A Survey of Elementary Schools' Achievement in the School City of "E"

Andrew Jackson Manges
Butler University
A SURVEY OF THE ELEMENTARY SCHOOLS' ACHIEVEMENT
IN THE SCHOOL CITY OF "E"

by

ANDREW JACKSON MANGES

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1941

A. J. M.
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CHAPTER I

INTRODUCTION

The intelligent planning of an educational program for any community depends on the availability of information concerning two areas: (1) the local conditions and needs and (2) the capacity of the schools to adjust to or alter the conditions and meet the needs. The need for such information has led to quite extensive surveys of political, economic, industrial, and moral conditions in many communities with the result that more adequate programs have been and are being planned and pursued. As a result of these community-surveys\(^1\) schools and teachers have availed themselves of the knowledge of these illustrative materials in the community in order to integrate the school work of the pupils with their experiences outside of the school thus making the instruction more vital and meaningful.

On a larger scale such excursions are planned with reference to making neighboring communities, states, and larger areas a part of the pupils' educational experience.

The effectiveness of the school program, however, depends on its ability to set up immediate objectives that will finally lead to the attainment of the broader, ultimate, educational goals. Barr, Burton, and Breuckner say, with reference to the foregoing:

Ultimate objectives are those characteristics of the individual that are manifested in wholesome, desirable methods of adult living. In general they may be defined as those qualities, attitudes, and abilities that are essential for efficient living in an evolving, industrial, democratic society. The immediate objectives of the school are the direction and development of desirable forms of behavior, consistent with ultimate objectives, as the individual progresses through the school. The work of any grade is largely determined by these immediate objectives. To the degree that they are valid they will contribute to the attainment of the ultimate goals. Under such conditions it may be assumed that any measure of the characteristics of the pupils in a given grade is an indirect measure of the extent to which the ultimate goals are being achieved.

Achievement Testing--Needs and Purposes

In order that the community may be kept well informed of the progress and attainments of the schools in those areas

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2Roberts, Alvin B. "The Nation, Our Campus," The Educational Screen. (1941), pp. 5-8.

of activity less spectacular than the contests and competitive games it is necessary to employ other methods. School exhibits, open-house, various publications, and community free entertainments are some of the means employed.\(^4\) In too many instances though, these activities do not interpret the achievement of the pupils in their core-curriculum or academic field. This is the important phase of school work upon which rests the major portion of the responsibility for which the schools have been delegated as "...the agency for transmission of the cultural and social heritage."\(^5\)

There are many reasons for giving tests, all of which seem to be the outgrowths of attempts to achieve certain well defined purposes. Some of these objectives may be to aid the supervisor in the following ways:

1. To evaluate teaching methods and/or instructional materials
2. To determine growth in learning
3. To analyze achievement in each subject and/or grade
4. To determine the status of the school's achievement in relation to other local schools and/or in relation to national norms

Achievement tests may also be given as a specific aid to the administrator in facilitating his administrative functions.


\(^5\)Ibid., p. 496.
Results of tests for such a purpose may be used in the assimilation of information required to meet the demands listed below:

1. To collect data for reports to parents
2. To secure data for records of exchange in the transfer of pupils
3. To provide suitable school records of pupil achievement and resulting school status
4. To secure data essential to the recording of data to be used in periodic reports
5. To provide information essential to the planning of the program: i.e., allotment of time for various of the subjects and activities
6. To grade, classify, and group pupils and classes for instructional purposes
7. To provide data which may be used to effect certain economies which may be possible in the administration of the school program

Further, achievement testing is invaluable to the individual teacher in helping to shape and revamp the procedures to be followed in organizing and administering the methods desired to be used in learning activities and guidance services which are rapidly becoming a prominent phase of every teacher's obligation to school and pupil. Some of the uses to which a teacher may put the interpretation of achievement tests are as follows:

1. To determine the status of the class and/or any pupil at the beginning and end of each term
2. To group pupils for instructional purposes and to provide for individual differences
3 To determine variations within classes and within the school between like classes
4 To determine amount and rate of achievement of selected pupils or groups
5 To compare and evaluate the accomplishment of each pupil in relation to intelligence, mental age, and chronological age

The foregoing are perhaps the three more important groups of purposes requiring the use of achievement tests. These, it will be noted, are all associated with the instructional, supervisory, and administrative functions of the school. However, let us not be unmindful of the fact that no school is wholly immune from the charges, "We used to read, 'cipher,' and spell better than they do nowadays." or "We don't begin to get what we are paying for." and others of which the foregoing are merely examples. It is extremely difficult to meet such charges unless there is plenty of evidence "in black and white" to substantiate one's stand. To this end have been devised achievement tests which do a remarkable job of filling in the gap.

The Purpose of the Study

With the above mentioned tools at one's immediate disposal, greatly enhanced becomes the likelihood of attaining the purposes of this study which are:

1. To survey the achievement of the four elementary schools in a comparative way with one another with respect to their individual achievement in each grade and in each subject represented in the battery used
2 To make a comparison of each grade's achievement, by subject, with city median achievement and norms; to each grade's total achievements with the city total and respective norms.

3 To point out any indications of undue acceleration or retardation in subject matter by classes and in grades as a whole in total subject-matter accomplishment.

4 To show satisfactory cause for such deviation or at least factors that would tend to produce such results.

The purpose of this study is to determine individual school and grade status in relation to one another on the same portion of the battery and to suggest or recommend procedures of adjustment where deviations appear to warrant them.

Limitations

The survey involves nearly nine-hundred-fifty pupils from the lower fourth to the upper seventh grades in four elementary schools in a city predominantly industrial and strongly professional with a population of from 12,000 to 14,000, very few of whom originate from colored or foreign born stock.

Source of Materials and Method

The data were secured from the records on file in the respective elementary school offices, from records on file in the personnel office of the local high school, and from the tabulated results of the battery test that was given the various classes in their respective buildings. The tests
given were, Metropolitan Achievement Tests, Intermediate Battery--Partial: Form B and Advanced Battery--Partial: Form B, both revised. (The same test in Form C was used in the second and third grades but much relevant data were not available which rendered exclusion of these two classes advisable.) This battery test covered reading, vocabulary, arithmetic fundamentals, arithmetic problems, English (language, punctuation, and grammar,) and spelling.

