

'BRIGHT' AND 'SLOW' PUPILS IN ELEMENTARY AND HIGH SCHOOL*

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The investigation here reported set out to answer the following questions:

- (1) What per cent. of "Bright" pupils in the high school were "Slow" in the "Early" grades?
- (2) What per cent. of "Slow" pupils in the high school were "Bright" in the "Early" grades?
- (3) If such cases are found, what explanation can be offered for such change in the standing of these pupils?
- (4) Other minor questions, such as may arise in connection with the study, with reference to progress and elimination.

Before proceeding with the investigation it was first necessary to define the terms "Bright" and "Slow," and to set the limitations of the terms "Early" and "Late," as applied to entrance to school. For the purpose of our study, the dividing line between "Early" and "Late" entrance was placed at the end of the fifth grade. Thus all the pupils who entered in the fifth grade or earlier were classed as "Early" entrants and all who entered in the sixth grade or later were classed as "Late" entrants.

It was decided to class the upper quartile of each group investigated as "Bright" and to class the lower quartile as "Slow." This involved the adoption of some system of ranking the pupils in respect to their scholarship. The only source of information available consisted of a set of high school record cards, on which were recorded the marks given by the teachers and a set of elementary record cards containing the teachers' estimate of the pupils. The high school marks were reported six times each year for each subject taken and in some cases twice for each subject, as for example, English, for which two grades were sometimes recorded, one being for composition and the other for literature. Two grades were sometimes found in the case of Latin and a few other subjects. The

* A study of the records of 116 graduates and 184 non-graduates for the years 1913-14 to 1916-17, inclusive, who attended the Ethical Culture School, of New York City.

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system of marking used was as follows: A equals very good—90 to 100%; B equals good—75 to 90%; C equals passing—60 to 75%; C— equals not passing—condition; D equals failure. Effort is shown by the use of a plus mark and lack of effort by the use of a minus mark. (In the case of C— lack of effort is shown by an additional minus mark.) The elementary record cards were regularly handed in several times each year and more often as occasion might require. For a pupil who entered the kindergarten and continued on through the high school to graduation, there were as many as 150 to 200 of these cards on file. While these are called elementary record cards, it appears that similar cards are turned in by the high school teachers, so that the complete report for each pupil from the time of entering the school to the time of leaving is found in one file, with the exception of the *marks* received in high school. There were also found incomplete grade cards for the years below the high school. There appeared to be an inverse correlation between the scholarship rating of any given pupil and the number of report cards turned in, *i. e.*, the higher the standing, the fewer the number of cards and the lower the standing, the more cards were turned in by the various teachers all the way through the grades and the high school.

As a basis for ranking the pupils it was decided to use a method of weighting the marks received in high school and check this rating by comparing it with the judgment of the teachers as found on the report cards. The following formula was devised for the evaluation of the marks received in high school:

$$S. Q. = \frac{3A + 2B + C - D}{A + B + C + D} \text{ in which}$$

A, B, C, and D represent the number of each mark received, respectively, and S. Q. represents the 'Scholastic Quotient' sought. This quotient has a range of from minus 1 to plus 3. In the accompanying table a few of the more representative values are shown in terms of the relative proportion of each mark necessary to yield the given quotient. The highest possible quotient, of course, is when all the marks received are A's and the lowest possible quotient is when all the marks are D's. The number of marks received does not alter these limits, since the same result is obtained with one mark or with a thousand and one. There are numerous possible combinations of

Limits of range of Q.'s are—1.00 & 3.00

3	00	All	A			
2	50	Equal No.	A	B		
2	00	Equal No.	A	B	C	
2	00	All		B		
2	00	Equal No.	A		C	
1	50	Equal No.		B	C	
1	25	Equal No.	A	B	C	D
1	00	Equal No.	A			D
1	00	All			C	
	67	Equal No.		B	C	D
	50	Equal No.		B		D
0	00	Equal No.			C	D
- 1	00	All				D

the four marks that would produce various degrees of the quotient, ranging theoretically from the highest, or plus 3.00 to the lowest, or minus 1.00.

It should be pointed out in this connection that the use of this formula assumes an equal weight for all the subjects for which marks are given. For this reason we should expect some cases in which, for example, a pupil would be placed in the class of "Bright" high school pupils because of a high S. Q. and at the same time be rated very much lower by the combined judgment of the teachers. This discrepancy would be explained by the fact that the most of the high marks received might conceivably be in subjects such as art, shop, or physical training, which are not reckoned as contributing as much toward scholarship in this particular school, as do the other subjects. Such a case is that of girl No. 6 of the class of 1914-15, who shows the very high S. Q. of 160. This places her in the upper half of the

middle 50 per cent of a group of 64 graduates, who entered "Late." As a matter of fact, however, 11 of the 15 A's received were given in the subject of physical training.

