THE COST OF EDUCATION PER UNIT OF ACHIEVEMENT IN ELEMENTARY SCHOOLS

by

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Master of Arts

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1 9 3 5

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Date

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CHAPTER I

INTRODUCTION

The cost of education has ever been a consideration of major importance, especially in periods of economic distress and in the political district which contributes the funds for any educational enterprise.

Various methods and terminologies have been used to indicate the cost of education. In most instances, the outcome of the educational system has not been given major consideration. The outcome or result is the only phase of education that need be considered in justifying or condemning an educational system. In this connection, education may be defined as the sum total of all the changes that have been effected in the pupils of the schools.

Thus it is evident from analysis of publications that cost is indicated by units that consider only the constant factor of the pupil in attendance or the teaching unit and disregard the cost involved in securing the outcomes obtained.

Statement of the Problem

The problem of this study is to determine the financial cost of education in terms of pupil outcomes as measured by standardized tests in the elementary public schools.

The cost of public education in the United States and in its various political subdivisions is commonly indicated by the following terms or units:

(1) Cost per pupil per year.[1] (2) Daily instructional cost per pupil per subject.[2] (3) Cost per unit of subjects taught in teachers' colleges.[3] (4) Cost per unit of teaching high school subjects.[4]

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[1] Comstock, Lulu Mae, "Per Capita Costs in City Schools, 1929-30," U. S. Office of Education Bulletin No. 19, 1931.
Crouch, Edward G., "Cost of Education Per Student in 277 Small Iowa High Schools," Masters Thesis, 1929, Iowa State College, Ames.

[2] Clark, James R., "The Daily Instructional Cost Per Pupil Per Subject in High Schools of Randolph County, Indiana," Masters Thesis, Indiana University, 1930.

[3] Sangren, Paul V., "Unit Cost Study of Instruction in Western State Teachers' College, 1929", Western State Teachers' College, Kalamazoo, Michigan.

[4] Davis, Harvey H., "A Technique for Computing Unit Costs of Subjects Taught in High Schools," Doctor's Thesis, 1928, University of Iowa
Indall, Harold A., "Cost of Teaching High School Subjects in South Dakota," Masters Thesis, University of Iowa, 1928.
Morgan, Bert E., "Cost per Unit of Teaching High School Subjects in Iowa Schools Offering Vocational Agriculture," Masters Thesis, 1929, Iowa State College, Ames.

(5) The daily instructional cost per pupil.[5] (6) The cost per class period.[6] (7) The cost per pupil per period.[7]

This problem is confined to the cost per unit of achievement in the elementary school of Saint David, Arizona. The Pressey First Grade Reading Test measured the achievement in Grade 1; the New Standard Achievement Test, Primary and Advanced, measured the achievement in grades 2 to 8 inclusive, the composite score being used as the evidence of advancement. The data on expenditure were obtained from the District records and from the office of County Superintendent of Schools.

The data on achievement and expenditures are for the fiscal years 1932-33 and 1933-34. The unit of achievement is based wholly upon the pupil outcomes measured by the tests.

[5] Sweet, Stanford, "A Study of Costs in the High Schools of Arizona," Masters Thesis, University of Arizona, 1923

[6] Ibid

[7] Ibid

CHAPTER II

NEED FOR DEFINITE UNIT UPON WHICH TO BASE COST OF EDUCATION IN ANY SYSTEM

The purpose of elementary education in the United States is to produce the desirable pupil outcomes of habits, knowledge, skills, techniques and attitudes; to perpetuate the necessary social institutions and to insure the stability of social thought and actions.

All expenditures for gounds, buildings, equipment, financing, janitorial service, teachers' service, etc., are only a means to an end. The fundamental object of public education is to secure to as great an extent as possible the desirable education of the pupil.

If desirable outcomes are absent or are not secured to an optimum degree, the system is, to that extent, failing to achieve its primary object.

It is becoming increasingly more important for the administrator to indicate definitely and accurately what the tax dollar is buying.

The tax payer, the parent, and the administrator need a definite index of cost in terms of desirable pupil outcomes if the proper economy, efficiency and cooperation is to be effected.

It is evident that to indicate the cost of education in terms of money and the pupil unit or in terms of money and the subject unit is merely a fiscal expediency and convenience. To state that in one system the A.D.A. cost per year is $100 and in another system the A.D.A. cost per year is $150 is to indicate definitely but one thing--that when the A.D.A. is stated, the annual expenditure may be computed. This method of stating cost does not inform anyone which system is securing the lowest cost per unit of pupil outcome. It is highly possible that the system expending the fifty per cent more money per pupil is securing more than fifty per cent more pupil outcome, the production of which is the only reason for a school's existence.

Many factors enter into the efficiency of a school system, the treatment of which is largely outside the limits of this study. However, it is generally recognized that often in a school system, an additional increase of, for example, ten per cent in expenditure may result in an increase of desirable results of far more than ten per cent over former output.

When emphasis is placed upon cost per pupil unit or per subject unit, the natural tendency of the administrator is to reduce the cost per unit, but in reducing the cost the pupil outcome is too often obscured and neglected. To state that the cost per pupil in A.D.A. has been reduced in a system does not necessarily state how well or how effectively the school dollar has been expended. False economy may be practiced in a school system as in any other organization.

In the publications previously cited, no references are made to the changes produced in the pupils by the stated expenditures. The reader has no information concerning the relative achievement of the schools studied or the outcomes produced within any one system. The emphasis in these studies is placed upon a unit which indicates little, if any, measurement of pupil outcomes, the production of which is the prime objective of the school.

> "In the school of the future---------there will be an increasing need for developmental facts, obtained by reliable methods of observation; there will be more need than ever for methods of measuring what is being accomplished. Enlightened parents will seek more information about what the schools are doing, and what changes are being brought about in their children. Tax payers may demand from the schools an accounting of results, in terms of objective standards which will be intelligible to the layman." [8]

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[8] Williams, J. Harold, Education, Volume 53, March 1933, pp. 417-420.

CHAPTER III

ORGANIZATION OF DATA; DEFINITION OF TERMS

The unit of achievement (U. A.) herein used to indicate the achievement of each pupil and of the entire school per school year is the quotient of nine months achievement divided by nine; or, it is the standard achievement per pupil for one school year as measured by the tests used.

9 months progress $\div$ 9 $\equiv$ 1 U.A.

The scores were carefully computed for each test. The number of months progress was determined by comparing the pupil's total score in September with the pupil's total score in May of the same school year. The progress in months was determined from the column indicating the school grade in the test for grades 2 to 8 inclusive. For grade 1, the progress was interpolated on the basis of the norms as established by the Pressey First Grade Reading Test.

In order to indicate more accurately the efficiency of school system, the relation between the number of pupils taught and the total pupil outcome must be expressed. In this study, the A.D.A. is taken as the basis to indicate the size of the group receiving the benefits of the instruction, since only those in actual attendance may benefit from the expenditure.

Therefore, the U. A.s of the entire system for the year divided by the A.D.A. for the year will be used to indicate the efficiency of the school, or the E.Q. (Efficiency Quotient).

Computation of U.A. of First Grade

In the Pressey Test a score of 19 points equals standard achievement at the end of four and one half months. A score of 35 equals standard achievement at the end of nine months. 16 points indicate the standard progress during the last half of the school year or during four and one half months. Thus one month progress would be indicated by 16 $\div$ $4\frac{1}{2}$ or 3.55 points on the scale. Further, 1 point on the scale would indicate .28 month progress and progress in months $\div$ 9 equals U.A. or .28 month progress equals .0311 U.A.

Since 19 points measured the standard achievement from the beginning of the school year to the end of the first semester and from 19 to 35 on the scale measured the standard achievement of the second semester, in order to approximate the value of the points above 35 the same value was given each point above 35 as was indicated by each point on the scale between the two norms of 19 and 35 which represent the norms of pupils at the end of the first and second semesters, respectively.

35 — 19 = $4\frac{1}{2}$ months progress.

16 $\div$ 4.5 = 3.55 points or measurement of one months progress. According to definition of U.A. the progress in months $\div$ 9 = 1 U.A.

