

COMMUNICATIONS AND DISCUSSIONS

AGE-GRADE DISTRIBUTION AND INTELLIGENCE QUOTIENT

IN the issue of the JOURNAL OF EDUCATIONAL PSYCHOLOGY for November, 1919, appeared an article on age-grade distribution by Superintendent Ernest C. Witham, of Southington, Conn.

The discussion gives age-grade statistics for several school systems, in each case, the tabulation of over-ageness shows a rapid increase up to the fourth or fifth, and, in one or two cases, the sixth grade, and a corresponding decrease beyond this point.

Undoubtedly any one who has made any continued study of conditions has found the same characteristics with regard to over-ageness. Doubtless most of us have asked the questions that Supt. Witham asks: "What is the reason for so much more retardation in the fourth grade than in any other grade? . . . Is the course of study too difficult for the fourth grade?"

For the past six years I have been noting these conditions, and wondering what can be done to improve them. Naturally, the first thing to suggest itself was better teaching in the lower grades. However, it soon appeared that, while better teaching might help the fourth grade slightly, still the same piling up occurred, and was bound to occur somewhere along the line, if not in the fourth, then in the fifth or sixth.

The establishment of the theory that the distribution of intelligence follows the curve of normal distribution seems to answer the question "why?". If we accept this theory, as, it seems, we must, then there will always be a certain per cent of the pupils of any school who have not the mental ability to complete successfully the work of the fourth grade, another per cent who can do the fourth, but not the fifth, etc. There is also, of course, a certain per cent who cannot successfully complete the work of the first, second, and third grades, but usually these are carried along by the tendency of teachers to promote according to chronological age, and to send pupils whom they know cannot do the work, to the next grade in the hope that they "can get something there," which, of course, is impossible. In this way many of these pupils get to the fourth

grade where they are in such deep water that it is very apparent to every one that they cannot be allowed to go further. There they stay until their age allows them to leave school.

The investigations of Dr. Terman (*Intelligence of School Children*) show that the intelligence quotient, (found by dividing the mental age in months by the chronological age in months, and denoted by I.Q.) changes very little, if at all, in the individual child. Thus a child having an I.Q. of 75 will never attain a mental age of much more than 12, one of 60 I.Q. will never have a mental age of over 10 (9 yrs. 8 mo.), etc. It further appears from Dr. Terman's investigations that a mental age of about 10 is required to do successful work in the fourth grade, 11 in the fifth, 12 in the sixth, etc.

Now, according to the theory of normal distribution, there are about 2% of all children who have I.Q.'s of 60 or less, and who will, therefore, never be able to do successful work beyond grade four, and about 6% more with I.Q.'s less than 80 who can never successfully go beyond the sixth grade. Moreover the 2% above noted cannot do fourth grade work much before the age of 16, and the remaining 6% will have to be the same age to do successfully sixth grade work. All of this group, therefore, stay in the fourth, fifth and sixth grades until they are allowed to leave school.

In support of these statements I submit herewith a survey of the intelligence of the pupils of the Brewster school, from the fourth grade through the high school as measured by the "Otis Group Intelligence Scale."

Brewster is a village of about 2000, inhabited mainly by American born. Not over 5% of the pupils in the school are of foreign born parents. It is similar in population to hundreds of other villages in New York and New England. The school consists of about 450 pupils, from the first grade through the high school. The high school department contains about 65. The Otis tests were given to the whole group within a period of two weeks. All tests except the upper high school were given by the writer. Great care was taken to follow exactly the prescribed procedure, and conditions were identical in each of the tests. One grade was tested beginning about 10:00 a. m., and another about 2:00 p. m. on each day. The high school pupils were tested in two groups the same afternoon, one test being conducted by the principal of the school, who had

previously been present while some of the grades were being tested, and was supplied with a copy of the manual of directions. The results, therefore, are certainly comparable as between grades and individuals.

Assuming the usual figures for the normal age in each grade, viz. 9-10, for grade four, 10-11 for grade five, etc. we find that, of 56 over-age pupils registered in the grades only two are above 100 I.Q., and that, of 23 under-age pupils, only four are below 100 I.Q., and that these four are all above 90 I.Q.

According to our theory, if the pupils of the various grades were viz. 9-10, for grade four, 10-11 for grade five, etc., we find that, grade, a correlation of—1 between the chronological age and the I.Q. The correlations in these grades are as follows: grade 4,—.57, grade 5,—.72, grade 6,—.65, grade 7,—.79, grade 8,—.63. The correlation in the fourth grade is considerably lower than the others on account of the piling up of pupils of low I.Q. If we eliminate the 10 below 70 the correlation in this grade is —.72. In the upper grades the correlation is lower than it should be on account of a number of pupils of high I.Q. who are behind the grade their mental age would entitle them to be in.

THE I.Q. DISTRIBUTION IN BREWSTER H. S.