This raises the question of what subjects furnish the best criterion for estimating scholarship and hence the best basis on which to predict success or failure in life. The answer to this question very naturally depends upon the kind of success in life one has in mind. If success in life means to become a successful teacher of Latin or Greek, or any other language for that matter, manifestly the only persons who will ever be successful are those who master the languages which are to be taught. So, also, if success in life means to attain a high degree of prominence in some vocation, which involves the use of higher mathematics, manifestly those who are to be counted as successful must master higher mathematics. Or, again, if success in life is interpreted to mean the passing of college entrance examinations and the completion of a classical course in some institution of higher learning, it goes without saying that success in life can be predicted by success or failure in the same subjects in the high school. But, if it is allowed that a millionaire broker, or manager of a great manufacturing concern, or a manager of a big league base ball team, or a president of a great banking concern, or a big wheat farmer, or a cattle raiser on a large scale, or the mayor of a great city, or the promoter of some great philanthropic enterprise, or any one of a hundred and one other persons of similar influence and prestige has made a success in life, then the best criterion for estimating scholarship and the best basis on which to predict success in life might conceivably be one's ability to "get by on a pony" in the Latin class, or one's ability to excell in managing college athletics for a season, or even the ability to get others to do the work that one is supposed to do himself. So, also, if success in life is interpreted to mean the becoming of a great painter or sculptor, manifestly aptness in art work and in clay modeling is a better basis on which to predict success than either language or mathematics. Indeed it may be said at the present time that the ambitions of the majority of our brainy young men who enter the high school lead them into fields of endeavor in which little of higher mathematics is wanted and almost none of any kind of foreign language, not to mention the *dead* languages.

For this particular school, however, in which one of the chief purposes is to prepare for college entrance examination in colleges which still persist in requiring a certain formal knowledge of language

and mathematics, together with English literature and a few closely allied subjects, the scholastic standing of the pupils must necessarily be based chiefly upon achievement in these subjects. Even so, there were found only a very few cases in which the rank of a given pupil as based on his S. Q. was markedly different from that given him by a consensus of the teachers' judgments as found on the report cards. There is an almost perfect correlation between the rank of the pupils as determined by the S. Q., as calculated by the above formula, and their rank as determined by an averaging of all the reports made by the teachers.

In the course of our investigation the following facts were brought to light, some of which may have a significant bearing upon certain problems arising in connection with the administration of a private school of this kind in a community like New York City.

The period of time chosen for our investigation comprised the years 1913-14 to 1916-17, inclusive. During this period there were 116 pupils who graduated from the high school, and 184 others who advanced as far as into the eighth grade, in line for graduation in one or another of the four classes, but yet who failed for various reasons to complete the course. Of the 116 graduates 40, or 34 per cent, were boys and 76, or 66 per cent, were girls. Of the 116 graduates there were 16 boys and 36 girls who entered "Early," *i. e.*, before the end of the fifth grade. That is to say, 40 per cent of the boys and 47 per cent of the girls who graduated entered "Early." The records for the four years show a gradually decreasing per cent of graduated boys who entered "Early." The figures for the four years are 44, 43, 40 and 29 per cent. Just the reverse is true in the case of the girls, the per cents being 12, 48, 53 and 53 for the four years, respectively. The increase in the per cent of girls entering "Early" exceeds the decrease in the case of the boys, so that when taken together there is an increase in the per cent. of pupils graduating who enter "early." When combined the per cents are 29, 46, 48 and 49 respectively, for the four years.

As noted above there were, during this same period, 184 pupils who advanced into the eighth grade, in line for graduation in one of the four classes, but who failed to complete the course. Of these 65, or 35 per cent, were boys and 119, or 65 per cent, were girls. Of the 184 non-graduates there were 23 boys and 24 girls, who entered "Early." That is to say, 35 per cent of the non-graduate boys

entered "Early," as against 40 per cent of the graduate boys and 20 per cent of the non-graduate girls entered "Early" as against 47 per cent of the graduate girls. From these data we have calculated the following expectation on the basis of 100 entrants and also the requirements in terms of entrance in order to insure an out-put of 100.