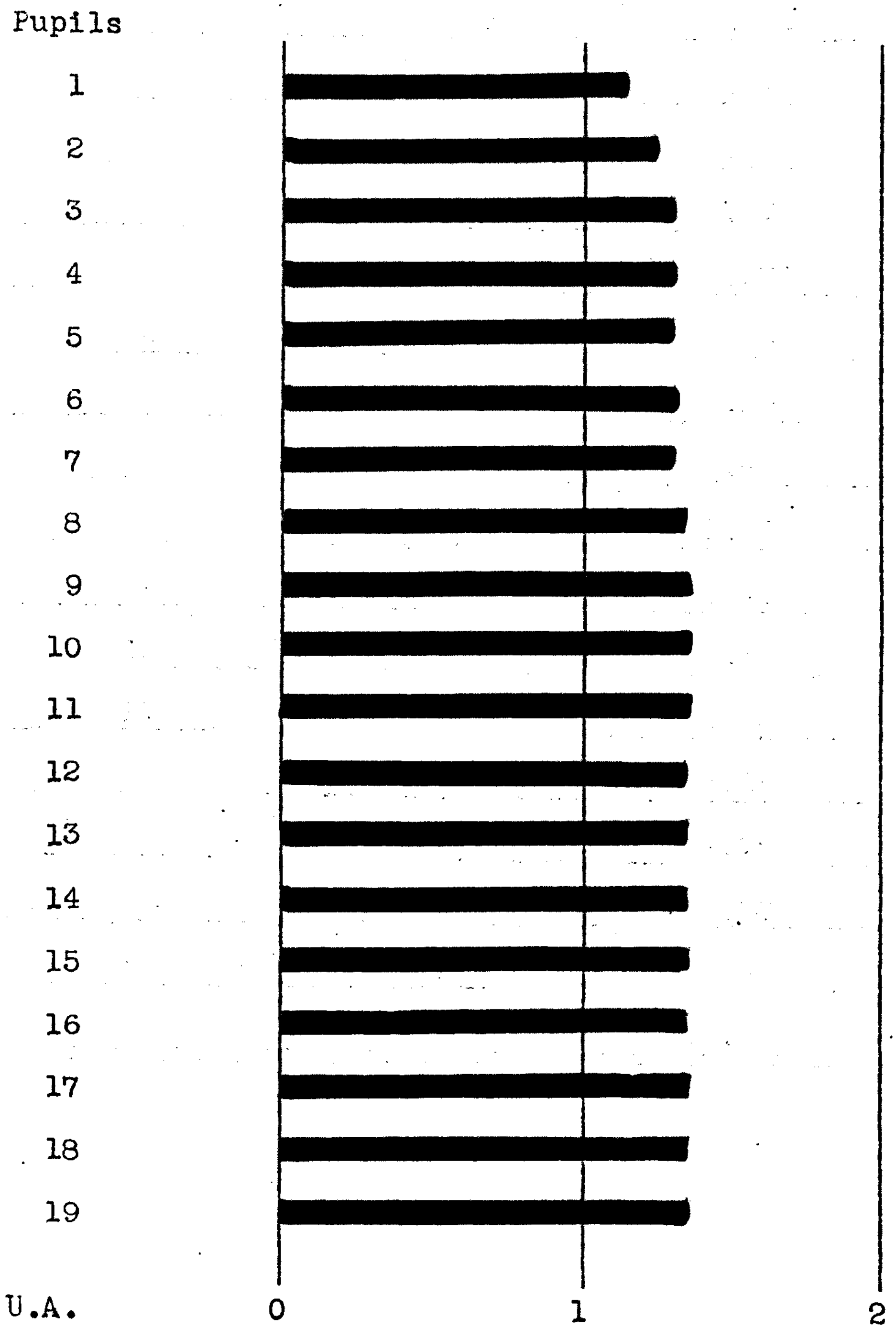
1 point therefore equals .28 month ($1 \div 3.55$); $.28 \div 9 = .0311$ U.A.

A score of 35 represents one year's achievement or 1 U.A. Each point above 35 has a value of .0311 U.A.

Units of Achievement of First Grade 1932 - 33
Derived from Pressey First Grade Reading Test

Pupils #	Score	Months Progress	U. A.
1	38	9.84	1.09
2	42	10.96	1.21
3	44	11.52	1.28
4	44	11.52	1.28
5	44	11.52	1.28
6	44	11.52	1.28
7	44	11.52	1.28
8	45	11.80	1.31
9	45	11.80	1.31
10	45	11.80	1.31
11	45	11.80	1.31
12	45	11.80	1.31
13	45	11.80	1.31
14	45	11.80	1.31
15	45	11.80	1.31
16	45	11.80	1.31
17	45	11.80	1.31
18	45	11.80	1.31
19	45	11.80	1.31
Total			24.42

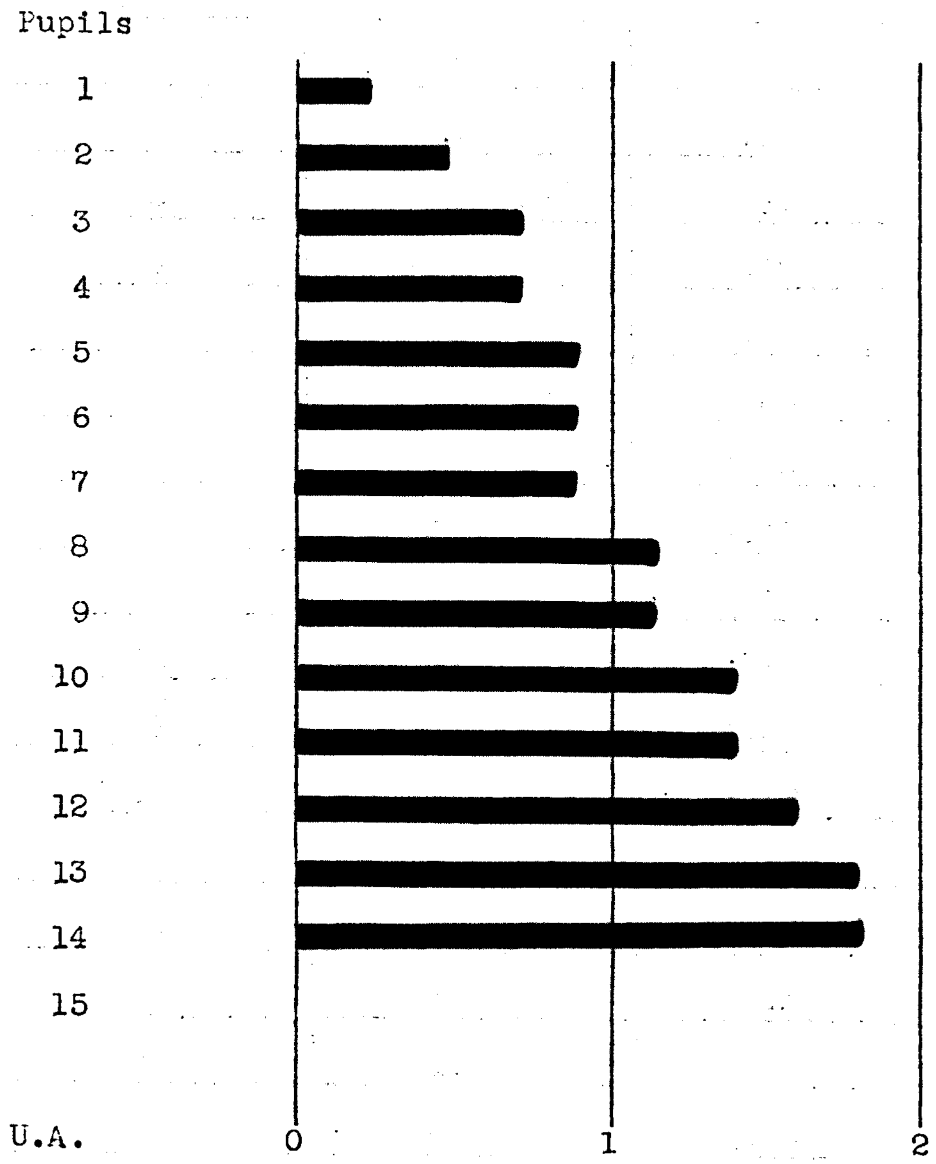
Units of Achievement of First Grade 1932 - 33



Units of Achievement of Second Grade 1932 - 33

Pupils #	Months Progress	U. A.
1	2	.22
2	4	.44
3	6	.67
4	6	.67
5	8	.89
6	8	.89
7	8	.89
8	10	1.11
9	10	1.11
10	12	1.33
11	12	1.33
12	14	1.55
13	16	1.78
14	16	1.78
15	--	---
Total		14.66

