

**VARIATION IN
ACHIEVEMENT
AND ABILITY
WITHIN THE GRADES**

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Variation in achievement and ability within the grades by S. C. Garrison

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BY
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PART I

1. INTRODUCTION*

During the past few years much psychological investigation has been made into the nature and amount of individual differences. Before the publication in 1883 of Galton's "Inquiries into the Human Faculties and Its Development," the work done had been only of a general nature. Up to that time psychological conceptions had been based largely upon data secured from investigations made upon the mental processes by which we know and recognize the physical world.

Since that time much has been done in the standardization of tests for the measurement of mental and physical abilities. Also a large number of scales have been developed by means of which the problems arising in education are studied. Methods of applying these standardized tests and of handling the results secured in a scientific way have been developed. This whole field of endeavor is but a part of a much larger one which has during the last century been extending and applying science to all phases of life.

Ever since Galton announced the results of his investigations, this field has been a fruitful source of experimentation. A number of investigations have been made simply for their scientific interests. Others have been made with a view of discovering the causes for certain social and moral conditions. And yet others have been undertaken in which the work was confined principally to school children, with the hope that the results might aid in solving some of the pressing educational problems. These studies have been confined for the most part to children in the upper grades, or to college students, and a major portion of the work devoted to younger children has dealt with physical rather than mental abilities. Probably the most fruitful work in the field of individual difference for the educator interested in children in the lower grades has come as a by-product of investigations aimed primarily along other lines. Just now much work is being done with educational tests. Variations in the achievement of pupils, and even classes and schools, are being measured.

The studies on the question of mental ability and its relation to school work have been very fragmentary. The bright school child has been neglected by most investigators. Perhaps one reason for this lies in the fact that many

*This study was made during the school year of 1917-1918. Its completion was delayed by the World War.

studies have been made by those not directly interested in school work. A very large number of investigations have been made with reference to the relations existing between low mentality and the social vices. This question has been a very pressing one, and it is but natural that new methods of investigation should first be applied where apparently the need is greatest.

It is important that the school know the individual differences and possibilities of the children it is trying to educate; it should know what abilities exist and how they are distributed; it should know how many dull, normal, and bright children there are, how they are distributed, and where each child ranks on a definite scale of values. It is extremely important that no social or educational hindrances be permitted to handicap the development of children of unusual ability.

Perhaps the most frequent criticism of the ordinary grammar school is that it subjects all pupils to the same conditions. Only in a few schools is provision made for superior ability. Pupils of different abilities are subjected to the same conditions. They take the same course of study for the same period of time and are promoted together. Even the time of promotion is fixed beforehand without any regard to the differences in ability represented in the grade.

2. THE PROBLEM

This investigation has been undertaken with a view to obtaining facts on educational questions which arise because of individual differences in the ability of grammar-school children. It is an attempt to help solve some of the everyday educational problems which arise because of individual differences in pupils. We wish to study the difference in the various abilities of children, some of whom stand at the top of the class and others at the bottom. Are the children at the head of the class stronger in some special ability than those at the bottom? In what abilities are the children at the bottom of the class weakest? Where is there greater variability with reference to mental ability—at the top or the bottom of the class? What relation is there between mental ability and standing in the grades? These are some of the questions we wish to hold in mind throughout the study. It is hoped that the study will contribute something to method, in that we will be better able to judge the abilities of the various groups within the grades. It is hoped also that the study will contribute something to school organization, inasmuch as we will notice the overlapping of mental ability.

3. THE SUBJECTS

The subjects used in this investigation were the children of the fourth, fifth, sixth, and seventh grades of the Peabody Demonstration School. Only those children who had been in the school for a year or more and who had been fairly regular in attendance were used. No attempt was made to select the children because of class standing. The only factors used in the selection, as stated above, were regularity of attendance and enrollment in the school for at least a year before the study was made. As a matter of fact, most of the children taking the tests had been attending the school three years. In all, 108 children—43 boys and 65 girls—were used. These were divided between the four grades, as follows: fourth, 24; fifth, 24; sixth, 30; and seventh, 30. They were divided according to sex as follows: fourth, 10 boys and 14 girls; fifth, 8 boys and 16 girls; sixth, 14 boys and 16 girls; and seventh, 11 boys and 19 girls. Tables Ia to Ic show the distribution of the children used in the study according to age, sex, group (each group contains approximately one-fourth of the grade), and grade. Age has been considered here as meaning the age of the child at his last birthday.