The very nature of the problems to be solved governed the procedure to follow, dictating the use of the survey and critical analysis method.

A survey of the achievement of the elementary schools involved the following problems:

1. How does the average achievement (all subjects and all grades) in the city compare with the established norms?
2. In which grade (or grades) is average achievement best?
3. In which grade (or grades) is average achievement poorest?
4. How does average achievement in each grade compare with the established and local norms?
5. How does average achievement in each subject in each grade compare with the established norms and local averages?
6. In what subject is the achievement range greatest--best and poorest?
7. In what grade is the achievement range greatest--best and poorest?
8. In total achievement how do the schools rank in relation to each other and the established norm?
Definition of Terms

Battery—a group of subject-matter tests which have been constructed and standardized on the same pupils, thus making possible a comparison of age or grade equivalents for the various subjects tested. A battery test as used hereinafter indicates a number of subject tests in the battery used (page 7).

Several types of paragraphs constitute the first half of the reading test. In a few the pupil merely reads facts; draws conclusions in others; while in some he must comprehend the entire paragraph in order to respond with correct answers; and in still others he must display his ability to grasp the essential thought of the paragraph.

The paragraphs used were selected with a view to including in their content, words common to the fields of history, literature, government, and elementary science.

All of the choices in the vocabulary test were selected and checked against the list in the Thorndike Teacher's Word Book to make sure of their appropriateness to their respective vocabulary levels.

Arithmetic fundamentals include all types of numbers (integers, fractions, etc.), as well as various types of ex-

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6Metropolitan Achievement Tests: Supervisor's Manual. Ed. by Jacob S. Orleens. New York, Yonkers-on-Hudson: World Book Company, 1939, p. 9. All of the definitions were taken from this source since they are applied to this particular battery and since there are some slight differences of opinion disclosed in various authors' interpretation of the same terms.
amples such as in the case of addition, single combinations, single- and double-column without carrying, two-column with carrying, etc.

Problems were chosen according to processes used and type of content so as to include money, time, savings, distance, interest, etc.

Only the simplest and most frequently employed items of punctuation, basic grammar concepts, and capitalization are covered. The language usage items were selected from studies of errors in usage and items specified in courses of study.

Assuming vocabulary frequency to be indicative of the probability of their written use by pupils, words for the spelling test were selected and then checked against the contents of the more familiar spelling tests.

Forms—There are several forms for each battery of the Metropolitan Achievement Tests. They are equal in difficulty and similar in content and organization, thus avoiding repetition though using the same test. The reason for these various forms7 is very simply explained. When results of a testing program have been analyzed, needs pointed out, and remedial procedures formulated and carried out it is time for retesting to determine the growth in accomplishment. Other forms of the same test have been provided which may be used for this purpose most effectively.

7Intermediate Battery (Grades 4, 5, and 6)—Forms A, B, C, D, and E. Advanced Battery (Grades 7 and 8)—Forms A, B, C, D, and E.
Standard Score--The score obtained by comparing the number of correct responses with a table found at the end of each test.

Grade Equivalent, Educational Grade, or Subject Grade--The grade location for which the given score is the average; e.g., if a pupil's score of 30 points (number of correct answers) is equal to a grade equivalent of 50 or 5-0 on the Individual Profile Chart which accompanies each battery, it is because a score of 30 points is the average score that is obtained by pupils in the beginning of the 5th grade.

Educational Age, Age Equivalent, or Subject Age--The age which corresponds to the grade for which the given score is the average; e.g., a spelling age of 11-8 means that the score made on the spelling test by the pupil is the same as the average score made on the spelling test by pupils in the grade for which the average age is 11 years 8 months. This information may also be found on the Individual Profile Chart. Thus, if a pupil's score is 41, his spelling grade is 6-1, and his spelling age is 11-8.

Total Score (Grade Equivalent)--The sum of all the scores on the separate tests.

Average Subject Grade Equivalent--Found by adding the separate subject grade equivalents of all the pupils and dividing by the number taking the test in order to find the average subject achievement of a class.

Norm--The average or median achievement of pupils of
different ages, or grades; determined by testing a large re-
presentative group of pupils.

**Mental Age**—The same as the chronological age for which
the average score on an intelligence test is the same as the
score obtained by the pupil. By this is meant a pupil's actual
score registered on a test, divided by the months in a calendar
year: \[ \text{M.A.} = \frac{\text{score}}{12} \]

**Intelligence Quotient**—The I.Q., a relative measure used to
express the pupil's superiority or inferiority to others in his
group, is found by dividing the pupil's mental age by his chrono-
logical age and multiplying by 100. This expresses the relation-
ship of the pupil's mental and chronological ages.

**Summary**

The function of education is so complex that it is ac-
complished only through a number of social institutions and
activities of which the public school as a formal institution
is only one, albeit important, agency.

Only through continuing appraisal of its activities and
ensuing achievements may the schools best serve their respect-
ive communities. By continual and careful evaluation the
schools may better interpret their functions to their commun-
ities and gain the approval that they need in order to better
follow their programs.

Notwithstanding the many tasks given over to the schools
aside from the obligation of transmitting our social and
cultural heritage, they are derided and criticized; charged with turning out inferior pupils and with doing only partially a job for which, supposedly, sufficient funds are made ever available.

In order to meet such charges; and to make the work of the school more effective, it is necessary to determine the status of the individual school. It is necessary to make some comparisons to show the school in relationship to other schools having both better and poorer facilities. This must be done accurately and with due regard to pertinent information all of which calls for a rather standardized means of evaluation. This is the role of the various kinds of standard achievement tests.

After the tests are given they have value only if and when they are properly interpreted and improvements are made in the further operation of the school that are commensurate with their findings.
CHAPTER II

PRESENTATION AND TREATMENT OF DATA

Part A--Achievement Grade by Grade

The battery was administered in every grade of each of the schools during the second month of the school year. This means after the middle of the first actual month since, the first month extends from a half-month before to a half-month after the specific time at which the semester began.