Units of Achievement of Second Grade 1932 - 33

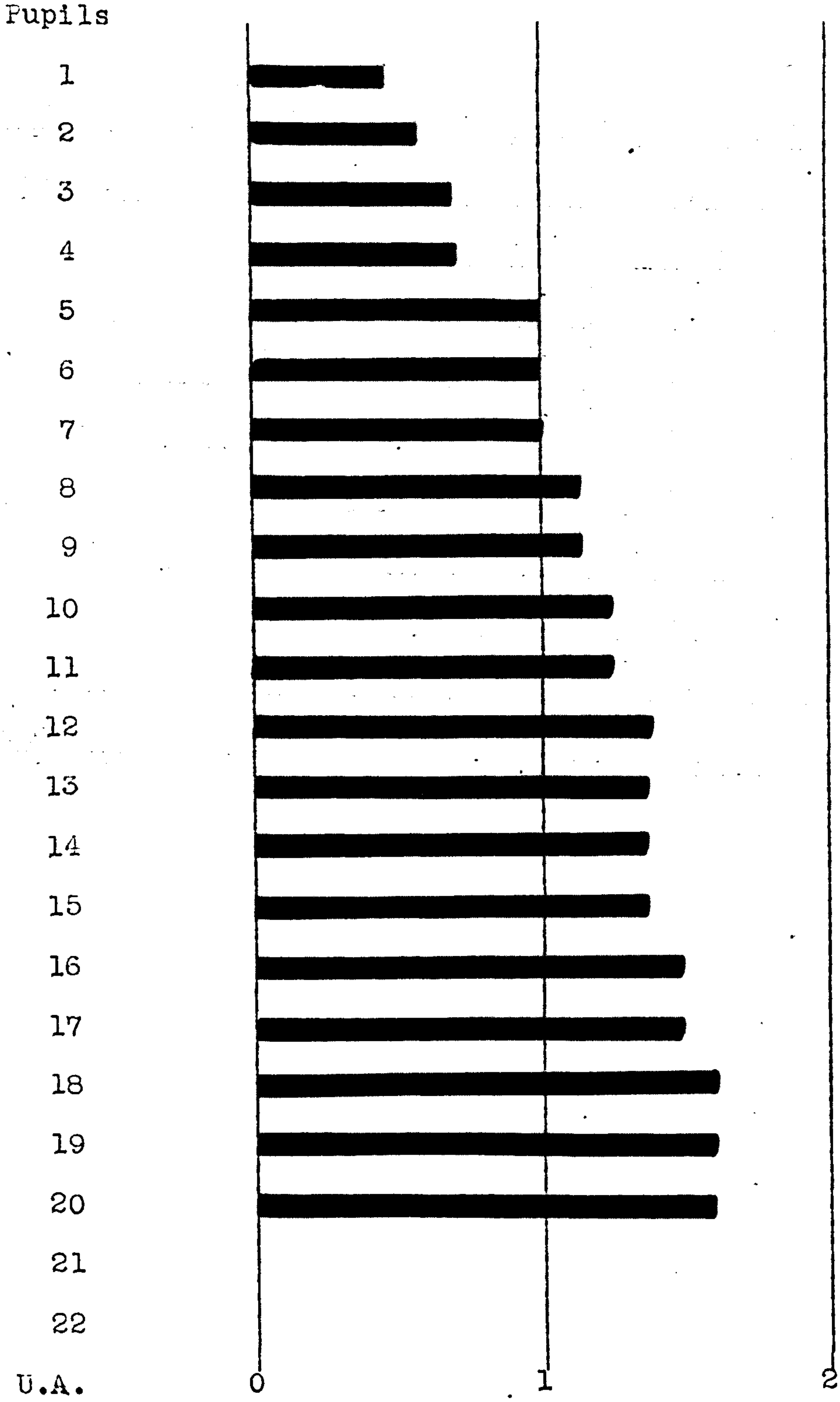


Units of Achievement of Third Grade 1932 - 33

Pupils #	Months Progress	U. A.
1	4	.44
2	5	.55
3	6	.67
4	6	.67
5	9	1.00
6	9	1.00
7	9	1.00
8	10	1.11
9	10	1.11
10	11	1.22
11	11	1.22
12	12	1.33
13	12	1.33
14	12	1.33
15	12	1.33
16	13	1.44
17	13	1.44
18	14	1.55
19	14	1.55
20	14	1.55
21	x---	----
22	x---	----
Total		22.83

x No record.

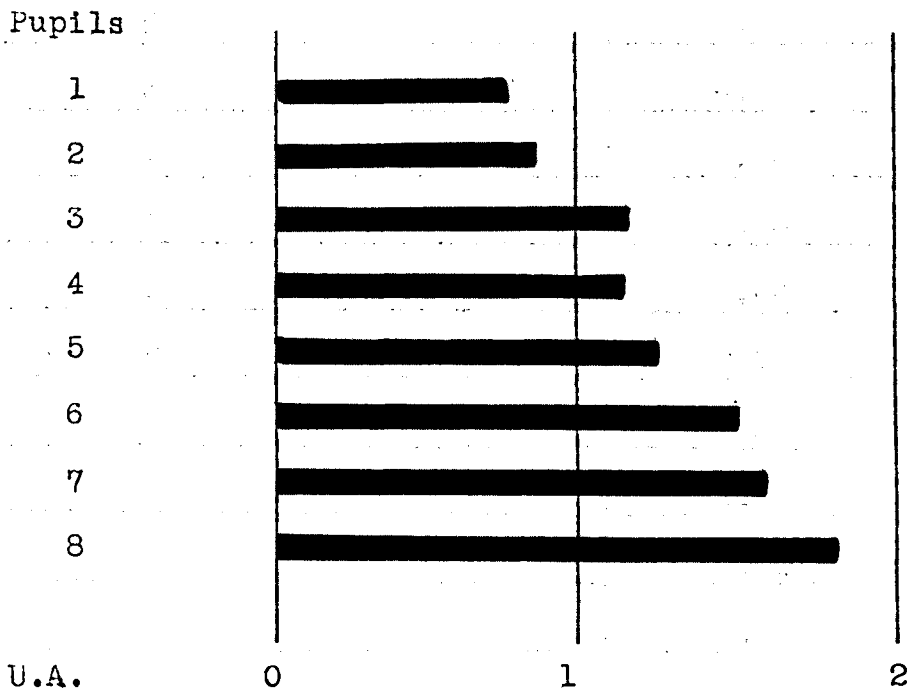
Units of Achievement of Third Grade 1932 - 33



Units of Achievement of Fourth Grade 1932 - 33

Pupils #	Months Progress	U. A.
1	7	.78
2	8	.89
3	10	1.11
4	10	1.11
5	11	1.22
6	13	1.44
7	14	1.55
8	16	1.78
Total		9.88

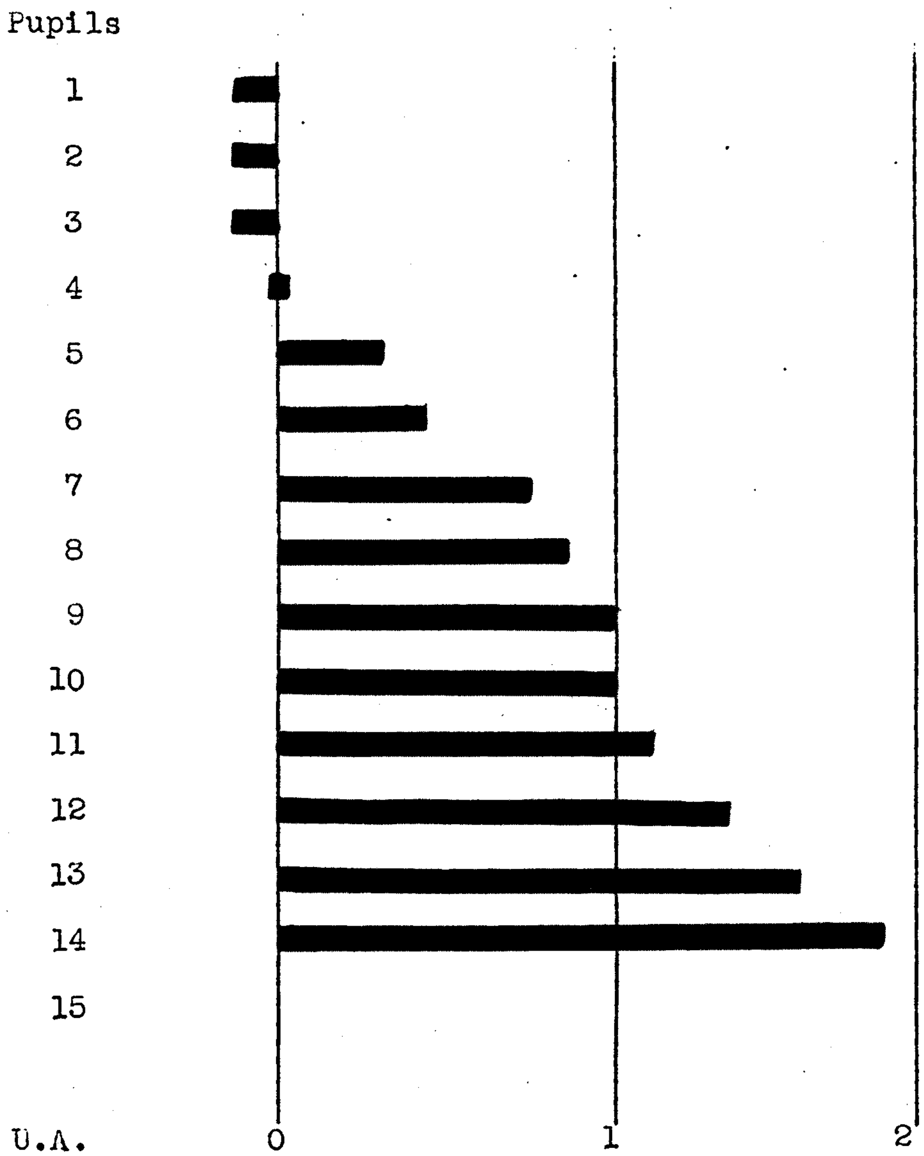
Units of Achievement of Fourth Grade 1932 - 33



Units of Achievement of Fifth Grade 1932 - 33

Pupils #	Months Progress	U. A.
1	-1	-.11
2	-1	-.11
3	-1	-.11
4	0	.00
5	3	.33
6	4	.44
7	7	.78
8	8	.89
9	9	1.00
10	9	1.00
11	10	1.11
12	12	1.33
13	14	1.55
14	17	1.89
15	--	-----
Total		9.99

