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Psychological Tests and Guidance of High-School Pupils

(REVISED AND ENLARGED EDITION)

WILLIAM MARTIN PROCTOR

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The Use of Psychological Tests in the Educational and Vocational Guidance of High School Pupils

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EDITOR'S INTRODUCTION

When Professor Terman's book on *The Intelligence of School Children* appeared, it became evident that Leland Stanford Junior University was the center of a surprisingly extensive investigation of human mentality. It was clear that records were being made, not once, but repeatedly, with reference to the same children and that many of these children were being kept under observation throughout their school careers and even beyond. In other words, the common curse of our educational inquiries, in virtue of which nothing is studied hard enough and long enough to reach fundamental results, seemed to have been lifted from the efforts of the Stanford group of men and women.

One of the members of the Stanford group is Dr. William M. Proctor, the author of this book. He has given particular attention to high-school pupils and to underclassmen in college and it is to these groups that he has applied his tests.

These tests are for the most part such as may be given to large numbers of persons simultaneously. Instruments of this kind have been appropriately called group tests, in contradistinction to the individual or interview tests in the use of which an examiner handles only one person at a time. The history of the development of these group tests to their present status has been sketched in a number of places. It is generally and correctly understood that the prototype of all the present group intelligence tests is the collection of examinations loosely termed the Army Tests.

From the Army Tests, either in direct descent or by collateral branches, has sprung a large progeny in the form of group intelligence scales or tests. The use of these tests has already become enormous. To a certain extent the persons who have devised them have become victims of this popularity. When the school people will buy and use these tests by the millions, there is a temptation for authors to rush them into print without sufficient preliminary analysis and without extensive trial in practical situations.

Of course, this is only a temporary condition. Out of the competition among different tests and the trials of two or more of them on the same individuals will come a critical literature which will surely bring untrustworthy instruments into disrepute. This sort of literature is only just now coming through. The development of group intelligence tests has been so rapid that books on their use have not had time to appear. Magazine articles involving the use of one or two of them have been published. Dr. Holley's monograph on the use of mental tests appeared during the past autumn. The present book is another of much the same sort. It deals with the Binet Scale, the Army Examinations *a* and *b*, and the Army Alpha Test.

But Dr. Proctor's book, although incidentally concerned with the validity of the different scales, is primarily devoted to the practical uses to which the results of intelligence testing may be put. For example, upon testing the same pupils after an interval of two and a half years, Dr. Proctor is especially interested in the fact that "the person who made the original tests . . . would have been in a position to give very helpful advice to all of the pupils tested by him; also that his predictions as to the possible educational future of each of these pupils would have deserved serious consideration by parents and teachers." Again, when it becomes possible to compare the success in high school of two groups of pupils of which one has received guidance on the basis in part of intelligence testing while the other has received no such guidance, Dr. Proctor is especially interested in this practical demonstration. About a third of the unguided pupils, but only one-fifth of the guided pupils, failed in one subject. None of the pupils who had received the benefit of guidance failed in two or more subjects, while rather more than one in ten of the unguided pupils failed to that extent.

In other directions his interest in the practical use of intelligence tests leads him into the field of vocational guidance. Here he makes good use of the work of the army psychologists by which the intelligence of recruits belonging to different occupations was revealed. These he relates to the occupational prefer-

ences which he obtained from over nine hundred high-school pupils. The lowest intelligence score made by the middle 50 per cent of professional workers among the army recruits was 98. On the other hand, 50 of the high-school pupils who expressed their intention of becoming professional workers scored less than 90. Again, he points out the fact that over 60 percent of the high-school pupils aspired to join the ranks of the professional class while, according to the United States census, less than 5 percent of the gainful workers of the country belong to that class. Dr. Proctor, therefore, although not neglecting the theoretical and scientific aspects of his subject, gives particular attention to the practical bearings of it. Indeed, we should say that his monograph is a good example of a method of treatment, which, while it is competent from the point of view of research workers, is also of special interest to public school workers.

