES							ACCURACY SCORES		
	ANOKA			BUTTE	SALT LAKE CITY	ELGIN	JANES- VILLE	ANOKA		
	Frank- lin	Wash- ington	Mean					Frank- lin	Wash- ington	Mean
V.....	4.2	4.0	4.1	2.2	3.7	2.9	2.4	3.2	4.0	3.6
VI.....	6.4	5.0	5.7	3.9	6.4	5.0	3.4	5.5	4.0	4.7
VII.....	6.8	10.8	8.8	5.8	8.6	6.0	5.8	6.8	9.9	7.9
VIII.....	9.7	.....	9.7	7.7	10.5	8.0	6.3	9.4	.....	9.4

median number of examples correct at Anoka and a comparison of these figures with those obtained elsewhere and with Mr. Courtis' standards. The comparisons for the number of examples attempted and for the percent of accuracy indicate about the same relative position for Anoka. The results informed us that much time, energy, information, and teaching ability will be necessary to bring our schools up to standards set by other schools and by the needs of ordinary life. As soon as the scores were reported the teachers began to call for all types of information upon teaching and drilling fundamental facts in number work. Four sets of Studebaker Economy Practice Exercises in Arithmetic¹ were purchased and are now used. The sixteenth and eighteenth year-books of the National Society for the Study of Education were again brought into service. Better teaching of the fundamentals will result.

The product of a handwriting test was judged both for speed and quality by means of the Gettysburg Edition of the Ayres Handwriting Scale. The work was done by two teachers, the writing supervisor, and the teacher of commercial subjects. The average of their scores was taken. As the median marks indicate, the speed of the pupils is high and the quality is low. The only remedy we can find for this condition is not less attention to speed but more attention to letter and word formation. By a study of the quality (Table V) we notice that there is no marked improvement in ability to write more legibly until we reach the seventh grade. This grade as well as the eighth suddenly approach the standard in quality. The cause for such poor penmanship in the

¹ These are published by Scott, Foresman and Company.

lower grades and such sudden improvement in the upper grades may be due to the writing method used. We feel that we wish to develop rapid writers rather than slower drawers. We have not yet found a method whereby we can keep our speed and at the same time teach better quality.

TABLE IV. COURTIS STANDARD RESEARCH TESTS IN ARITHMETIC, SERIES B—RIGHTS

GRADE	ANOKA			DE-TROIT	BOS-TON	IND- IANA	SALT LAKE CITY	BUTTE	COL- UMBIA	KAN- SAS	AUTHOR
	Frank- lin	Wash- ington	Mean								
Addition											
IV..	2	2	2	.....	.....	.....	.....	.....	.....	.....	6
V..	4.2	3	3.6	5.7	6.6	3.6	4.1	2.9	2.4	3	8
VI..	4.8	4.9	4.8	7	8.3	4.4	6.4	3.4	2.9	3.9	10
VII..	5	4	4.5	7.5	9.0	4.9	6.9	3.8	3.9	4.8	11
VIII..	6	.....	6	9.4	10.4	5.8	8.5	5.3	4.0	5.4	12
Subtraction											
IV..	3.5	4	3.7	.....	.....	.....	.....	.....	.....	.....	7
V..	7	6	6.5	7.9	7.7	5	5.2	5.5	4	4	9
VI..	6.4	6	6.2	8.6	9.5	6.5	7.8	5.8	4.8	5.9	11
VII..	8	7	7.5	9.9	10.3	7.9	8.8	7.1	5.6	7.2	12
VIII..	12	.....	12	12.5	11.8	8.9	9.8	9.8	5.4	7.7	13
Multiplication											
IV..	4	4	4	.....	.....	.....	.....	.....	.....	.....	6
V..	6.3	4	5.2	5.8	5.6	3.9	4.3	4.1	3.4	3.1	8
VI..	5.4	5	5.2	7.2	7.2	5.1	5.3	5.0	4.4	4.7	9
VII..	5.8	7	6.4	7.8	8.2	5.9	7.1	6.5	5.5	5.9	10
VIII..	8.4	.....	8.4	9.8	9.3	7.3	8.3	8.1	4.6	8.3	11
Division											
IV..	4	2	3	.....	.....	.....	.....	.....	.....	.....	.....
V..	5	3	4	4.6	4.9	2.6	3.0	3.6	2.5	2	6
VI..	4.2	3	3.6	7.3	7.4	4.8	5.5	4.3	3.9	3.5	8
VII..	4.6	6	5.3	9	8.8	6.7	7.7	7.2	5.5	5.3	10
VIII..	8.8	.....	8.8	11.7	11.0	9.1	9.5	10.2	5.5	8.3	11

Language and composition ability were tested and scored by the Trabue Language Scales, Series B and C, and by the Nassau County Supplement to the Hillegas Scale. By the median scores in Tables VII and VIII it may be seen that the pupils stand high in language and composition writing abilities. The

compositions were scored by four judges. Two of these were teachers, the third was the superintendent, while the fourth was engaged from outside the system. The judgments were independent. The average of the four opinions was taken as the final score. While some differences in scores were found, there was a striking similarity in the four sets of marks.