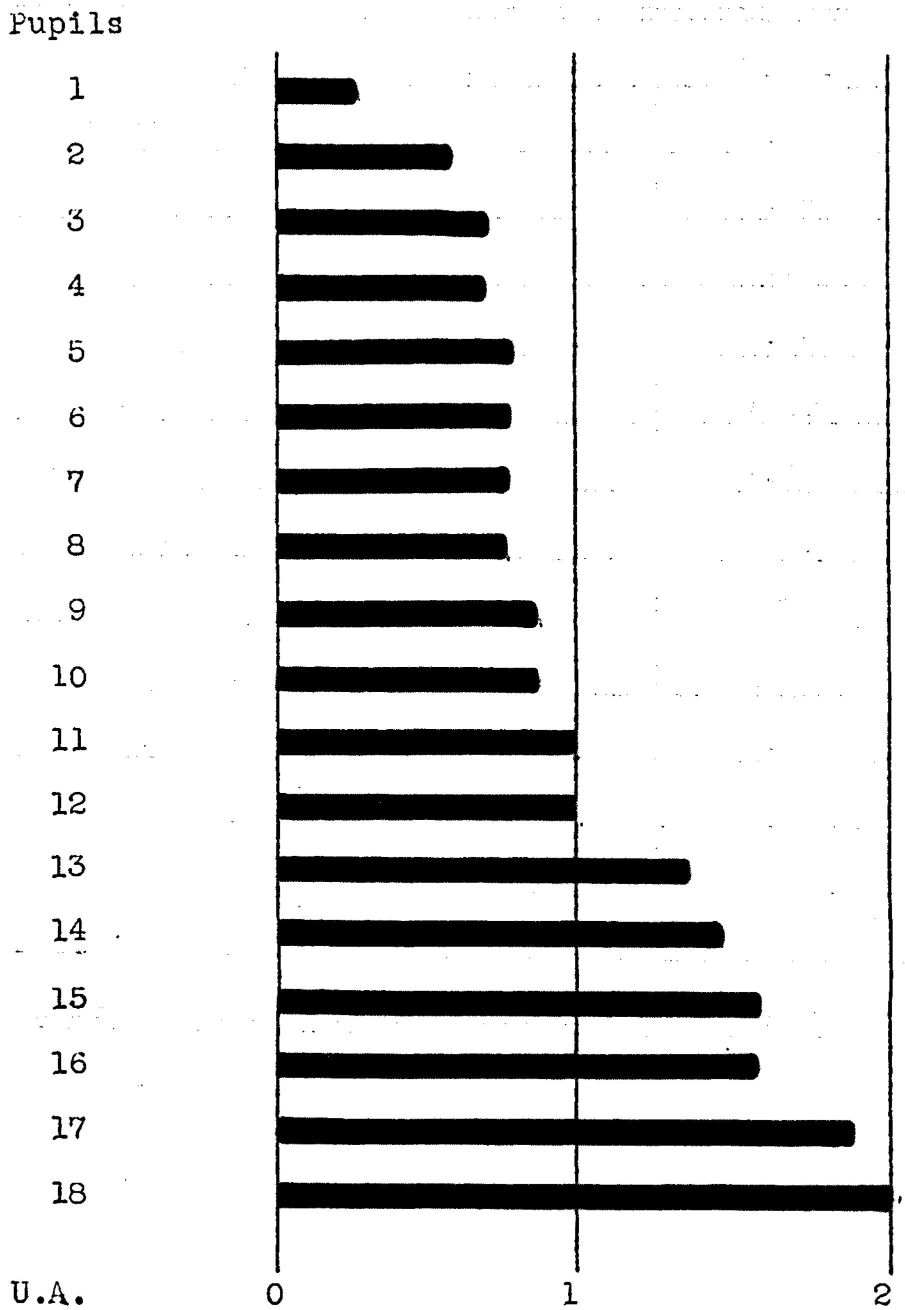
Units of Achievement of Fifth Grade 1932 - 33



Units of Achievement of Sixth Grade 1932 - 33

Pupils #	Months Progress	U. A.
1	2	.22
2	5	.55
3	6	.67
4	6	.67
5	7	.78
6	7	.78
7	7	.78
8	7	.78
9	8	.89
10	8	.89
11	9	1.00
12	9	1.00
13	12	1.33
14	13	1.44
15	14	1.55
16	14	1.55
17	17	1.89
18	18	2.00
Total		18.77

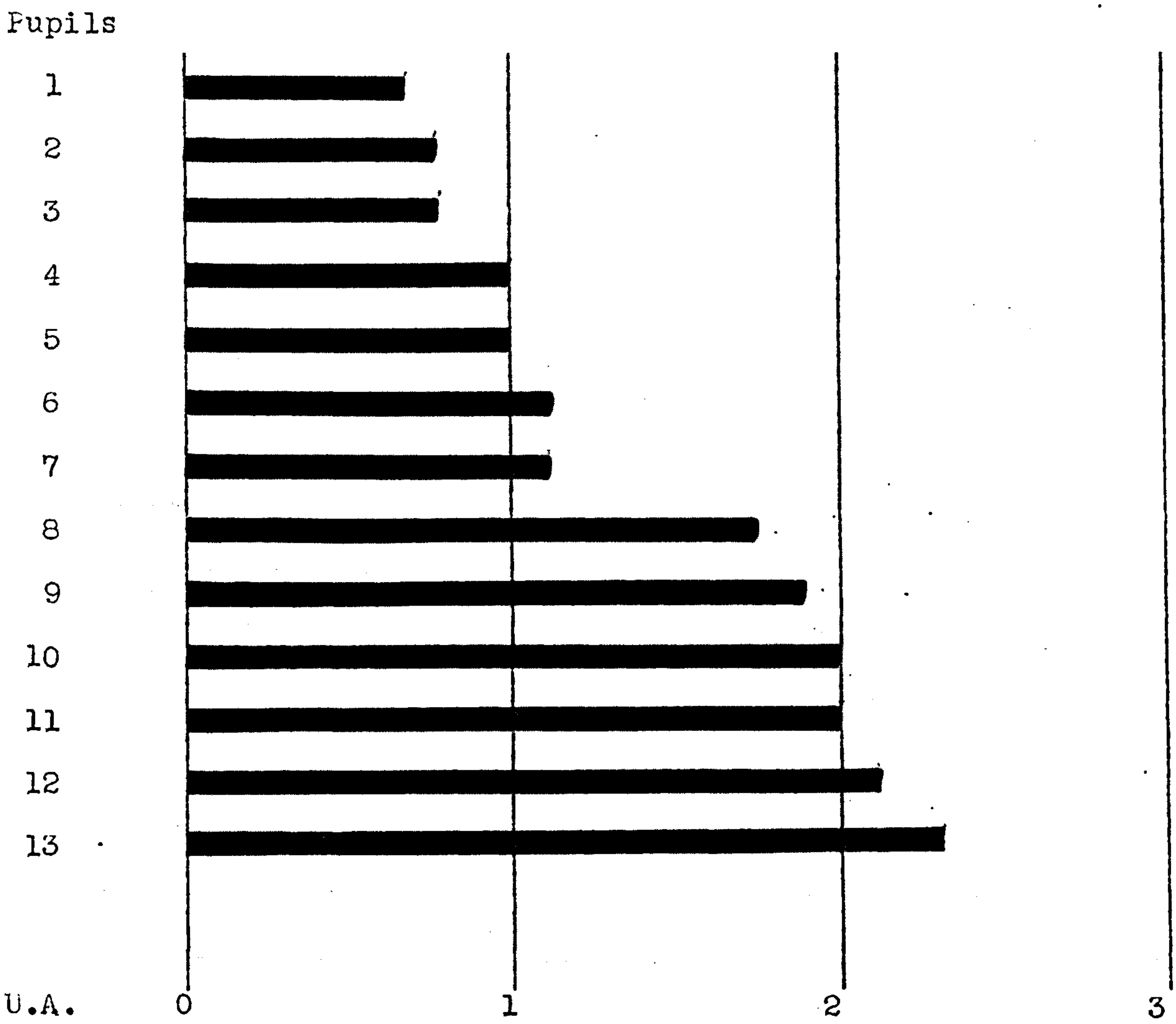
Units of Achievement of Sixth Grade 1932 - 33



Units of Achievement of Seventh Grade 1932 - 33

Pupils #	Months Progress	U. A.
1	6	.67
2	7	.78
3	7	,78
4	9	1.00
5	9	1.00
6	10	1.11
7	10	1.11
8	16	1.78
9	17	1.89
10	18	2.00
11	18	2.00
12	19	2.11
13	21	2.33
Total		18.56