With respect to vocational guidance Dr. Proctor's material supports his view that those who seek a ready means of determining whether pupils should be telephone operators or photographers, bakers or blacksmiths, farm workers or barbers, are likely to be disappointed. Nothing in our general intelligence tests will enable us to be specific to this degree. If, however, occupations are divided into five or six general classes, the data at hand regarding the range of intelligence among people belonging to these classes are such as to permit us to say something definite concerning the class of work in which a given pupil may, so far as intelligence is concerned, be successful. Perhaps even here we can say with greater certainty what the class of occupations is in which the pupil will *not* be successful. For example, if a pupil's intelligence quotient is 90, we can be sure that his intelligence is not sufficient for professional work but that he may (if other conditions are favorable) successfully pursue some occupation belonging to the class of skilled labor. Whether that occupation shall be that of a bricklayer or a painter, a plumber or a carpenter, cannot be determined on the basis of intelligence. Such a determination will depend upon individual aptitude, pref-

erences, and opportunities. In other words, we may with some safety advise pupils as to classes of occupations, but we cannot assume—at least on the basis of general intelligence—to advise them with respect to particular occupations within the occupational classes.

Those, therefore, who are looking to the intelligence test to determine whether a boy should be a bookkeeper or a telegrapher may as well know at the outset that these tests offer no basis for such determinations. This comes about from the very simple fact that the same degree of general intelligence is required and is now being exhibited by both bookkeepers and telegraphers. In other words, the difference between the qualifications for workers of these two sorts is not intellectual in the general sense. Perhaps we shall subsequently develop trade and occupational tests which will differentiate more sharply than is now possible between the aptitudes pertaining to occupations in the same class. Indeed, we can already mark out in a general way the lines along which such investigation will proceed. There will be, in the first place—to stick to our bookkeeper and telegrapher—an analysis of the bookkeeper's job and the telegrapher's job for the purpose of finding out what these workers have to do. From these data some inferences may be made as to the specific abilities required in learning and performing the operations incident to the occupation. Having determined these abilities, or the most important of them, tests may perhaps be devised for measuring such abilities. Many trials of these tests and a checking of the results obtained from them against the ultimate success of persons who have become bookkeepers and telegraphers will be required in order to refine the tests to the point where they will be valid instruments. Meanwhile, one ought to point out that trade tests are quite different from guidance tests. For example, we have certain trade tests which have been developed in the army. We also have tests for clerks and stenographers. But all these tests are given to determine the ability of persons already belonging to the occupation or claiming to belong to it. A test to deter-

mine whether a person, prior to studying about an occupation or entering upon it, has the ability to pursue it successfully is quite another matter.

Dr. Proctor's chapter on the application of the Army Tests to freshmen upon entrance to college is especially interesting. It is worth noting how the different educational levels correspond to different intelligence levels. Dr. Proctor found, for example, that, expressed in terms of the intelligence quotient, the typical first-year high-school pupil has a mentality of 105. Three or four years later, when elimination throughout the high school has had its effect, the typical intelligence of high-school graduates has gone up 6 points—namely to 111. If the reader will recall Professor Terman's classification of intelligence quotients, he will observe that this means that more than half of the high-school graduates belong in the classification called "superior" or in a higher classification. Between graduation from high school and entering college another sharp elimination apparently takes place in virtue of which the mentality of typical students now moves up 4 points so that the median intelligence quotient for students entering college is 115. As Dr. Proctor points out, if the same process of selection takes place in college as in high school, "we should expect the median intelligence quotient of college graduates to be 120 or over." This means that students of no more than average intelligence will be likely to be eliminated from college before the senior year.

In conclusion, we should like to point out that Dr. Proctor makes no inordinate claims for the intelligence test. Some of the results—particularly the correspondences between intelligence scores and teachers' estimates and between intelligence scores and official ratings—would be higher if better tests had been at his disposal. The Army Alpha Test was not intended for high-school or college students. On this ground, and also because it was a pioneer and is capable of improvement, it is to be expected that future workers will secure even more significant correspondences than Dr. Proctor found. But whether this is true or not,

the spirit of the author would no doubt remain the same—the spirit of scientific conservatism which refuses (to use his own words) “to place undue confidence in the results of a single psychological examination, however thoroughly it may have been standardized.”

B. R. BUCKINGHAM

January 22, 1921

CHAPTER I

INTRODUCTION

The secondary-school population of the United States has, since 1890, increased three times as fast as the general population. In the year 1915 there were 14.4 pupils of secondary grade for every 1,000 persons of the general population, whereas in 1890 there were only five. According to recent estimates there are in the United States 14,000 high schools caring for 1,500,000 pupils requiring the services of 80,000 teachers, and calling for the expenditure of \$75,000,000 per year for salaries and maintenance.

The problem of administering the physical side of this vast educational enterprise has occupied the attention of school authorities to such an extent that small consideration has been given to the need for internal betterment. The average American community is willing to tax itself for material equipment. An imposing high-school building becomes a matter of civic pride. It is a good talking point in chamber of commerce literature, and can be shown to visitors as an index of the progressive nature of the community.