Scores and resultant grade equivalents\(^8\) were recorded for each class (e.g., 4B, 4A, 5B, etc.) as shown in Table 1. This table includes mental age, chronological age, and intelligence quotient. It was not possible to incorporate comparisons and relationships which the inclusion of such data would permit due to the fact that such data were not uniformly available.

In the event that a supervisor or teacher was desirous of determining individual achievement with respect to apparent capacities (achievement quotient) such information along with scores and grade equivalents, would prove invaluable. It was for the benefit of any reader so interested that this additional information has been included in this table—merely a suggested procedure that might aid one in carrying out a study for a special group, grade, or room.

\(^8\) From a chart accompanying each test.
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The data used in subsequent tables and figures were obtained from just such informational sheets, omitting the scores in each case and using their grade equivalents instead. This trend toward total or average class and school achievement was due to the fact that the comparisons were made with respect to the whole rather than the part, the part being employed only insofar as particularly outstanding acceleration or retardation measurably affects the achievement as a whole.

The figures on the following several pages show how each school ranks with respect to the others in its attainment, subject by subject, on the entire battery. In other words, Figure 1 shows the relative standing of the 4B grade in each of the elementary schools on each subject included in the battery. For example, in English the 4B grade of school B ranked superior to its nearest competitor, school A, by fourteen months, the former ranking 5-8 (the eighth month of the fifth year) while the latter ranked 4-4. Further interpretation reveals that school B also established an achievement that is three and one-tenth semesters above the norm for that subject in the 4B grade. It will be noted that schools A, C, and D are relatively near the norm in their averages and that the 4B grade of School B is singularly significantly.

In like manner each of the other figures may be examined. Figure 2 reveals a negative significance for schools A and D, while the 4A grades of schools B and C have like averages which
Figure 1. Comparison of total battery achievement of all schools, subject by subject, on the 4B grade level.
are identical with the norm for their respective grade.

Notwithstanding the fact that the 5B grade in all schools was equal or superior to the norm, the averages of the respective schools were below the norm in every case except for school B whose 4B grade barely equaled it. School B has exceeded the norm once and equaled on the other two of three figures thus far examined.

A different story, however, is that told by figure 4, showing the relative standings of the 5A grade in the respective schools. This grade in all schools averages below the norm from a scant two-tenths of a semester (school C) to two full semesters (school D). Positions of rank are changed somewhat, school B relinquishing her honors in favor of school C.

In Figure 4 one may observe that schools B and C closely correlate with one another and schools A and D with each other respectively in pairs and that they all maintain their respective relationship whether above, below, or approaching the norm.

Outstanding is the range in subject achievement in two instances particularly when one views the status of the 6B grade in the various schools as illustrated in Figure 5. In reading comprehension there is a range of four and one-tenth semesters from the highest rank (school B) to the lowest (school D). Again, taking arithmetic problems for comparison,
FIGURE 2. Comparison of total battery achievement of all schools, subject by subject, on the 4A grade level.
FIGURE 3. Comparison of total battery achievement of all schools, subject by subject, on the 5B grade level.
FIGURE 4. Comparison of total battery achievement of all schools, subject by subject, on the 5A grade level.
there exists a range of two and eight-tenths semesters while spelling runs a close third with a differential of two and four-tenths semesters.

Particularly significant is the sudden rise and fall in the bars representing achievement in the various subjects. In subject achievement within the grade there is as much as five and six-tenths semesters variation (school A, reading vocabulary and spelling). With all this vast difference in range school B has come into the foreground, again equaling the norm while exceeding the other schools by well over one full semester.

Reference to Figures 2 and 4 will show that the achievement portrayal of grade 6A as given in Figure 6 is directly in line with the constant negative showing or retardation therein shown. The 6A grade is no exception and again the average achievement for each school falls below the norm, the nearest one (school B) being over a semester retarded while the three other schools are closely grouped together two and one-half and more semesters retarded.

Again there is a significant range in achievement this time amounting to as much as four and two-tenths semesters.

Using the data given in Figure 7 as a criterion, school C has the outstanding 7B grade, being well above the other schools and the norm in all subjects except spelling. Particularly
FIGURE 5. Comparison of total battery achievement of all schools, subject by subject, on the 6B grade level.
FIGURE 6. Comparison of total battery achievement of all schools, subject by subject, on the 6A grade level.
noteworthy is the retardation in reading vocabulary for school D and in arithmetic problems in school A amounting to one month short of two-semesters, while school C is showing an acceleration in reading comprehension for a like measure.

Figure 8 seems to bear out the findings of the second semester achievement of each grade. Reference to Figures 2, 4, and 6 shows that these grades are consistently retarded when compared with the norm and that they also consistently rank with school B at the top, school D at the bottom, and schools A and C somewhere in between.
FIGURE 7. Comparison of total battery achievement of all schools, subject by subject, on the 7B grade level.
FIGURE 8. Comparison of total battery achievement of all schools, subject by subject, on the 7A grade level.
Part--B Achievement Subject by Subject

Comparison of the status of each school based on its respective achievement in each subject included in the battery is shown in the data recorded in Tables 2 to 7 inclusive. Figures 9 to 14 are offered since comprehension of tabulated materials is greatly facilitated by a similar presentation in graphic form.

Table 2 may be read as follows, with reference to the other schools: School A is average in 4B reading comprehension; average in 4A; six-tenths of a semester retarded in 5B; average in 5A; retarded six-tenths of a semester in 6B; average in 6A; accelerated four-tenths of a semester in

<table>
<thead>
<tr>
<th>School</th>
<th>G R A D E</th>
<th>Ave. Diff. from Norm in months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) (2)</td>
<td>(3)</td>
</tr>
<tr>
<td>A</td>
<td>4-3</td>
<td>4-7</td>
</tr>
<tr>
<td>B</td>
<td>4-6</td>
<td>4-6</td>
</tr>
<tr>
<td>C</td>
<td>4-3</td>
<td>5-1</td>
</tr>
<tr>
<td>D</td>
<td>4-1</td>
<td>4-3</td>
</tr>
<tr>
<td>Ave.</td>
<td>4-3</td>
<td>4-7</td>
</tr>
<tr>
<td>Norm</td>
<td>4-2</td>
<td>4-7</td>
</tr>
</tbody>
</table>

TABLE 2

COMPARISON OF ACHIEVEMENT OF ALL SCHOOLS WITH AVERAGE GRADE EQUIVALENTS AND NORMS FOR READING COMPREHENSION
7B; and accelerated two-tenths in 7A. Tables 3, 4, 5, 6, and 7 may be read in like manner.