Units of Achievement of Seventh Grade 1932 - 33

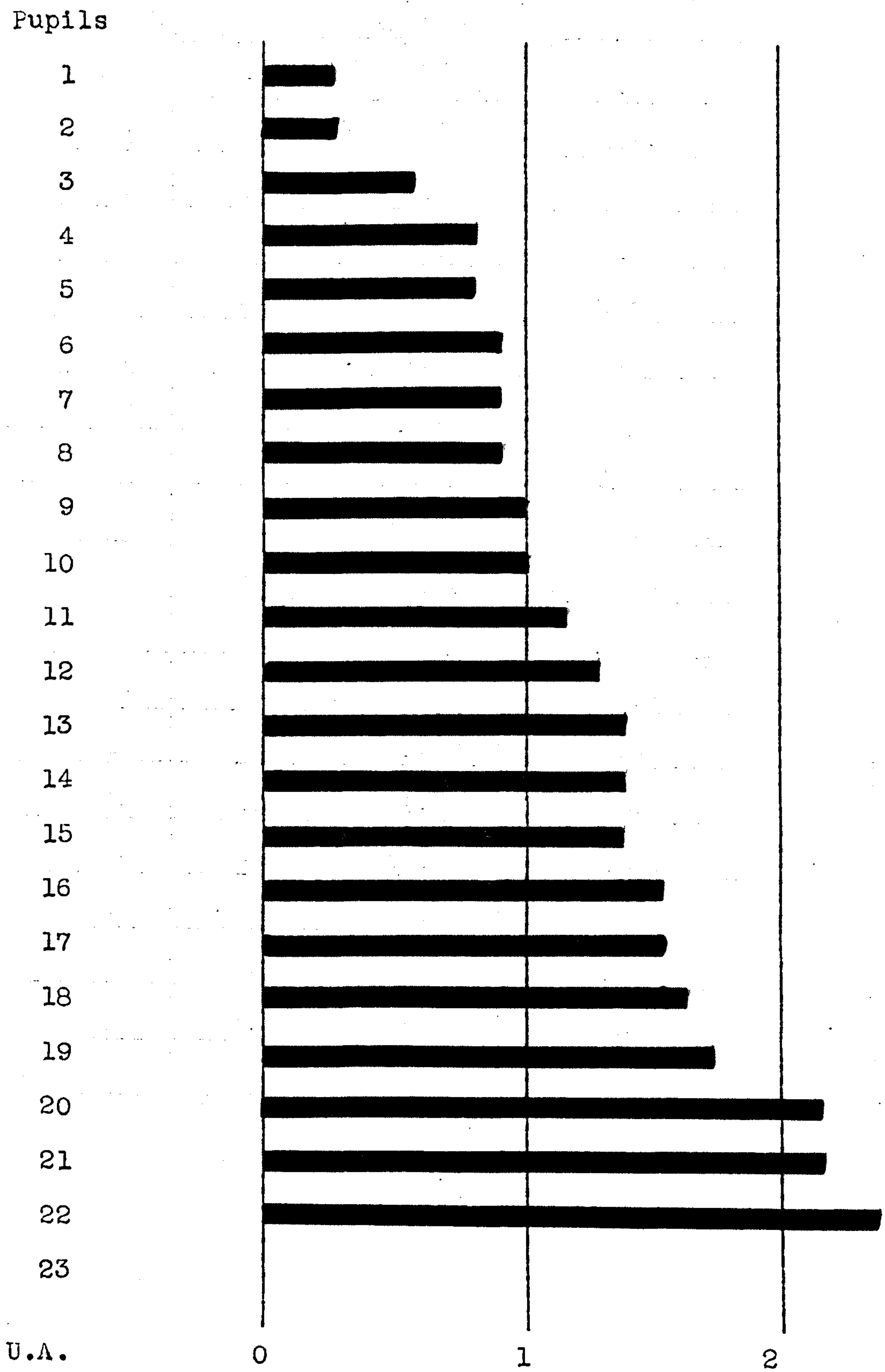


Units of Achievement of Eighth Grade 1932 - 33

Pupils #	Months Progress	U. A.
1	2	.22
2	2	.22
3	5	.56
4	7	.78
5	7	.78
6	8	.89
7	8	.89
8	8	.89
9	9	1.00
10	9	1.00
11	10	1.11
12	11	1.22
13	12	1.33
14	12	1.33
15	12	1.33
16	13	1.44
17	13	1.44
18	14	1.56
19	15	1.67
20	19	2.11
21	19	2.11
22	21	2.33
23[x]	--	----
Total		26.21

x No record.

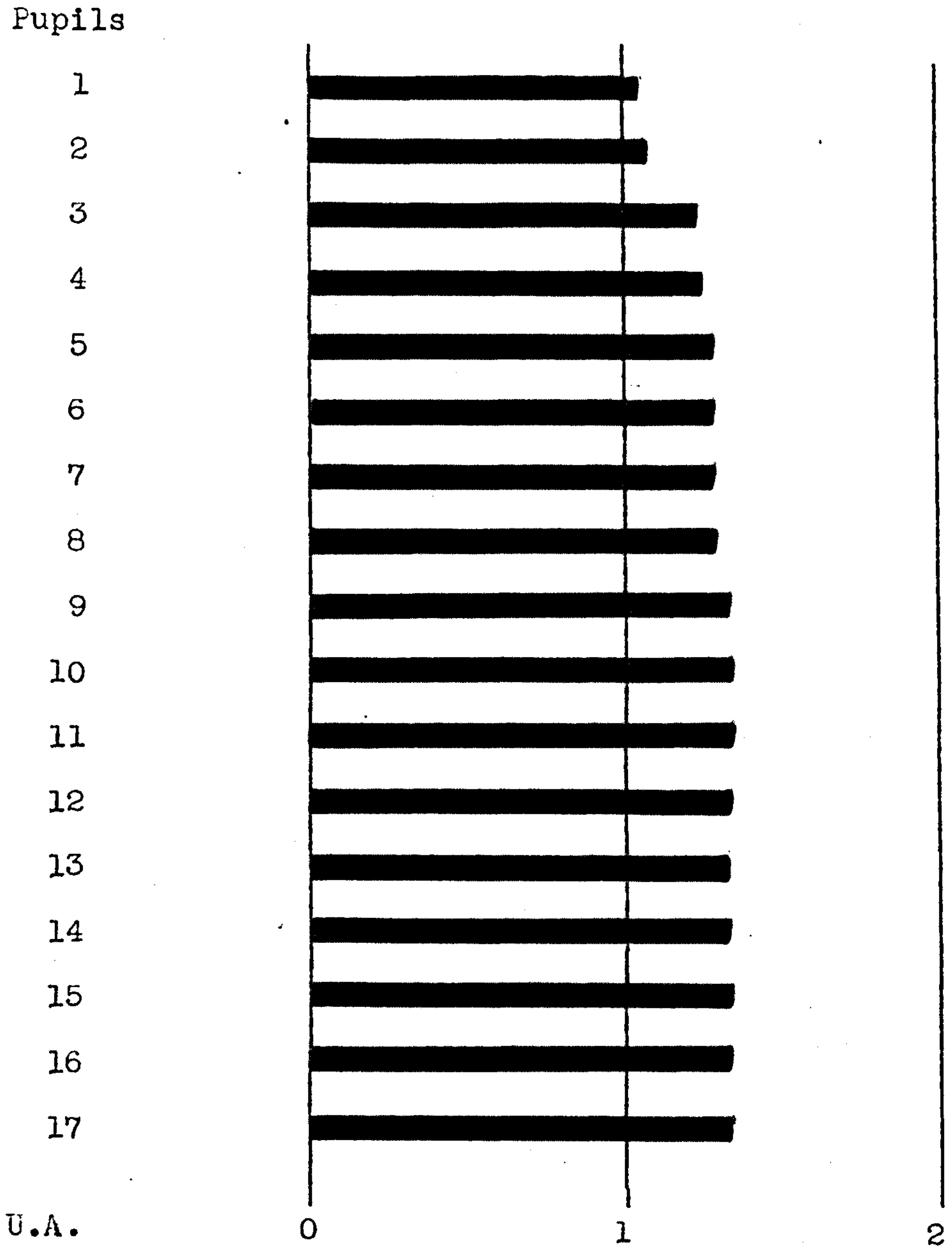
Units of Achievement of Eighth Grade 1932 - 33



Units of Achievement of First Grade 1933 - 34
Derived from Pressey First Grade Reading Test

Pupils #	Score	Months Progress	U. A.
1	36	9.28	1.03
2	37	9.56	1.06
3	42	10.96	1.22
4	42	10.96	1.22
5	44	11.52	1.28
6	44	11.52	1.28
7	44	11.52	1.28
8	44	11.52	1.28
9	45	11.80	1.31
10	45	11.80	1.31
11	45	11.80	1.31
12	45	11.80	1.31
13	45	11.80	1.31
14	45	11.80	1.31
15	45	11.80	1.31
16	45	11.80	1.31
17	45	11.80	1.31
Total			21.44