Many of our city high schools are housed in buildings superior to those occupied by the best colleges and universities a generation ago. Buildings costing from \$500,000 to \$1,000,000 are not uncommon; and it is perfectly safe to say that no other nation has begun to spend as much upon its secondary-school buildings as has our own.

When, however, it comes to securing more money for teachers' salaries, for enriching the curriculum, or for other matters of internal improvement, the task is much more difficult. The results obtained by spending money to make a better adjustment between the child and the curriculum, or between the child and his future place in the social order, are quite intangible. It is very difficult to prove to the tax-paying public that money so spent will pay ascertainable dividends.

Since the public is more willing to spend money on buildings that can be seen than on invisible internal betterments, reforms in our secondary schools have come very slowly. Natural conservatism as well as considerations of economy have combined to sustain the traditional curriculum in seventy-five out of every hundred high schools.

So long as preparation for college was the chief end and aim of secondary education, the narrow, college-preparatory course of study was satisfactory. But since the high-school population now comes from every class of home, and since only 10 percent of those who enter high school ever reach college, the demand has come to be more and more insistent that secondary education shall prepare the youth of the land for citizenship and vocations.

In the discussion of the proposed reorganization of secondary education large space is being given to the problem of educational and vocational guidance. The classical, college-preparatory high school of former days had no need of educational guidance. There was only one course of study. It was a case of take it or leave it. Neither was there great need for vocational guidance. Those who could master the prescribed course of study were headed for the professions. Those who were unable to complete the course taught school or went back to the farm. The boy or girl in perplexity as to a life career could find wise and sympathetic counselors in the village minister, doctor, or lawyer.

The boy or girl of the present day faces a much more complex situation. The fields of vocational opportunity have been greatly multiplied. Where formerly there were six or seven possible lines of life work open to the educated man or woman, there are now literally hundreds. Some agency must take over the task of collecting, organizing, and imparting accurate information regarding possible vocational opportunities to the boys and girls in our high schools.

The necessary information is no longer easily accessible to the inquiring boy or girl. The "No Admittance Except on Business" sign bars them from shop and office alike. They have become more and more dependent upon imparted, as against first-hand,

information concerning the qualifications necessary to success in the different fields of endeavor. The minister has been practically eliminated as a factor in vocational guidance, because the church reaches such a small fraction of the high-school population. A majority of parents have neither the disposition nor the means to acquire adequate information regarding vocations to make them competent counselors. This means that the home is a much less important factor than it used to be in the vocational guidance of youth.

The high school, therefore, becomes the residuary legatee of, the church and the home in the field of educational and vocational guidance. Whether the high school meets its opportunity for service in this new direction or fails entirely to function will depend upon the methods of educational and vocational guidance adopted.

The vital nature of guidance in education is well stated by Truman Lee Kelley:¹

The modern idea of education is crystallizing into an effort to guide rather than to instruct—to answer a need rather than to cater to a curriculum. The growing recognition of the need of vocational and educational guidance is resulting in the establishment of bureaus endeavoring to give the former, and in the training of psychologists to solve the problems of the latter.

Also by J. M. Brewer:²

The development of men and women is the purpose of the school, and the selection of and preparation for occupations is one of the important features of this development. The school must therefore be organized with the vocational guidance of the child as one of the aims in mind.

This monograph embodies the results of a recent study by the writer involving the use of psychological tests in the educational and vocational guidance of high-school pupils. The data gathered and the conclusions reached are presented in the hope that those interested in the advisement problem in the high school may find herein helpful suggestions or be stimulated to make constructive criticisms in the light of their own experience.

¹ Kelley, Truman Lee. *Educational guidance*. (Teachers College, Columbia University Contributions to Education, No. 71.) New York: Teachers College, Columbia University, 1914, p. 1.

² Brewer, J. M. *The vocational-guidance movement*. New York: Macmillan Company, 1918, p. 58.

The study was begun in the school year 1916-1917. All the pupils of the September and February entering classes of the Palo Alto Union High School were given the Stanford Revision of the Binet Intelligence Scale. In 1917-1918 group tests, Army Examinations *a* and *b*, and Army Alpha Test, Form 5, were given to more than 1,600 high-school pupils, representing nine different institutions.