For the sake of further comparison the norm is given and the status of each school with the norm is indicated by the respective colored lines.

In the illustration above, using school A, the average difference from the norms shows a retardation in the amount of one and three-fourths months which is a normal deviation.9

Figure 9 shows that in reading comprehension the 6B grade in school A and the 7B grade in school C are outstanding with regard to average city achievement; especially is this true of the former which ranks two full semesters ahead of its nearest competitor. Taking the norm for each grade across and securing the average shows schools B and C above and schools A and D below it. For this subject the results are in close conformity with the previously referred to achievements grade by grade, i. e., the schools rather consistently rank in B, C, A, and D order.

Comparing schools and grades with the average city achievement, 4B grade in school A is found to be on the average, school B is 4-6, while the average is 4-3, thus placing B three months or three-tenths of a year above the average; school C is on the average, while school D, achieving a grade equivalent of 4-1 is retarded three-tenths of a year in read-

FIGURE 9. Comparison of Schools by Grades in Terms of the Average Grade Equivalents for the City in Reading Comprehension.
ing comprehension; not an unreasonable deviation.

Since the purpose of this phase of the study is to show the relative status of each school in the city by subject, the norms are not used except in a generally comparative way. However, they have been included in the tables and average differences in months from the norm are also calculated to facilitate a broader comparison if that should become desirable on the part of the reader.

A line showing the average total achievement for each school is not shown in Figure 9 nor in any of the subsequent figures in this area of comparison simply because it would only tend to complicate the figures when it is quite evident that the average would have to fall somewhere between the two extremes, school A's average of 6-2 and school D's average of 5-5.

An interesting situation is found upon examination of Table 3 and that is with respect to the reading vocabulary achievement of school D and the other three schools. When observed in graphic form, Figure 10, the situation is more readily discernable. Note that schools C, B, and A rank in that order all closely grouped near the grade equivalent of 6-0 while school D comes in a poor fourth, averaging over one semester in retardation, at 5-4.

Worthy of note too is the trend toward retardation in arithmetic fundamentals (Table 4) for all schools, the greatest difference being found in schools D and A which show
### TABLE 3

**Comparison of Achievement of All Schools with Average Grade Equivalents and Norms for Reading Vocabulary**

<table>
<thead>
<tr>
<th>School</th>
<th>Grade</th>
<th>Ave. diff. from Norm in months</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4-9</td>
<td>5-0</td>
</tr>
<tr>
<td>B</td>
<td>4-9</td>
<td>4-9</td>
</tr>
<tr>
<td>C</td>
<td>4-6</td>
<td>5-2</td>
</tr>
<tr>
<td>D</td>
<td>4-2</td>
<td>4-4</td>
</tr>
</tbody>
</table>

| Average | 4-6 | 4-9 | 5-5 | 5-8 | 6-3 | 6-1 | 7-1 | 7-0 | -0.47 |

| Norm    | 4-2 | 4-7 | 5-2 | 5-7 | 6-2 | 6-7 | 7-2 | 7-7 |

### TABLE 4

**Comparison of Achievement of All Schools with Average Grade Equivalents and Norms for Arithmetic Fundamentals**

<table>
<thead>
<tr>
<th>School</th>
<th>Grade</th>
<th>Ave. diff. from Norm in months</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3-9</td>
<td>4-3</td>
</tr>
<tr>
<td>B</td>
<td>4-5</td>
<td>4-6</td>
</tr>
<tr>
<td>C</td>
<td>4-2</td>
<td>4-5</td>
</tr>
<tr>
<td>D</td>
<td>4-1</td>
<td>4-1</td>
</tr>
</tbody>
</table>

| Average | 4-1 | 4-4 | 4-7 | 4-8 | 5-2 | 5-1 | 6-9 | 6-8 | -7.0  |

| Norm    | 4-2 | 4-7 | 5-2 | 5-7 | 6-2 | 6-7 | 7-2 | 7-7 |        |
FIGURE 10. Comparison of Schools by Grades in Terms of the Average Grade Equivalents for the City in Reading Vocabulary.
nine and one-tenths and eight and seven-tenths retardation. This in turn has kept the city average for all schools and grades in this subject matter at seven-months below their expected attainment. In other words, their total achievement in arithmetic fundamentals is one and two-fifths semesters retarded. These data are more easily interpreted when viewed in Figure 11.

Similar comparisons may be made from the tabulated information found in Table 5. This table, showing all schools and grades, concerns arithmetic problems. According to the table and to Figure 12 accompanying it, School A has a retardation of eleven and one-tenth months from the norm which

<table>
<thead>
<tr>
<th>School</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
<th>Grade</th>
<th>Ave. Diff. from Norm in months</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3-9</td>
<td>3-9</td>
<td>4-2</td>
<td>4-4</td>
<td>4-4</td>
<td>5-4</td>
<td>6-3</td>
<td>6-2</td>
<td>-11.1</td>
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<tr>
<td>B</td>
<td>3-9</td>
<td>4-0</td>
<td>4-6</td>
<td>5-0</td>
<td>5-8</td>
<td>6-9</td>
<td>6-8</td>
<td>6-6</td>
<td>-6.2</td>
</tr>
<tr>
<td>C</td>
<td>3-9</td>
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<td>4-4</td>
<td>5-4</td>
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<td>6-6</td>
<td>-6.9</td>
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<tr>
<td>D</td>
<td>3-9</td>
<td>3-8</td>
<td>4-2</td>
<td>4-2</td>
<td>5-0</td>
<td>5-2</td>
<td>6-9</td>
<td>7-1</td>
<td>-9.1</td>
</tr>
<tr>
<td>Average</td>
<td>3-9</td>
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<td>4-4</td>
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<td>5-4</td>
<td>6-9</td>
<td>6-7</td>
<td>-8.5</td>
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</tr>
<tr>
<td>Norm</td>
<td>4-2</td>
<td>4-7</td>
<td>5-2</td>
<td>5-7</td>
<td>6-2</td>
<td>6-7</td>
<td>7-2</td>
<td>7-7</td>
<td></td>
</tr>
</tbody>
</table>
FIGURE 11. Comparison of Schools by Grades in Terms of the Average Grade Equivalents for the City in Arithmetic Fundamentals.
FIGURE 12. Comparison of Schools by Grades in Terms of the Average Grade Equivalents for the City in Arithmetic Problems.
is the equivalent of slightly over two semesters. School D is running a reasonably close second indicating a retardation of nine and one-tenths months or the equivalent of almost two-semesters.