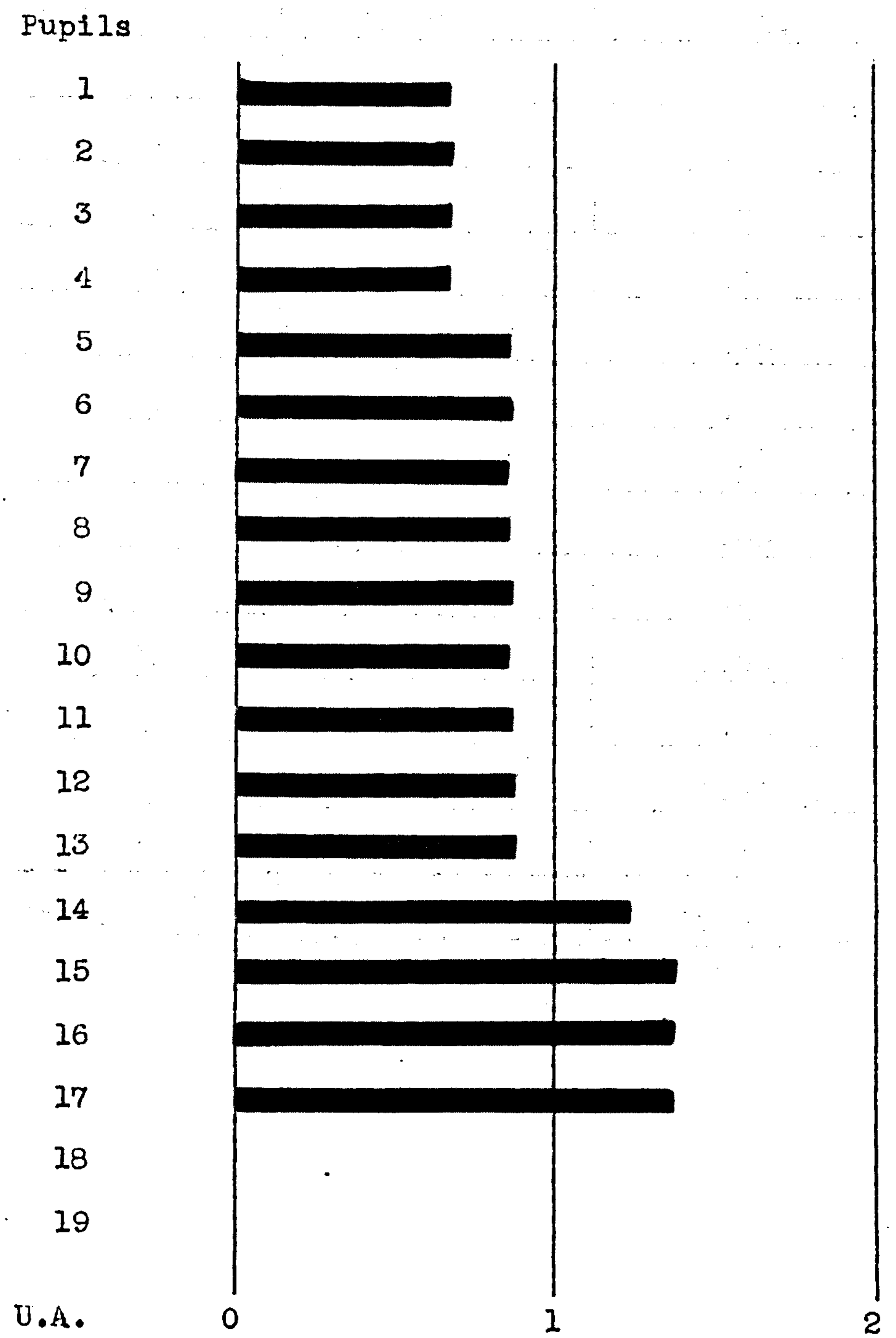
Units of Achievement of First Grade 1933 - 34



Units of Achievement of Second Grade 1933 - 34

Pupils #	Months Progress	U. A.
1	6	.67
2	6	.67
3	6	.67
4	6	.67
5	8	.89
6	8	.89
7	8	.89
8	8	.89
9	8	.89
10	8	.89
11	8	.89
12	8	.89
13	8	.89
14	10	1.22
15	12	1.33
16	12	1.33
17	12	1.33
Total		14.90

Units of Achievement of Second Grade 1933 - 34



Units of Achievement of Third Grade 1933 - 34

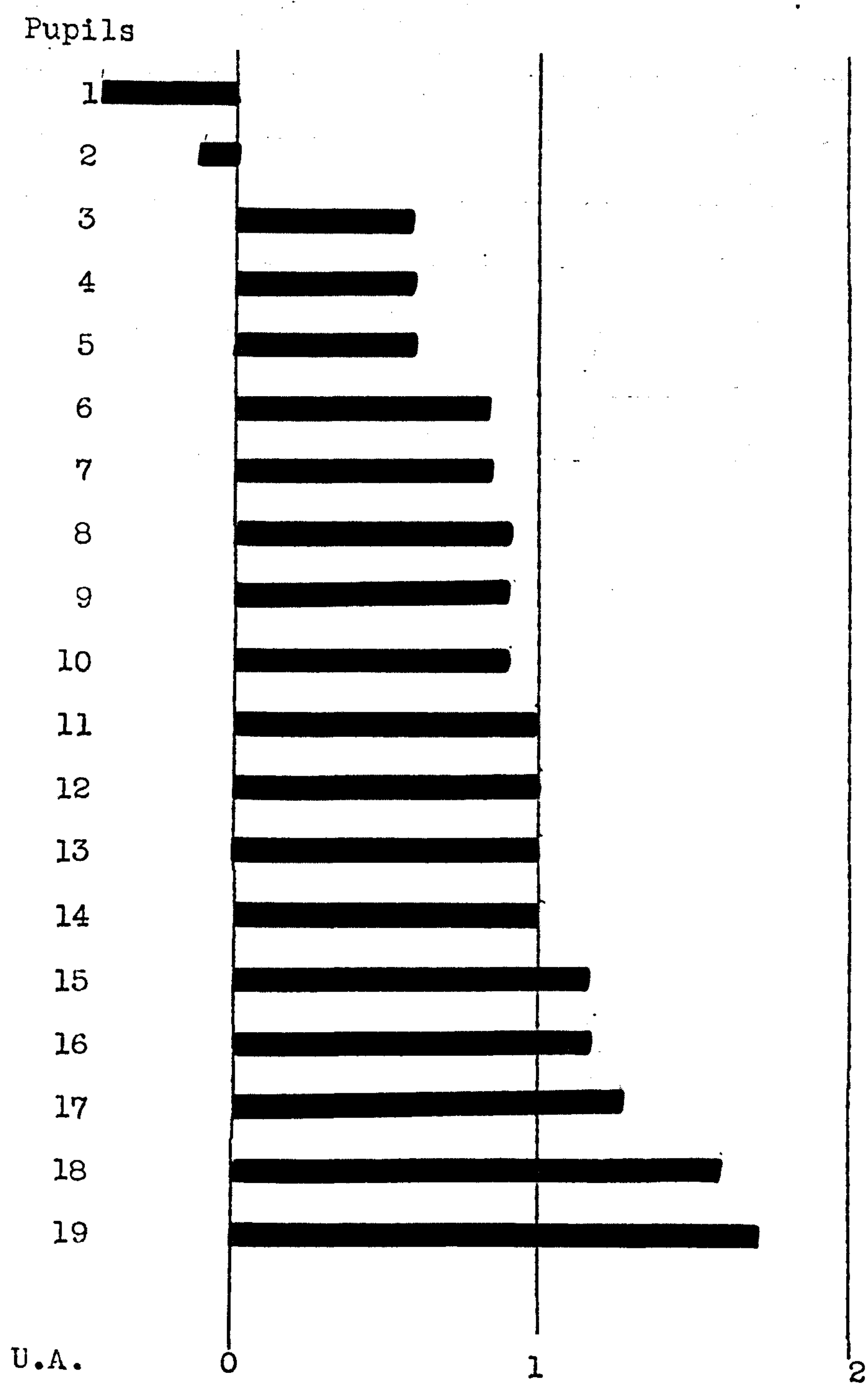
Pupils #	Months Progress	U. A.
1	4	.44
2	7	.78
3	7	.78
4	7	.78
5	7	.78
6	8	.89
7	8	.89
8	9	1.00
9	9	1.00
10	9	1.00
11	10	1.11
12	11	1.22
13	12	1.33
Total		12.00

Units of Achievement of Third Grade 1933 - 34

Units of Achievement of Fourth Grade 1933 - 34

Pupils #	Months Progress	U. A.
1	-4	-.44
2	-1	-.11
3	5	.55
4	5	.55
5	5	.55
6	7	.78
7	7	.78
8	8	.89
9	8	.89
10	8	.89
11	9	1.00
12	9	1.00
13	9	1.00
14	9	1.00
15	10	1.11
16	10	1.11
17	11	1.22
18	14	1.55
19	15	1.67
Total		15.99