Of every 100 boys who enter "Early" 41 will graduate and 59 will not. Of every 100 boys who enter "Late" 36 will graduate and 64 will not.

Of every 100 girls who enter "Early" 60 will graduate and 40 will not. Of every 100 girls who enter "Late" only 30 will graduate, the other 70 will not. That is to say, of every 100 pupils who enter "Early" 52 are boys and 48 are girls, and of every 100 pupils who enter "Late" 32 are boys and 68 are girls.

That is, if we feed in 100 pupils "Early" and 100 "Late" as they usually come to this school, we may expect 84 of them to be boys and 116 to be girls. We may expect 33 of the 84 boys to graduate and 49 of the 116 girls to graduate.

Or, if it is desired to turn out, say, 100 graduate boys each year, 244 "Early" entrants must be fed in, or 278 "Late" entrants. Or, if the classes are such that it is desired to have an equal number of boys entering "Early" and "Late," it will be necessary to provide 129 of each class, or a total of 258 pupils.

If it is desired to turn out 100 graduate girls each year it will be necessary to feed in 167 "Early" entrants, or 333 "Late" entrants. Or, if it is desired to admit an equal number of "Early" and "Late" entrants the number needed of each class will be 111, or 222 altogether.

The average length of time spent in the grades by the 116 graduates was 6.7 semesters and the average length of time spent in the high school was 7.7 semesters. The average length of time spent in the grades by the 184 non-graduates was 4.61 semesters and 3.8 in the high school. The graduated girls spent on an average 1 semester more in the grades and 1.7 semesters more in the high school than the graduated boys.

Of the non-graduates, the boys spent a slightly longer time both in the grades and in the high school than did the girls. This means that as a rule, in this particular school, the boys who graduate either advance through the high school more rapidly than the girls, or there

are more boys who enter higher up in the high school. The probability is that both these factors operate to make the difference shown in the length of time spent. Referring to our previous statement regarding the per cent of pupils entering "Early," the above supposition is shown to be true, for 60 per cent of the boys who graduate enter "Late," and only 53 per cent of the girls who graduate enter "Late."

Coming now to our main problem, we find that *there were no cases presenting any marked change from "Bright" to "Slow," or vice versa.* as they passed from the "Early" period in the elementary school to the high school, in either the graduate or the non-graduate group. The following procedure was carried out, however, which yielded valuable data for general reference and for the study of certain other specific problems, as that of individual differences in school achievement, as based on sex, age, physical condition, the comparison of teachers' marks in the different subjects in the high school and the relative change in marks from year to year, etc.

The information contained on the high school and elementary record cards was tabulated, in convenient form in a note book after the following manner: A separate tabulation was made for each graduating class, boys and girls separate, from the year 1911-12 to 1916-17, although only the last four years of this period were used in the calculations here presented. The tabulation contained, first the name of the pupil, then the date of entrance and the class entered, the time spent in the grades and in the high school, when graduated, *i. e.*, whether in February or June, standing in the grades and in the high school in terms of "Bright," "Average," or "Slow," the number of each kind of mark received, the S. Q., and finally a distribution of the cases in which he received high marks (A's) and low marks (C's and D's) in the various subjects. All the subjects offered in the high school curriculum were grouped into the following eight groups, *viz.*: English, Modern Language, Ancient Language, Mathematics, Science, Arts, Shop, and Physical Training.

The 52 graduates, who entered "Early," were then arranged in the order of their S. Q. from the lowest to the highest. The S. Q.'s for the whole group ranged from .75 to 2.49. This means that the poorest member of the group is about equal to a student who receives an equal number of B's, C's and D's, and no A's, while the best member of the group is about equal to one who receives an equal

number of A's and B's, with no grades lower. The lower quartile (13 pupils) includes those whose S. Q.'s range from .75 to 1.24, *i. e.*, from the poorest, as described above, to a pupil about equal to one who receives an equal number of all four marks. The lower half of the middle 50 per cent (the second quartile from the lowest) includes the 13 pupils whose S. Q.'s range from 1.24 to 1.54. Thus this group ranged from a pupil about equal to one who receives an equal number of all four marks to one who receives an equal number of B's and C's, with no marks higher or lower. The upper half of the middle 50 per cent (the third quartile from the lowest) includes the 13 pupils whose S. Q.'s range from 1.54 to 1.90. That is from a pupil about equal to one who receives an equal number of B's and C's, with no marks higher or lower, to one who receives all B's, or an equal number of A's, B's and C's, with no D's. The upper quartile, classed as "Bright," include the 13 pupils whose S. Q.'s range from 1.90 to 2.49. The range of this group is thus from a pupil about equal to one who receives all B's, or an equal number of A's, B's and C's and no D's, to one who receives an equal number of A's and B's and no mark lower. We have, therefore, 13 "Bright" pupils, 26 "Average" and 13 "Slow" ones.