The entire group of city schools is apparently retarded in arithmetic problems according to these data—a greater negative result than that indicated in arithmetic fundamentals. It is evident that these two subject-test results are materially affecting the average total achievement of the entire city, but they are not the most flagrant as will be noted later in Figure 14, accompanying Table 7.

In all instances, in the results of the arithmetic fundamentals and problems, there appear retardations. Perhaps it is significant, in the comparison of these data (Tables 5 and 6) to note that Schools B and C are maintaining their apparent superiority in standings and that school D has surpassed school A on each of these phases of the battery.

The data tabulating the results of the English test portion of the battery are shown in Table 6. A more desirable achievement is evident here, especially when the schools are showing and near showing a little acceleration insofar as the norms are concerned.

The results of the English subject-test show that while the schools maintained their respective previously established achievement ranks with one another they were not
TABLE 6

COMPARISON OF ACHIEVEMENT OF ALL SCHOOLS WITH AVERAGE GRADE EQUIVALENTS AND NORMS FOR ENGLISH

<table>
<thead>
<tr>
<th>School</th>
<th>Grade</th>
<th>Ave. Diff. from Norm in months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>A</td>
<td>4-4</td>
<td>4-7</td>
</tr>
<tr>
<td>B</td>
<td>5-8</td>
<td>5-5</td>
</tr>
<tr>
<td>C</td>
<td>4-1</td>
<td>5-2</td>
</tr>
<tr>
<td>D</td>
<td>4-0</td>
<td>4-1</td>
</tr>
<tr>
<td>Average</td>
<td>4-6</td>
<td>4-9</td>
</tr>
<tr>
<td>Norm</td>
<td>4-2</td>
<td>4-7</td>
</tr>
</tbody>
</table>

quite so closely grouped around and near one common grade equivalent (see Figure 13).

Table 7, comparing the spelling achievement of the various grades and schools points toward a rather common weakness in all grades and all schools. Hardly accountable is the great range and sudden rise of the 7B and 7A grades in each school. Notwithstanding this apparently unusual achievement only one school (B) approaches the norm as shown in Figure 14. The retardation for the city as a whole is ten months from the established norms which is equivalent to two semesters. In the cases of School C and D this retardation is increased to four-tenths of a semester more.
FIGURE 13. Comparison of Schools by Grades in Terms of the Average Grade Equivalents for the City in English.
TABLE 7

COMPARISON OF ACHIEVEMENT OF ALL SCHOOLS WITH AVERAGE GRADE EQUIVALENTS AND NORMS FOR SPELLING

<table>
<thead>
<tr>
<th>School</th>
<th>4B (1)</th>
<th>4A (2)</th>
<th>5B (3)</th>
<th>5A (4)</th>
<th>6B (5)</th>
<th>6A (6)</th>
<th>7B (7)</th>
<th>7A (8)</th>
<th>Ave. Diff. from Norm (10)</th>
<th>Ave. Diff. from Norm (10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4-0</td>
<td>4-2</td>
<td>5-2</td>
<td>4-4</td>
<td>4-0</td>
<td>4-3</td>
<td>7-5</td>
<td>7-3</td>
<td>-8.4</td>
<td>-8.4</td>
</tr>
<tr>
<td>B</td>
<td>4-6</td>
<td>4-6</td>
<td>4-7</td>
<td>4-4</td>
<td>5-1</td>
<td>4-9</td>
<td>6-9</td>
<td>7-7</td>
<td>-7.8</td>
<td>-7.8</td>
</tr>
<tr>
<td>C</td>
<td>3-7</td>
<td>4-3</td>
<td>4-5</td>
<td>4-8</td>
<td>4-0</td>
<td>3-9</td>
<td>6-3</td>
<td>6-0</td>
<td>-12.0</td>
<td>-12.0</td>
</tr>
<tr>
<td>D</td>
<td>3-7</td>
<td>4-1</td>
<td>4-2</td>
<td>4-2</td>
<td>3-9</td>
<td>4-3</td>
<td>6-8</td>
<td>6-4</td>
<td>-12.5</td>
<td>-12.5</td>
</tr>
<tr>
<td>Average</td>
<td>4-0</td>
<td>4-3</td>
<td>4-6</td>
<td>4-4</td>
<td>4-2</td>
<td>4-3</td>
<td>7-0</td>
<td>6-8</td>
<td>-10.0</td>
<td>-10.0</td>
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<tr>
<td>Norm</td>
<td>4-2</td>
<td>4-7</td>
<td>5-2</td>
<td>5-7</td>
<td>6-2</td>
<td>6-7</td>
<td>7-2</td>
<td>7-7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ranking of each school with the other is relatively close each making a great stride in the interval of 6A and 7B grades. There is a notable departure from the usual standings of the schools, B-alone maintaining her place atop the group while A stands second replacing the usual second-place C which has dropped to third place while D maintains her usual fourth rank.
FIGURE 14. Comparison of Schools by Grades in Terms of Average Grade Equivalents for the City in Spelling.
Part C--Subject Achievement Compared
With City Average and Norms

Table 8 shows the achievement by average grade equivalents for each subject, by grade, as compared with the established norm and the city average for the respective grades and subjects.