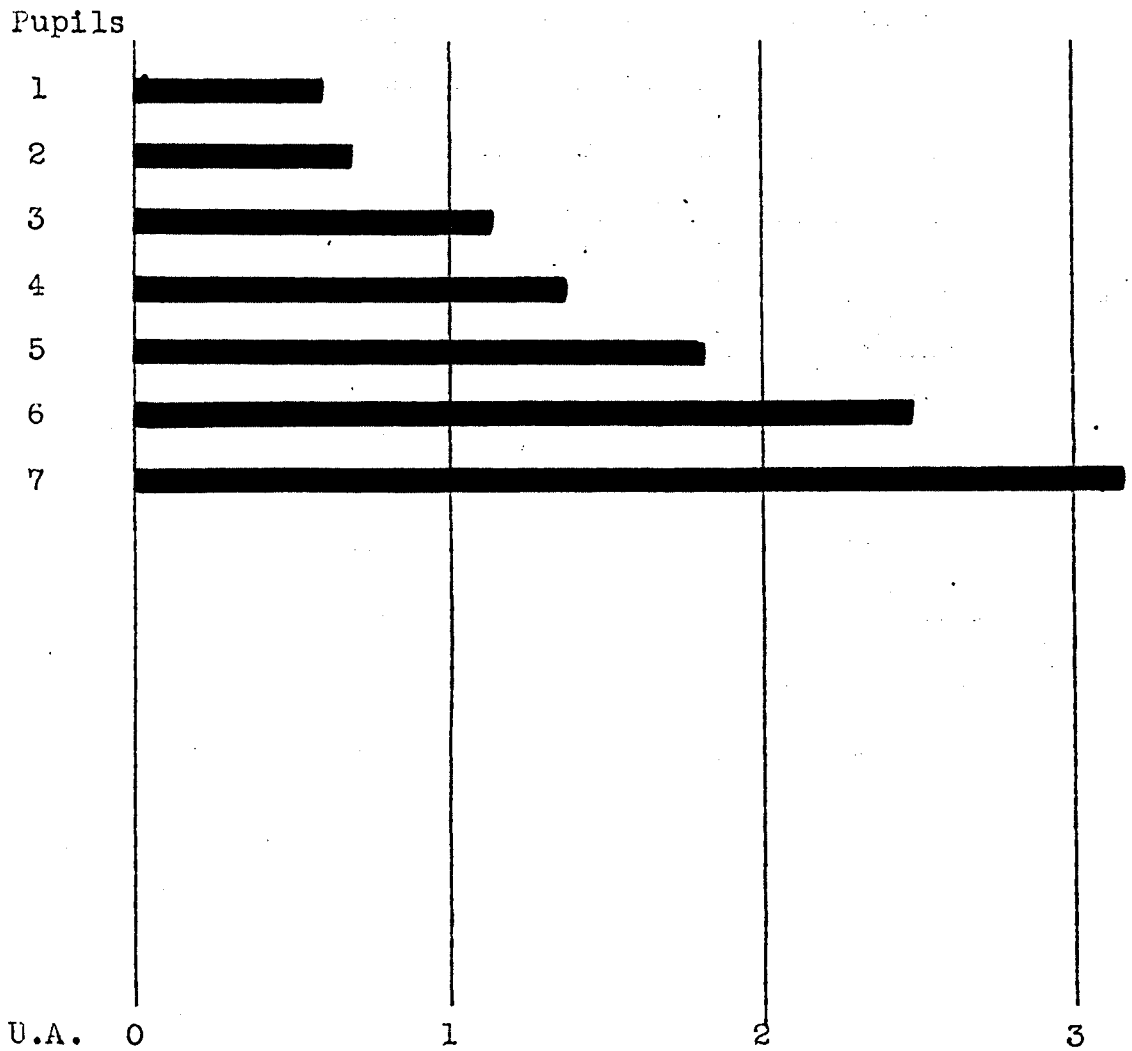
Units of Achievement of Fourth Grade 1933 - 34



Units of Achievement of Fifth Grade 1933-34

Pupils #	Months Progress	U. A.
1	5	.56
2	6	.67
3	10	1.11
4	12	1.33
5	16	1.78
6	22	2.44
7	28	3.11
Total		11.00

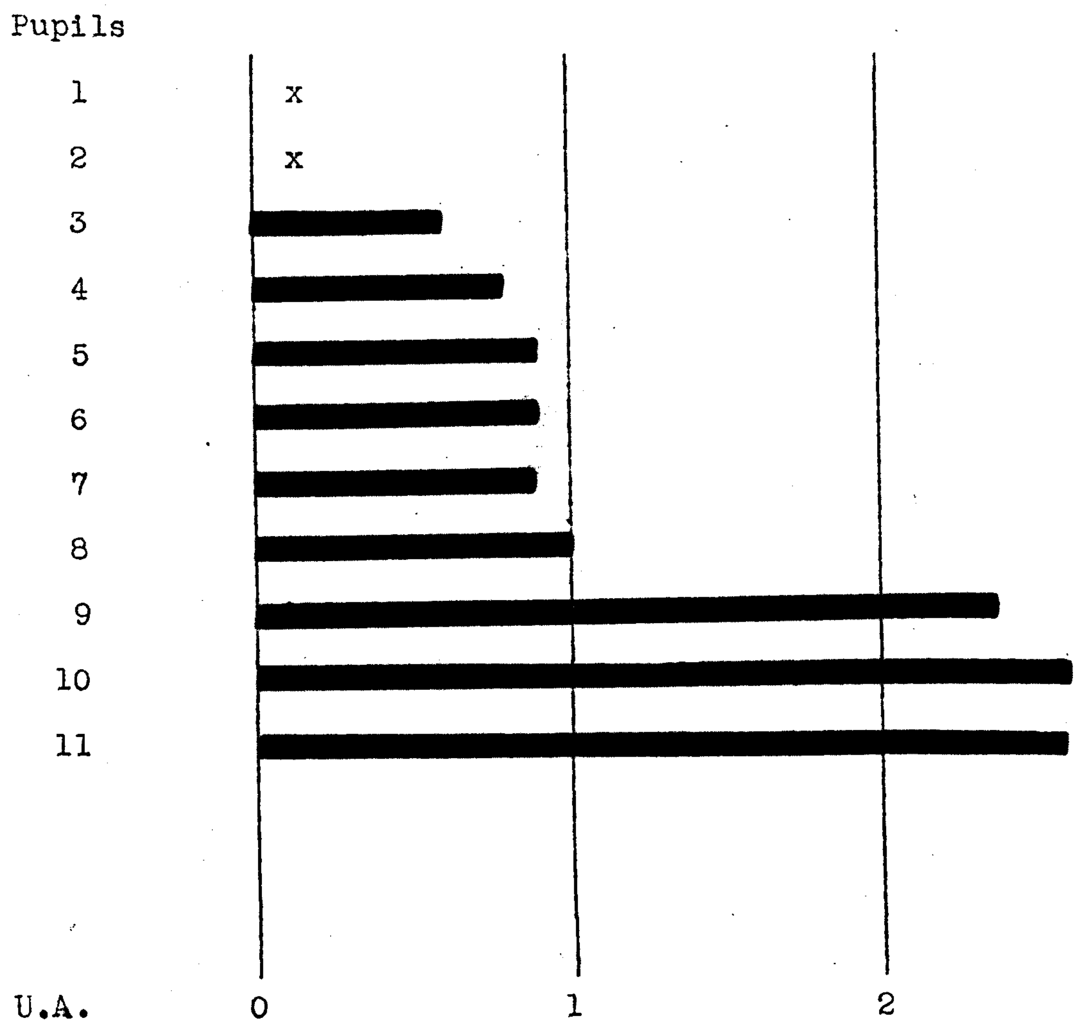
Units of Achievement of Fifth Grade 1933 - 34



Units of Achievement of Sixth Grade 1933 - 34

Pupils #	Months Progress	U. A.
1		
2		
3	5	.56
4	7	.78
5	8	.89
6	8	.89
7	8	.89
8	9	1.00
9	21	2.33
10	23	2.56
11	23	2.56
Total		12.46