TABLE I

	Below 70	70-89	90-109	110-129	130 and Above	Total Cases	Median I.Q.
GRADE							
4	10	10	8	6	1	35	85
5	12	15	4	7		38	79.3
6	4	8	17	3	1	33	85.8
7	3	9	12	12		36	100
8		6	20	13	3	42	105
ACADEMIC							
1		1	13	7	2	23	101.7
2			14	7	1	22	106.7
3			2	5	2	9	120
4			1	3		4	110.7
Total.	29	49	91	68	10	242	95.6

It will be noted that the median I.Q. varies from 79 in the fifth grade to 105 in the eighth, and that for all years of the high school it is above 100. In the seventh grade there are three pupils below 65 I.Q. who have been dragged along by chronological promotions. Aside from these no pupil of this grade is below 80 I.Q. In the eighth grade the two pupils below 80 I.Q. are not able to do the work of the grade successfully, and will probably drop out at the end

of the year. The 17 year old pupil, particularly, has, it must be admitted, plenty of grit to stick to it as long as she has, but what chance has she in competition with the brilliant 12 and 13 year olds in the group?

In the first two years of the high school there are only 3 pupils who have an I.Q. of less than 90, and in the last two years no pupil has an I.Q. of less than 105. This seems to indicate that successful high school work cannot be done by pupils of less than normal intelligence. If this is true our high schools, instead of being the democratic institutions we have always claimed them to be, ("The University of the Masses," they have been called) in reality present an insurmountable obstacle to half of all our children, and that the upper grades automatically shut off a large per cent of children.

TABLE II
DISTRIBUTION OF 12-YEAR OLDS IN BREWSTER H. S.

	Below 70 I.Q.	70-89	90-109	110-129	130 and Above	Total Cases	Median I.Q.
GRADE							
4	1					1	57.5
5	5	6				11	71.25
6	1	4	8	1		14	94.9
7				3	8	11	114.2
8			3	3	1	7	117.5
Total,	7	10	14	12	1	44	99.99

Table II shows the distribution of 12 year olds. All of these are still in school as they cannot be released on account of the compulsory attendance law. Of the 44, occurring in every grade from the fourth to the eighth, 22 are below 100 I.Q., and 22 are above. All of the 12 year olds in the fourth and fifth grades are below 90 I.Q., and all in the seventh and eighth grades are above 90 I.Q.

TABLE III
DISTRIBUTION OF 14-YEAR OLDS IN BREWSTER H. S.

	Below 70 I.Q.	70-89	90-109	110-129	130 and Above	Total Cases	Median I.Q.
GRADE							
4	1					1	41
5	2					2	46.5
6	2					2	60
7		4	6	1		11	92.5
8		1	8	2		11	102.5
H. S. 1			4	2	1	7	109.2
2			1			1	102
Total	5	5	19	5	1	35	100.8

Table III shows the distribution of 14 year olds. Seventeen of these are below 100 I.Q., and 18 are 100 or above. The medium I.Q. for the 12 year olds in each grade varies from 57 to 117, and for the 14 year olds, from 41 to 109. The one 14 year old in the fourth and the two in the fifth are not able to do the work of these grades, but have been shoved along by the teachers below who had them for two or three years and had gotten tired of them.

At the time the tests were given, each teacher in the grades was asked to rate her pupils' intelligence on a five point scale as follows: Very Superior=A, Superior=B, Average=C, Fair=D, low=E. Afterward the pupils of each grade were rated on an I.Q. scale as follows: 130 I.Q. and above=A, 110-129=B, 90-109=C, 70-89=D, below 70=E. The correlations between these ratings and the teachers ratings were as follows: Grade 4, .67, grade 5, .60, grade 6, .57, grade 7, .65, grade 8, .62. The general tendency in the lower grades was to rate too high, and in the upper grades to rate too low. Taking into consideration the median I.Q. of the various grades this is easily explained. Each teacher, naturally, rated the individuals in comparison with the whole group. This was her only basis for such rating. The fourth grade, with a median I.Q. of 85 had as many Bs as the eighth grade with a median I.Q. of 105 on the teachers' rating. One or two teachers, in spite of instructions as to what the distribution should probably show, placed the large part of their classes on the extremes, having more As and Ds than Cs. It is hard, too, for the teacher to take the age of the pupil into account; she usually gives old and young pupils the same mark if their class work is about equal.

These being the facts of the case, what is the remedy? If it is going to be impossible to get rid of our high retardation because of this group without sufficient intelligence to do the work of any grade higher than the fourth or fifth, then the only thing for us to do is to see to it that the pupils in the upper part of the I.Q. scale are advanced as rapidly as their intellectual development will allow. In this way we will, at least, have a group of under-age pupils which will balance the over-age group.

The railroad train despatcher has a chart showing the location of every train on his division. By the use of this he is able to keep each one going at its best rate. An age-grade-I.Q. chart will serve

the same purpose in the school. By its use the school executive will be able to pick the individuals who can go faster than the main group and give them a clear track ahead.

For the past three years the writer has experimented somewhat along these lines. The basis of selection has been the Trabue Completion Test. About eight or ten pupils in the Brewster school, and a smaller number in some of the other schools of the county have been "skipped" each year on this basis. But while the correlation between the Trabue scales and the Otis test is high (.60 to .70) there are, of course, several pupils of high I.Q. who have not been recognized by its use.

There are a number of pupils in the school who could profit by skipping a grade. For example, in the fourth grade is a pupil of 169 I.Q., the highest in the school, who has a mental age of about 15 and who, therefore, is able to do first year high school work. There are also three ten year olds in the fourth grade who have higher I.Q.'s than a majority of the ten year olds in the sixth grade. Likewise there are five or six in each of the other grades who can do work one, two, or three years ahead of their present location, and who, now that we have discovered them, will get the opportunity they deserve.

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