### TABLE 8
AVERAGE GRADE EQUIVALENTS FOR EACH SUBJECT
BY GRADE FOR THE ENTIRE CITY

<table>
<thead>
<tr>
<th>Grade</th>
<th>Norm</th>
<th>Read</th>
<th>Vocab</th>
<th>Arith Fund</th>
<th>Arith Prob</th>
<th>Eng</th>
<th>Spell</th>
<th>Achievement Deviation</th>
<th>No. of Months Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7A</td>
<td>7-7</td>
<td>7-4</td>
<td>7-1</td>
<td>7-1</td>
<td>6-7</td>
<td>7-6</td>
<td>6-8</td>
<td>7-1</td>
<td>-6</td>
</tr>
<tr>
<td>7B</td>
<td>7-2</td>
<td>7-6</td>
<td>7-1</td>
<td>7-2</td>
<td>6-6</td>
<td>7-5</td>
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<td>0</td>
</tr>
<tr>
<td>6A</td>
<td>6-7</td>
<td>6-0</td>
<td>6-1</td>
<td>5-2</td>
<td>5-8</td>
<td>6-5</td>
<td>4-4</td>
<td>5-7</td>
<td>-10</td>
</tr>
<tr>
<td>6B</td>
<td>6-2</td>
<td>6-3</td>
<td>6-2</td>
<td>5-2</td>
<td>5-1</td>
<td>6-4</td>
<td>4-4</td>
<td>5-6</td>
<td>-6</td>
</tr>
<tr>
<td>5A</td>
<td>5-7</td>
<td>5-3</td>
<td>5-5</td>
<td>4-7</td>
<td>4-6</td>
<td>5-8</td>
<td>4-5</td>
<td>5-1</td>
<td>-6</td>
</tr>
<tr>
<td>5B</td>
<td>5-2</td>
<td>5-3</td>
<td>5-5</td>
<td>4-6</td>
<td>4-4</td>
<td>5-6</td>
<td>4-4</td>
<td>4-9</td>
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</tr>
<tr>
<td>4A</td>
<td>4-7</td>
<td>4-7</td>
<td>4-8</td>
<td>4-4</td>
<td>4-0</td>
<td>4-9</td>
<td>4-3</td>
<td>4-5</td>
<td>-2</td>
</tr>
<tr>
<td>4B</td>
<td>4-2</td>
<td>4-4</td>
<td>4-5</td>
<td>4-1</td>
<td>3-9</td>
<td>4-9</td>
<td>4-1</td>
<td>4-3</td>
<td>-1</td>
</tr>
</tbody>
</table>

Column 9 of Table 8, shows the median grade achievement found by averaging the grade equivalents for the separate tests. In averaging these grade equivalents, simply consider them as whole numbers add, and divide by the number of subjects tested in the battery. Selecting the 7A
grade equivalents as an example, the equivalents are found to be 7-4, 7-1, 7-1, 6-7, 7-6, 6-8 reading across from reading comprehension in column 3 to and including spelling in column 8. Add the figures representing months (the figures immediately following the dash (e.g., 7-4, 7-1, etc.; the 4 and 1) giving a total of 27, record the 7 and carry the 2; add the grade values (42 when the 2 is carried), making a total of 427. Divide this number by 8 to obtain the average grade equivalent, which is 71 or 7-1.

Figure 15, comparing reading comprehension achievement, is read in the following manner: The established norm for 4B grade is 4-2; the city average grade equivalent, indicating total achievement for the battery, is 4-3 for the same grade; while in reading the 4B grades' achievement is 4-4; thus, interpreted, the figure reveals that in the city the 4B grades' total battery achievement is above the established norm by one month; that their reading comprehension achievement is two months above the norm all of which indicates that some other subject than reading is lowering the 4B grades' achievement, making it approach the established norm for that grade.

In like manner it will be noted that the 6A grade achievement is three months above the city total achievement but it is in turn seven months or seven-tenths of a year retarded in
FIGURE 15. Comparison of Average Grade Equivalents for Reading, City Achievement, and the Established Norm.
reading comprehension according to the established norm. Interpreted this means that although the city-wide achievement is below the norm for this grade level and although the reading achievement is also below that level; nevertheless, the reading comprehension achievement is tending to raise the city-wide status toward the norm and the conclusion is that again something other than reading is holding the city-wide accomplishment below that of normal expectation. It will be noted that consistently throughout Figure 15, reading is above the city norm and in the cases of the grades, 4B, 4A, 5B, 6B, and 7B respectively, it is equal to and above the established norm. Therefore, one must look to some other subject in the battery if the cause is to be found for the city's general retardation according to the norm.

In like manner (as explained in detail for Figure 15), one may regard Figure 16 which is a comparison of average grade equivalents for all grades in reading vocabulary with the city average achievement and the established norms. Again it is found that the reading vocabulary achievement per grade is consistently on a par with or above the average total achievement of the city except in the 7B grade where it falls to one month retardation. On the other hand the grade by grade total achievement in the subject is equal to or above the norm in grades 4B, 4A, 5B, and 6B, while it is
FIGURE 16. Comparison of Average Grade Equivalents for Vocabulary, City Achievement, and the Established Norm.
below in the 5A, 6A, 7B, and 7A grades, respectively.

With reference to this subject in the battery it is indicative that something else is responsible for the range between the city achievement and the norm which at its greatest is some ten months or the equivalent of two semesters retardation (6A grade). However, the greatest retardation in reading vocabulary and the norm is only a six months retardation so the cause for the city's achievement being below the norm must be sought elsewhere. This logically calls for a more critical examination of successive subject results.

Examining the results of the test in arithmetic fundamentals (Figure 17) it is discernable at a glance that this is one of the factors contributing to the below-the-norm city achievement. In all except the 7B and 7A grades which are on a par, the arithmetic fundamentals results show that they are below the city total achievement per grade even as much as five months in the case of the 6A grade which, in turn, being some ten months below the norm indicates that the average achievement for the 6A grade amounts to a retardation of a grade and a half or three semesters. Additional interpretation would only point out that the 6A grade on the whole, was accomplishing no more than the normal expectation of a 5B grade in the same subject. Noting this figure
FIGURE 17. Comparison of Average Grade Equivalents for Arithmetic Fundamentals, City Achievement, and the Established Norm.
further, the 5B grade is found to place three months below the city achievement which in turn is three months below the norm thereby making the 5B grade some six months retarded. Comparing this status with the 6A grade it is discovered that, allowing consistently one semester of retardation per grade (not accumulative), the 6A grade remains retarded one full year in arithmetic fundamentals.