The high-school progress of these pupils has been noted; information as to vocational ambition, educational plans, etc., has been secured; teachers have been asked to give estimates of ability; and the school marks of those remaining in school have been obtained. The records made by 93 pupils who were graduated from high school subsequent to being given the psychological tests, and who entered Stanford University, have also been compiled. Chapter IV represents a sixth year follow-up of 132 Bineted cases, and sets forth the educational history of each case. Chapter VI represents a fourth year follow-up of over seven hundred cases to whom group intelligence tests were given. It throws light on the persistence of educational and vocational plans and their relation to intelligence.

The following chapters will indicate what the writer found to be the value of the tests as a means of predicting probable high-school, vocational, or university success. The word "probable" is used advisedly because it should be stated at the outset that the writer is not disposed to place undue confidence in the result of a single psychological examination, however thoroughly it may have been standardized.

The results obtained are at least suggestive of the methods of procedure, in the use of psychological tests by the high-school principal or teacher, that will throw the most light upon the problem of educational and vocational guidance in the high school.

CHAPTER II

PSYCHOLOGICAL TESTS AS A MEANS OF MEASURING THE PROBABLE SCHOOL SUCCESS OF HIGH-SCHOOL PUPILS

The validity of the Stanford-Binet Scale, when applied to high-school pupils, was discussed by the writer in the issues of *School and Society* appearing October 19 and 26, 1918.¹ In those articles it was shown that very significant correlations had been obtained between intelligence quotients,² (I.Q.'s), resulting from the individual tests of 107 high-school pupils and the school marks earned by the same pupils during the school year 1916-1917; also between I.Q.'s and teachers' estimates of intelligence made during the same year.

Two years and a half later there were 66 of the original 107 high-school pupils remaining. Teachers who had known all of these pupils during their stay in the high school were asked to give estimates of their intelligence upon the same rating sheet as that which was used in 1916-1917. All school marks earned during the two and one-half years were averaged. Correlations were then found (a) between the I.Q.'s obtained in 1916-1917 and the teachers' estimates made in 1919; (b) between the average of all school marks earned up to April 1, 1919, and I.Q.'s obtained in 1916-1917; and (c) between the average school marks and the teachers' estimates made in 1919. Table I shows the close agreement between the correlations obtained in 1916-1917 and those found in 1919.

Table I shows that the correlations obtained in 1918-1919, when the same comparisons were made as in 1916-1917, were

¹Proctor, W. M. "The use of intelligence tests in the educational guidance of high-school pupils," *School and Society*, 8:473-78, 502-9, October, 1918.

²The intelligence quotient is obtained by dividing the mental age by the chronological age. Thus a twelve-year-old chronologically who tested eight years old mentally would have an I.Q. of 0.66, expressed for convenience "66." The I.Q. is an index of relative brightness. For further discussion of intelligence quotient see: Terman, L. M. *The intelligence of school children*. New York: Houghton Mifflin Co., 1919, p. 7.

TABLE I. COMPARISON OF CORRELATIONS OBTAINED
IN 1916-1917 WITH THOSE OBTAINED IN 1918-1919^a

Year	Correlation between I. Q. and Teacher Estimates	Correlation between I. Q. and School Marks	Correlation between School Marks and Teacher Estimates	Total Number of Cases
1	2	3	4	5
1916-17.....	0.586 ± 0.043	0.545 ± 0.046	0.702 ± 0.033	107
1918-19.....	0.583 ± 0.055	0.487 ± 0.063	0.667 ± 0.046	66

^a Pearson's formula³ (shorter method) was used in making all correlations.

practically as high as those obtained in the first instance. The results of two and one-half years of follow-up work seem to indicate that the person who made the original tests with the Stanford-Binet Scale in 1916-1917 would have been in a position to give very helpful advice to all of the pupils tested by him; also that his predictions as to the possible educational future of each of these pupils would have deserved serious consideration by parents and teachers.

As a means of discovering individual differences between school children in order that they may be grouped in classes according to ability, the individual psychological test has been shown to be a helpful tool. From the standpoint of school administration, however, the individual test presents serious difficulties. The time required to give an individual test to a high-school pupil varies from 40 minutes to 120 minutes. The total number of pupils that can be examined by a single examiner in a day will seldom exceed ten. The use of the Stanford-Binet abbreviated scale enables an examiner to test from 15 to 25 pupils in a day. Even so, it is impossible to use the individual method when a rapid survey of an entire school population is to be undertaken.

Group mental examinations afford the only means of meeting the demand for a speedy and reliable method of measuring the

³ Rugg, H. O. *Statistical methods applied to education*. New York: Houghton Mifflin & Co., 1917, p. 274.