An examination of the more than 4,000 report cards for the 13 "Bright" and the 13 "Slow" pupils showed a very close correspondence between the rank as determined by the S. Q. and the rank as based upon the consensus of opinion of all the teachers. If the rank of any given pupil, as based upon his S. Q., is discussed with any given teacher, the individual judgment of said teacher will naturally differ from the S. Q., according as that particular pupil happened to be one who was 'good,' or 'poor' in the particular subject taught by that teacher. But if the consensus of opinion of all the teachers is taken as a basis for rating any given pupil, *no case was found in which a pupil, who was characteristically "Slow" in the "Early" grades, changed so as to be characteristically "Bright" in high school, or vice versa.*

The following two reports, one for a typical "Bright" pupil and the other for a typical "Slow" pupil, represent fairly well the characteristic remarks found on the report cards. The Roman numerals represent the grades from the time the pupil entered the school until the completion of the eighth grade and the capitals represent the four years of high school, which are designated as Alpha, Beta, Gamma and Delta, respectively.

(1) Excerpts from record cards of pupil No. 48, who ranks 9 in the uppermost quartile (The "Bright" group) and whose S. Q. is 2.18.

- I. Bright—Capable—Active—Keen—etc.
- II. Capable—Older—Serious—Thinks clearly—First impression is of brighter mind than he really is—etc.
- III. Bright—Responsive—All round satisfactory.—Right in front rank, yet not above his grade—etc.
- IV. Not of manual and mechanical type—Future?—Remarkable reasoning power—Great accuracy and care—etc.
- V. Splendid in every way, but lacks in ability to execute with hands—(Very naturally this was taken from a report card handed in by the teacher of manual training.)
- VI. Normal—A model—Satisfactory—Keen mentally—etc.
- VII. Serious—Excellent—etc.
- VIII. Similar reports—etc.
 - A. Eminently satisfactory—etc.
 - B. Scholarly qualities—Good worker—Fights against fault of 'Scatterbrainedness'—etc.
 - G. Typical plodder—Average ability—Steady serious boy—etc.
 - D. Conspicuous for good scholarship—etc.

(2) Excerpts from record cards of pupil No. 6, whose rank is 6 in the lower quartile (The "Slow" group) and whose S. Q. is .96.

- V. Unstable—Inattentive—Changeable—Not very strong—Pass—
- VI. Shows improvement—Satisfactory—Careful, but slow—etc.
- VII. Long absence—Above average in ability, but below in accomplishment—Lives far out—
- VIII. Absent much—Makes excuses—Passing—etc.
 - A. Average ability—Not strong physically—Easily confused—Tries hard when spirit is good—Lazy?—etc.
 - B. Failing in Latin and Mathematics—Similar weakness in brother—Lacks application—etc.
 - G. Reached limit in mathematics—Repeats in Latin, which seems good—
 - D. Barely passing—Good girl, but weak in scholarship—etc.

In interpreting these reports it should be borne in mind that the pupils who graduate from this school, as a rule, are those who are able to meet the minimum requirements in some, if not all, of the so-called 'heavier' subjects, viz.: language, mathematics, English and science. Moreover, it should be remembered that more of the pupils take these subjects than take the 'lighter' subjects, except in the case of physical training, which is required of all, unless excused by the authorities for physical reasons. Thus it is quite possible for a pupil to attain very high rank in scholarship and at the same time

be reported upon as 'Incapable, Not dexterous, or even possessed with faults' by the teachers of the lighter subjects.

On the other hand, it should be kept in mind that these samples were taken from a group of 52 pupils, all of whom entered "Early" and persisted with at least a passing grade, otherwise they could not have graduated. Thus in case of the "Slowest" of the "Slow," remarks, such as 'Passing, Satisfactory, and the like,' would naturally be found.