Similarly to the findings in Figure 17 showing arithmetic fundamentals one finds a comparable situation with reference to arithmetic problems, Figure 18. Whereas it was found that the average retardation for arithmetic fundamentals, Figure 17, was two and one-half months or approximately one-half semester below the city achievement, examination of the results of the arithmetic problems, Figure 17, shows that the average retardation is slightly more than four months and, as in the case of the former, here is another of the factors contributing to the below-the-norm status of the school city.

Contrary to indications toward any conclusions which might be drawn from comparisons made thus far a rather desirable situation is found existing in the test results of English, Figure 19. Here in every grade the subject achievement is above the total city achievement as much as eight months in grades 6A and 6B with an average acceleration over
FIGURE 18. Comparison of Average Grade Equivalents for Arithmetic Problems, City Achievement, and the Established Norm.
FIGURE 19. Comparison of Average Grade Equivalents for English, City Achievement, and the Established Norm.
the norm of slightly less than one-half semester; and an acceleration of six and one-fourths months or over one half semester above the city achievement.

Very definitely the city-wide English achievement is commendable, it being a significant factor in bolstering up the city achievement which in general is undesirably below the norm.

Hardly a critical analysis of the spelling achievement as portrayed in Figure 20 is necessary in order to conclude that here is undoubtedly the chief reason for the fact that the school city's total achievement is so far below the norm. In this test the retardation ranges from one month in the 7B grade to twelve months or two and two-tenths semesters in the 6B and 6A grades. Of greater significance is the range of retardation when compared with the norm for each grade. Here the difference is from one month (7B) to twenty-two months or four and two-tenths semesters. This would indicate that, in spelling, the achievement is anywhere from practically normal expectations to that of a 6A class exemplifying relatively the same ability as a normal 4B class in its third month.
FIGURE 20. Comparison of Average Grade Equivalents for Spelling, City Achievement, and the Established Norm.
Part D--School Achievement Compared
With City Average and Norms

To get a general idea of the relative achievement of each school, data similar to that previously shown, may be found which in the light of a different objective provides information which if it had been previously pointed out in connection with earlier tables would have rendered the ensuing figures so complicated as to make the comparisons in them almost indistinguishable. For these reasons the relationships pointed out in this division of this study (Part D) are made separately and a closer comparison of the status of each with the others is then given in the condensed form of Figure 25.

In table 9, school A ranks above the city average attainment in only one instance (7A); even with the average in two instances (4A and 7B); and below the average in the other five grades (4B, 5B, 5A, 6B, and 6A). With respect to the established norms, school A shows a retardation of five and one-half months (column 10) in total achievement on the battery.

School B, upon examination, is found to excel the average attainment of the city in the achievement of every grade save 7B only and here the retardation is only two months which is a normal deviation. The average deviation from the norm (column 10) shows a retardation of one and four-tenths which is the equivalent of a normal condition
TABLE 9

COMPARISON OF ACHIEVEMENT OF ALL SCHOOLS WITH AVERAGE GRADE EQUIVALENTS AND NORMS

<table>
<thead>
<tr>
<th>School</th>
<th>G R A D E</th>
<th>Ave. Diff. from Norm in months</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>A</td>
<td>4-2</td>
<td>4-5</td>
</tr>
<tr>
<td>B</td>
<td>4-7</td>
<td>4-7</td>
</tr>
<tr>
<td>C</td>
<td>4-1</td>
<td>4-7</td>
</tr>
<tr>
<td>D</td>
<td>4-0</td>
<td>4-2</td>
</tr>
<tr>
<td>Average</td>
<td>4-3</td>
<td>4-5</td>
</tr>
<tr>
<td>Norm</td>
<td>4-2</td>
<td>4-7</td>
</tr>
</tbody>
</table>

since a deviation of about two months acceleration or retardation is a normal expectancy.

Further examination of Table 9 shows that school C ranks above the city average in four grades (4A, 5B, 5A, and 7B) while it falls below in the remaining grades to such an extent that the average difference from the norm is a retardation of three and eight-tenths months which approaches a significant condition worthy of special study.

Highly significant, however, is the condition that exists in the case of school D. Here in every grade the achievement is below the average for the city which naturally places the total achievement below the total city attainment. Highly significant and warranting critical analysis is the fact that this school shows a retardation of seven and four-tenths months which is an average re-
tardation for the entire school of over one semester.

Column 10 also indicates that schools A and D are chiefly responsible for this retarded condition of the city.

Figures 21, 22, 23, and 24 which closely follow Table 9 show more vividly the relationships just above mentioned concerning the respective schools and the city average and norm.

In Figure 21, school A is found below the norm and the city average quite consistently. In Figure 22, school B is equally consistent in above city average achievement; however, remaining below the established norm save in four instances (4B, 4A, 5B, and 6B). School C (Figure 23) deviates above and below the city average a like number of cases, attaining and surpassing the norm once each. Consistent with comparative achievements in the majority of cases previously cited, school D, in Figure 24, ranks below the city average and the norm nor does it attain either in any grade.