TABLE Ia
DISTRIBUTION OF CHILDREN BY GRADES, AGES, AND SEXES

Age	Boys					Girls					G. T.
	Gr. IV	V	VI	VII	T.	IV	V	VI	VII	T.	
9 to 10	3	2	0	0	5	9	1	0	0	10	15
10 to 11	6	0	2	0	8	3	6	0	0	9	17
11 to 12	1	3	3	1	8	2	7	4	1	14	22
12 to 13	0	3	8	3	14	0	1	12	6	18	32
13 to 14	0	0	1	4	5	0	1	0	9	10	15
14 to 15	0	0	0	3	3	0	0	0	4	4	7
Grand total	10	8	14	11	43	14	16	16	19	65	108

TABLE Ib
DISTRIBUTION OF CHILDREN BY GRADES, GROUPS, AND SEXES

Grade	Boys				Girls				G. T.		
	G. 1	G. 2	G. 3	G. 4	T.	G. 1	G. 2	G. 3		G. 4	T.
IV	3	2	2	3	10	3	4	4	3	14	24
V	2	2	2	2	8	4	4	4	4	16	24
VI	3	4	4	3	14	4	4	4	4	16	30
VII	1	4	2	4	11	6	4	6	3	19	30
Grand total	9	12	10	12	43	17	16	18	14	65	108

TABLE Ic
AVERAGE AGE AND VARIABILITY OF EACH GRADE

Grade	Boys			Girls			WHOLE G.		
	Av.	A. D.		Av.	A. D.		Av.	A. D.	
	Yrs.	Mos.	Mos.	Yrs.	Mos.	Mos.	Yrs.	Mos.	Mos.
IV	10	4	7	9	11	5.5	10	1	6.0
V	11	2	11	11	1	9	11	1.3	9.7
VI	12	0.6	8	12	3	4.8	12	1.8	6.3
VII	13	3	8.7	13	2	7.5	13	2.6	8

TABLE Id
AVERAGE AGE OF EACH GROUP

Grade	G. 1		G. 2		G. 3		G. 4	
	Yrs.	Mos.	Yrs.	Mos.	Yrs.	Mos.	Yrs.	Mos.
IV	10	7	10	9	9	9	9	9
V	11		10	7	11	8	11	6
VI	12	8	12	2	12	3	11	8
VII	13		13	2	13	8	13	

4. THE FIELD

The field chosen for this study was the Peabody Demonstration School. This school is run in connection with George Peabody College for Teachers, and was under the direct supervision of Dr. Thomas Alexander, Professor of Elementary Education. The course of study covers the usual course found in the South. It, however, includes much more than is usually found in a twelve-grade course of study. Only the fourth, fifth, sixth, and seventh grades were used in this study.

The school draws its pupils from the best homes in the city. Its population is largely American. The homes from which the children come would compare favorably in wealth, social status, and intelligence with those of any city. The positions held by the fathers of the children are of a very varied nature. The following professions are the most frequent ones: banker, broker, city and state official, lawyer, manufacturer, and minister.

The fact that the school is dependent upon the tuition received from the pupils guarantees the hearty coöperation of its patrons. This fact will also attest to the character of the work of the school. Parents do not withdraw their children from public schools where tuition is free and where a good social atmosphere is prevalent to place them in a private school where there is a tuition fee, unless they feel that there is a distinct advantage in doing so. Furthermore, the school always has a very large waiting list. Parents make application for the enrollment of their children months ahead. Owing to limited facilities, only about 350 children can be provided for.

In a sense, the school receives only pupils from a select group. However, a close examination will reveal the fact that this selection is not from one class of pupils, but from all the classes usually found in a large number of children. First, there are those parents who feel that their children are able to do exceptional work, and want to give them the very best advantages possible. Second, there are those who know that their children are not progressing in the public schools as they should and who desire to place them where they will be given special attention by well-trained teachers.

Then there is a third group who send their children to a private school simply because they are able to do so.

At no time are the grades in the school overcrowded. There are simply as many pupils as there are sittings in each room; and there is one teacher for every grade, except in the upper grades, where the work is on the departmental plan. Specialists teach swimming, sewing, music, and manual training. All recesses are taken on the playground every day in the year, except in rain or snow. The children have access to the college campus and gymnasium. There is nothing fixed or formal about promotions, except that the pupil must prove his ability to go ahead. A spirit of coöperation between parent and teacher such as is seldom seen is prevalent in the school work.

5. THE TESTS

A. Educational.—The first group of tests consisted of a number of educational tests. These tests were used in a survey of the Peabody Demonstration School during the spring of 1917. A part of the data secured in that survey has been used in this study. The children were promoted at the end of the session, and the grade to which they were promoted has been used throughout this study as their school grade. The tests employed in that survey, the data of which have been included here, consisted of two arithmetic tests, two reading tests, one writing test, and one spelling test. Two of the tests—one of arithmetic and one of reading—were given again in the spring of 1918. It was originally intended that all the tests should be given again in the spring of 1918, and the study based upon a comparison of the two sets of data. Owing to the fact that the writer entered the United States Army, this was not found possible. No detailed description of the tests has been given here. This may be found in the case of any of the tests by referring to the bibliography.

One of the arithmetic tests used was that devised by Woody ('16). This arithmetic scale consists of two series, A and B, each four in number—one each for addition, subtraction, multiplication, and division. The A series was used in this investigation. These scales were devised to measure achievement in the fundamentals of arithmetic, either of an individual, of a class, or of a whole school system. The Curtis ('14) arithmetic tests consist of a number of series subdivided into several forms. Form 2, Series B, was used in this study. This group of tests was devised by Curtis to provide a general measure of the four fundamental abilities in arithmetic.