As indicated above, a tabulation was made of all the cases in which high marks (A's) and low marks (C—'s and D's) were received by the 116 pupils who graduated from the High School during the period studied, viz.: the years 1913-14 to 1916-17, inclusive. The following is a summary of these data:

Subj.	1913-14				1914-15				1915-16				1916-17			
	Boys		Girls		Boys		Girls		Boys		Girls		Boys		Girls	
	H	L	H	L	H	L	H	L	H	L	H	L	H	L	H	L
Eng.	5	1	3	2	4	4	8	2	2	4	5	3	2	1	13	10
M. L.	4	2	5	1	4	7	16	5	4	2	10	4	1	4	10	13
A. L.	3	-	1	4	3	6	6	4	1	5	4	6	-	4	4	19
Math.	3	5	-	7	4	7	3	13	-	10	1	11	1	2	3	22
Sci.	3	2	3	4	3	8	9	4	4	2	6	6	2	1	6	12
Arts	2	-	5	1	3	1	8	3	2	-	6	1	2	-	14	2
Shop	2	-	-	-	1	1	-	1	3	1	-	-	3	-	-	-
P. T.	4	1	1	-	2	-	7	-	3	-	6	-	2	-	19	2
Total	26	11	18	19	24	34	57	32	19	24	38	31	13	12	69	80
For yrs.	H-44		L-30		H-81		L-66		H-57		L-55		H-82		L-92	

Summary for the 4 years.

Subj.	Boys		Girls		Boys & Girls	
	H	L	H	L	H	L
Eng.	13	10	29	17	42	27
M. L.	13	15	41	23	54	38
A. L.	7	15	15	33	22	48
Math.	8	24	7	53	15	77
Sci.	12	13	24	26	36	39
Arts	9	1	33	7	42	8
Shop	9	2	-	1	9	3
P. T.	11	1	33	2	44	3
Total	82	81	182	162	264	243

The above is not a tabulation of the number of *A's and C-'s and D's* received, but a tabulation of the number of *cases*, in which a pupil received either of these marks. For example, in the class of 1913-14, of which there were 9 boys and 8 girls, there were 26 cases in which *A's* were given to boys and 18 cases for the girls; there were 11 cases in which boys received *C—'s* or *D's* and 19 cases for the girls. For the whole class there were thus 44 cases in which high marks were received and 30 cases in which low marks were received. The summary for the four years shows that there were an almost equal number of cases in which both high and low marks were received by the boys. In the case of the girls, the number of cases in which high marks were received is approximately one eighth more than the cases in which low marks were received. Considering the boys and girls together for the four years there are about one eleventh more cases in which high marks were received than in which low marks were received.

By dividing the number of cases in which high marks were received through by the number of cases in which low markswere received. The ratios thus obtained give us a fair picture of the relative difficulty of each subject, arranging the subjects in the order of these ratios from the highest to the lowest, we have the following array:

Physical Training	14.67
Arts (Dom. & Fine)	5.25
Shop (Man. Tr., etc.)	3.00
English & History	1.56
Modern Language	1.42
Science92
Ancient Language46
Mathematics19

Thus there appears an almost perfect gradation all the way from the subject which is almost wholly a matter of *ideo-motor* coordination to the subject which involves the largest amount of abstract thinking. The only possible exception is that of ancient language, which should, no doubt, have occurred in the array following modern language. Allowing the facts displayed by this table to stand as they are, the question still might be raised as to the consistency of the standards set up by the various departments. For example, it might be asked, why one subject, as physical training, should be given in such a way that there would be 14.67 times as many cases in

which pupils receive high marks as the cases in which low marks are received, and another subject, as mathematics, be given in such a way that only one fifth as many cases occur with high marks as occur with low marks.

There are three possible ways by which the relative per cent of high and low marks may be made practically the same for all subjects taught. (1) By being more liberal in marking in the case of those subjects which show the lower ratios and by being more exacting in the case of those subjects which show the higher ratios in the list given above. (2) By introducing more difficult subject-matter, in the case of subjects showing high ratios and less difficult subject-matter, in the case of the subjects showing the lower ratios. And (3) by adopting a system of ranking the members of each class from the best to the poorest, using all available information as a basis for such ranking, and then distributing the marks according to a curve approximating that of the normal surface of frequency. Either one of these methods would result in an array of ratios, for all the subjects, varying but slightly either way from any ratio that might be chosen as the most desirable ideal.

In our opinion, the thing that should be done is to combine methods (2) and (3) in all cases where there are as many as 50 pupils in a subject (theoretically there should be at least 100), and with due allowance for exceptional cases in which the selection of pupils in the class is other than random.