TABLE V. AYRES HANDWRITING SCALE "GETTYSBURG EDITION"—
MEDIAN QUALITY SCORES

GRADE	ANOKA			CLEVE- LAND	KANSAS	ILLINOIS	IOWA	AYRES	GARY
	Frank- lin	Wash- ington	Mean						
II...	30	33	31.5	.....	44	39.7	35.7	38	.....
III...	{ 30								
	{ 33	30	31	.....	47	42	39.8	42	30
IV...	30	33	31.5	.....	50	45.8	44.5	46	31
V...	37	33	35	45	55	50.5	49.1	50	34
VI...	37	47	42	48	59	54.5	52.3	54	36
VII...	63	50	56.5	50	64	58.9	57	58	39
VIII...	{ 50	.....	58.5	55	70	62.8	61	62	42
	{ 67								
IX...	.....	.....	85	.....	.....	.....	.....	.....	43

TABLE VI. AYRES HANDWRITING SCALE—"GETTYSBURG EDITION"—
MEDIAN SPEED SCORES

GRADE	ANOKA			CLEVE- LAND	KANSAS	ILLINOIS	IOWA	AYRES	GARY
	Frank- lin	Wash- ington	Mean						
II...	30	35	32.5	.....	32	30.6	39.2	32	.....
III...	{ 32								
	{ 42	42	38.5	.....	35	43.8	49.2	44	18
IV...	55	88	71.5	.....	51	51.2	61.9	56	45
V...	81	84	82.5	60	61	59.1	65.5	64	58
VI...	72	84	78	70	67	62.8	72.6	70	70
VII...	82	86	84	78	71	67.9	75	76	80
VIII...	{ 84	.....	88	80	73	73	76.5	80	90
	{ 92								
IX...	.....	.....	86	.....	.....	.....	.....	.....	100

TABLE VII. TRABUE LANGUAGE SCALES, SERIES B AND C

GRADE	AUTHOR'S STANDARDS	ANOKA		
		25-percentile	Median	75-percentile
II.....	6	10	12	16
III.....	12	11	13	16
IV.....	16	14	18	21
V.....	18	18	22	25
VI.....	22	21	25	28
VII.....	24.6	23	26	28
VIII.....	26.6	23	26	29
IX.....	28.4	27	28	31

TABLE VIII. NASSAU COUNTY SUPPLEMENT TO THE HILLEGAS SCALE—MEDIAN SCORES

GRADE	ANOKA			SALT LAKE CITY	BUTTE	AUTHOR
	Washington	Franklin	Mean			
III.....	2.5	3.2	.....	.....	.....	.....
IV.....	3.5	3.5	3.5	2.9	2.34	3.5
V.....	3.1	3.8	3.45	3.1	2.87	4.0
VI.....	4.1	4.8	4.45	3.8	3.40	4.5
VII.....	4.9	5.5	5.2	4.4	3.75	5.0
VIII.....	.....	6.1	6.1	5.4	4.11	5.5

The measurement work above described has been very beneficial to the teachers, supervisors, principals, and superintendent. This is proved by the fact that some of the teachers have asked that during the present year two measurements be taken. The first samples were taken in October. The second will be taken in April. We shall then be able to see how much improvement has been made in the various subjects and grades.

This study of the tests has been a great help to the school system. It has acquainted the teachers with the measurement movement in education. It has helped them to discover individual weaknesses in various pupils. It has made the faculty more cognizant of individual differences. They are beginning to learn best methods for teaching fundamentals; methods based not so much upon *a priori* reasoning as upon facts, results, and investigations.

There has been much professional growth on the part of the faculty. As a manifestation of their interest sixteen of the force are taking a University of Minnesota extension course in mental diagnosis. This knowledge should bring further improvements in their teaching.

REFERENCES

- Cubberley, E. P. *School organization and administration*. Yonkers, N. Y.: World Book Co., 1916.
- Educational survey of Elyria, Ohio*. (United States Bureau of Education. Bulletin No. 15, 1918.)
- Monroe, W. S., De Voss, J. C., and Kelly, F. J. *Educational tests and measurements*. New York: Houghton Mifflin Co., 1917.
- Public schools of Columbia, South Carolina*. (United States Bureau of Education. Bulletin No. 28, 1918.)
- Public schools of Springfield, Illinois. Educational section of the Springfield survey conducted under direction of Leonard P. Ayres*. New York: Division of Education, Russell Sage Foundation, 1914.
- Strayer, George D. *Some problems in city school administration*. Yonkers, N. Y.: World Book Co., 1916.