Units of Achievement of Sixth Grade 1933 - 34

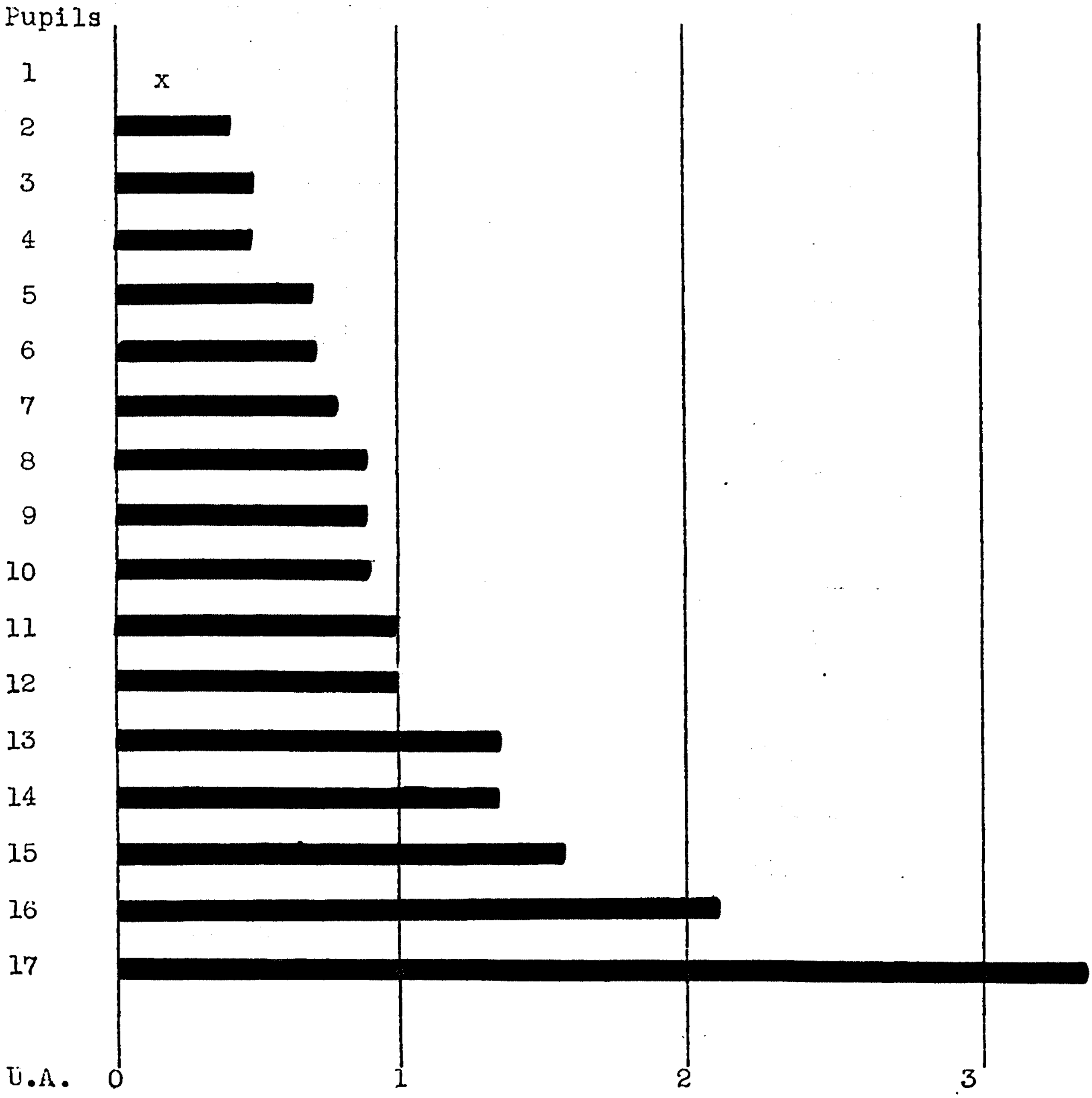


x No record. In attendance but short time.

Units of Achievement of Seventh Grade 1933 - 34

Pupils #	Months Progress	U. A.
1		
2	3	.33
3	4	.44
4	4	.44
5	6	.67
6	6	.67
7	7	.78
8	8	.89
9	8	.89
10	8	.89
11	9	1.00
12	9	1.00
13	12	1.33
14	12	1.33
15	14	1.55
16	19	2.11
17	31	3.44
Total		17.76

Units of Achievement of Seventh Grade 1933 - 34

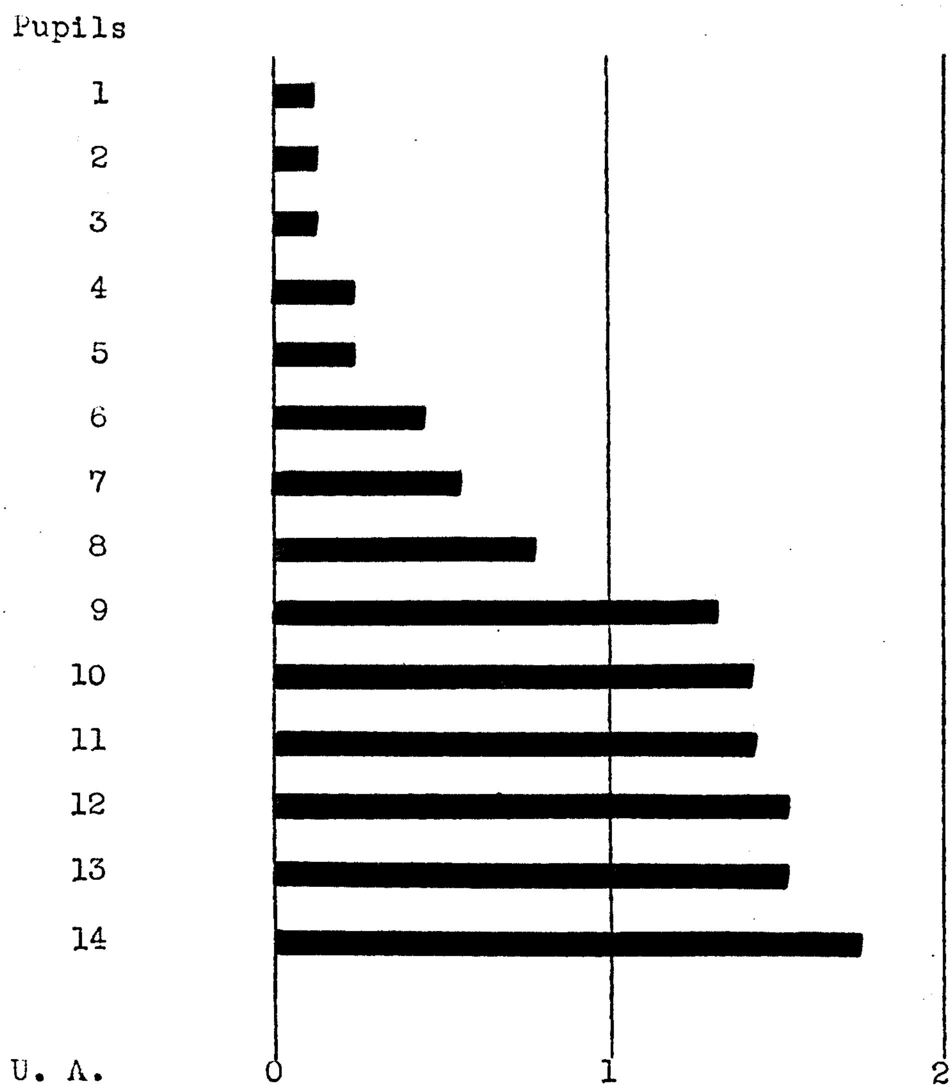


x No record.

Units of Achievement of Eighth Grade 1933 - 34

Pupils #	Months Progress	U.A.
1	1	.11
2	1	.11
3	1	.11
4	2	.22
5	2	.22
6	4	.44
7	5	.55
8	7	.78
9	12	1.33
10	13	1.44
11	13	1.44
12	14	1.55
13	14	1.55
14	16	1.78
Total		11.63

Units of Achievement of Eighth Grade 1933 - 34



The sum of the U.A.'s made by the pupils in the school during the year 1932 - 33 was 145.32, with an A.D.A. of 131.7, while in the year 1933-34 the corresponding sum was 117.18 U.A.'s with an A.D.A. of 118.5.

The expenditure for the year 1932-33 was $10,861.98. The total number of U.A.'s measured was 145.32 produced at a cost of $74.74 per unit.

Measurement of 128 pupils' achievement produced the total of 145.32 U.A.'s or an average of 1.136 U.A. per pupil. The A.D.A. was 131.7 making the efficiency quotient 1.103.

The expenditure for the year 1933-34 was #10,717.18. The total number of U.A.'s measured was 117.18 produced at a cost of $91.54 per unit.

Measurement of 113 pupils' achievement produced the 117.18 U.A.'s, an average of 1.037 U.A. per pupil. The A.D.A. was 118.5 making the efficiency quotient .988.

CHAPTER IV

CONCLUSIONS

The conclusions derived from the study are:

That the use of the U.A. and the E.Q. is far more accurate and expressive in indicating cost of education than are current terms which name only the pupil or the subject as the unit upon which to base the cost.

That to lower the cost per pupil in A.D.A. may lower the efficiency of the educational system and directly give less in return to the community for each dollar expended.

That a more thorough and complete program of testing should be used than was used in this study in order to make more reliable the measurement of the efficiency of the school.

That a more comprehensive test is needed than is now available.

That when the E.Q. is used in connection with the cost per U.A. comparisons of small and large schools may be made on a more equitable basis without unduly penalizing the smaller school.

That to base state or county aid to a school on the U.A. basis would tend to promote greater efficiency in the schools.

That undue emphasis may be placed on the U.A. as it is herein measured causing the intangible outcomes of true education to be neglected.

Suggestions for Application to Practice

The proposed method of indicating cost may be applied in any public school system by using the tests herein used or tests of like nature.

Directions for administering and scoring must be strictly observed; each pupil, except in the first grade, must have his score recorded in the school record upon his entering or leaving the system. The pupils of the first grade may be tested only after sufficient instruction to enable them to comprehend the test. Their progress during their attendance may then be computed.

The pupil's report card may indicate his achievement score which may be accepted by his new school in case he transfers.

It would be well to use the U.A. and the E.Q. in School Reports and in school publicity.

A study of the cost per U.A. will tend to promote more effective teaching methods and administrative procedures.

Statement of Limitations of Application

The reliability of the method is lessened by the fact that the tests are not comprehensive enough to measure many of the desirable outcomes of the pupils of any school.

Undue emphasis may be placed upon securing a high score on the outcomes measured to the neglect of such outcomes as honesty, patriotism, loyalty, tolerance and many other intangible values.

Difficulty may be encountered in securing accurate records of pupils, especially in a locality having a large transient school population.

The cost in time and money of administering tests is small when the school population is fairly permanent, but a transient population would involve much extra time and expense devoted to giving and scoring of tests.

Suggestions of Problems for Further Investigation

Several major problems for further study present themselves. Outstanding among these are:

Development of more comprehensive tests that include measurement of progress in music, physical education, industrial art, writing, and social development.

The development, for use in an Arizona state wide program, of uniform measurement of the achievement of the schools in accordance with the new State Course of Study and a comparison of costs per U.A.

A study to determine the cost per U.A. in a school of foreign speaking children as compared to the cost per U.A. in a school of English speaking children.

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