It is left for Figure 25 to sum up the total comparative standings of all the schools. Careful scrutiny reveals that, allowing one point for first rank, two for second, three for third, four for fourth, and a half more where two are tied for a ranking, it is found that school A ranked second, four times; tied for second, once; ranked third, twice; and fourth once. School B ranked first, five
times (out of a possible 8); tied for second once; ranked second once; and third, once. School C ranked second, four times; tied for second, once; ranked third, once; tied for third, once; and ranked fourth, once. School D ranked third, once; tied for third, once; and ranked fourth, six times. Averaging these rankings (the lower average indicating higher ranking), school B ranks first; school A, second; school C, third; and school D, fourth. It is interesting to ponder over the apparent fact that school A is as superior to the average as school D is inferior and that there is but a fraction of a per cent difference in the final rankings of the other two schools.
FIGURE 21. Comparison of Achievement, grade by grade in School A with the City Average and the Norm.
FIGURE 22. Comparison of Achievement, grade by grade, in School B with the City Average and the Norm.
FIGURE 23. Comparison of Achievement grade by grade, in School C with the City Average and the Norm.
FIGURE 24. Comparison of Achievement, grade by grade, in School D with the City Average and the Norm.
FIGURE 25. Comparison of Schools A, B, C, and D with each other and the Norm.
CHAPTER III
CONCLUSIONS AND RECOMMENDATIONS

The data employed in arriving at the relative ranking and status of each school and each grade were handled as objectively as possible. That is to say, the facts were presented concisely with no effort whatsoever to justify the apparent conditions that the results shown would indicate.

In determining the final ranking each grade was scored on the number of times that it equaled or exceeded the norm for that respective grade level; thus, the greatest score indicated the best achievement (7B); the lowest score the poorest achievement (6A). Although general achievement is best, according to the data, in the 7B grade it is relatively little above the levels of 4B and 5B, respectively. In the same place (Chapter II, Part A), the facts recorded point toward the 6A and 5A grades, with 4A closely following, as the grades exhibiting the least desirable achievement.

In achievement, subject by subject, Chapter II, Part C, the data reveal that English and reading comprehension far excell all of the other subjects tested in the battery (using the same basis and method as that explained above for ranking). Those subjects indicating the poorest achievement were arithmetic fundamentals, arithmetic problems and spelling.
The greatest range in achievement was also disclosed in Chapter II, Part C. The grade in which this range occurs is 7B and the subject is spelling. In this grade and for this subject the range was found to be twenty-three months or four and three-tenths semesters.

Comparing the total achievement of the schools with one another (allowing four points for first place; three for second; two for third; one for fourth; and one-half for ties) they ranked as follows: B, first; A, second; C, third; and D, fourth. It is noted further that Schools A and C rank almost on a par; School B alone shows a general acceleration; and School D is equally consistent in general retardation.

Throughout the second chapter, comparisons in subjects, grades, and school achievement with the established norms have shown a range so great that it becomes significant and therefore merits special study to determine the causes for such a range. Rather consistently, these deviations have been negative, indicating a general retardation in subject matter and total grade achievement with a resultant lowering of the respective school's total achievement until the city average showed a general retardation when compared with the norms.

The relative accomplishment of each of the schools is portrayed in the tables and figures of Chapter II, Part D. The results of the data there shown indicate a retardation of five and one-half months for school A; a slight acceleration
except in the 7B grade in School B; a retardation of three and eight-tenths months in School C; and School D, consistently below the norm in almost every grade, points toward a general retardation of seven and four-tenths months. A summation of these data is shown in Figure 25. A great amount of deviation from the norms is to be noted in this figure. However, this is to be expected from community to community due to such factors as local standards, economic conditions, social cleavages, and cosmopolitan population.

To give a justifiable reason for School B to rank superior to all of the other schools; for School D to rank consistently below the norms and the other schools of the city; for grades 4B, 4A, 5B, and 5A to be relatively normal as compared with the norms while 6B, 6A, and especially 7A are in some instances alarmingly below the norms; and also to justify such a great variation between the average achievement of all 7B grades which are definitely above the norm and the 7A grades which are just the reverse—consistently below the norms would be a thesis in itself since it would involve so many factors which, lacking adequate means of determining their importance, would be a stupendous undertaking beyond the confines of this study but surely worthy of later investigation.

10 Ibid., p. 19.
In conclusion it is recommended that there be a revision of the curriculum to meet the needs as indicated by this study; i.e., revise the methods and procedures in spelling, arithmetic fundamentals, and arithmetic problems and/or spend more than the time currently allotted to those subjects. Since as a whole the achievement is no more than it might reasonably be expected to be it would seem impractical to make a redistribution of time allotments for the various subjects. It might even prove practical to devise a means of measuring the efficiency of the personnel handling these subjects in order to make available their better procedures to others in an effort to benefit the system thereby. A schedule might be so drawn as to permit those best suited to commute between the various buildings teaching the subject or subjects in which they are particularly successful.

For the benefit of the classroom teacher desirous of determining the status of a grade, class, or the individuals in a class it is further recommended that a testing program of this kind be scheduled and completed in as brief a period as possible in order to facilitate the collection and tabulation of such data as currently needed and desired (Table 1, p. 15).

It is further recommended that a survey be made of the various school plants, physical equipment, personnel, and the communities in which they are situated in order to more accurately and specifically diagnose the causes for the results which a testing program discloses.
BIBLIOGRAPHY


"... In most uses of educational measurements we are concerned more with the comparison of the measure of a pupil's ability with an appropriate norm than with the absolute amount of his ability. For this reason, another type of derived measures have been proposed which would be an index of the relation of the measure of a pupil's ability to the appropriate norm. Mental ages have been compared with chronological ages by dividing the mental age of a pupil by his chronological age. The resulting quotient is called the intelligence quotient, or I.Q. McCall and Franzen have divided the pupil's achievement age by his chronological age and called the result the pupil's educational quotient (E.Q.). This quotient indicates the relation of a pupil's achievement to his chronological age, or, more strictly speaking, to the norm for his chronological age. If a pupil's achievement age is just equal to the norm for his chronological age his E.Q. will be 100. If his achievement age is above the norm for his chronological age his E.Q. will be greater than 100. The magnitude of a pupil's E.Q. will, therefore, define the position of his achievement with reference to the norm for his chronological age."
"The educational quotient (E.Q.) does not appear to possess a great deal of significance as an index of the pupil's effectiveness as a learner. The achievement quotient, on the other hand, is an index of the ratio of the pupil's achievement to his capacity to achieve." (The value of the achievement quotient is discussed in Chapter X.)


"A presentation of the essential elements for the statistical treatment and the graphic presentation of facts and the interpretation of such facts and data."


An outline and description of a course in Graphic Methods given by Dr. Williams in 1918 at Stanford University all at the suggestion received from the methods used by Dr. Spaulding in Newton, Mass.