

May, 1943

50 cents per copy
\$4.00 per year

EDUCATION

VOLUME 63



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problems as yet unsolved; and many interesting leads which point to ways and means of reducing errors of prediction still more. Not all the remaining errors can be removed by improving tests alone. As in any type of education, there are problems of instruction and in the measurement of the results of instruction which call for diagnosis and treatment. The Psychological Units are concentrating, however, upon further test construction. Within the interval of one year (1942), about 300 new ideas for tests were placed on record. Many new tests have been developed and many have reached the final try-out for validation purposes. For many tests in the classification battery, effective though they now may be, there are in the offing strong contenders for replacement. Much experience with succeeding classes often shows how and why certain modifications may mean a practical margin of improvement. Recognizing the ever-present possibility of coaching future Cadets in the wisdom of test-taking, it is important continually to introduce new forms and new varieties of tests. And so, the research side of the function of a Psychological Unit in the Air Forces is by no means the least of its *raison d'être*.

One cannot view the operations of one of these Units and the program of which it is a part at close range and

at the same time have in mind the background other experience in vocational psychology, without picturing some of the far-reaching social implications that should be the logical consequence. As is true in many technological fields, it requires a major catastrophe to stimulate the appreciation of a need for the scientific selection and sorting of individuals for jobs. Our national peril and the specialized type of warfare we must wage in order to defeat a technologically-equipped enemy demand the quickest and most efficient use of human resources. In such an emergency, all contributing technologies are liberally recognized and supported. Shall we, after the emergency has passed, be none the better for it? Will not the post-war project of maintaining a high-level domestic economy while reconstructing a shattered world demand that the same care be used in finding out which people can best do, or learn to do, which things? Will the demonstration that this kind of thing can be done, and has been done in the Army Air Forces, be remembered? Time will tell. In the meantime, we must concentrate on the immediate sink-or-swim struggle, gaining satisfaction from the thought that the type of measurement to which this number of EDUCATION is dedicated has not been found wanting in the hour of peril.

Psychometrics in Special Training Units of the Army

By MORTON A. SEIDENGELD, Lt. Col., A. G. D.
and PAUL A. WITTY, Major, A. G. D.

Adjutant General's Office, War Department, Washington, D. C.

Introduction

THE utilization of a program of tests and measurements for determining certain fundamental facts about military personnel has received rather widespread recognition in current psychological and educational periodicals. The emphasis in these accounts has been placed upon the use of psychometric procedures in the classification of men, the detection of mental abnormalities, and the identification of special aptitude and skill.

Knowledge of these psychometric approaches has been rather generally disseminated. Less well known are the procedures used in Special Training Units. It is our purpose to describe briefly the testing program being developed for these units. We shall describe the tests used in selecting and placing men in Special Training Units, in measuring their progress from time to time, and in evaluating their final attainment.

Description of the Special Training Unit.

The Special Training Units are designed to provide instruction for enlisted men not immediately suitable for assignment to regular training. To these units are sent illiterates, non-English speaking men, the education-

ally retarded and underprivileged, and selectees having moderate physical handicaps. The majority of the men fall in the category of trainable illiterates who have been denied opportunities to learn to read, to write, and to speak acceptably. The purpose of the Special Training Unit is to offer the rudimentary training which will enable these men to develop those academic skills which are needed in the Army. Class instruction is organized on the basis of an eight- to twelve-week period to provide the necessary systematic training for all groups except the physically handicapped. For this group, corrective measures are introduced in a modified training schedule.

Special texts, a monthly magazine called *Our War*, a weekly *Newsmag Supplement* containing simply written digests of activities on the various fighting fronts, film strips, and detailed teacher guides are issued for use in Special Training Units.

The Testing Program in the Special Training Unit

The following discussion will be limited to (a) tests of ability to profit from academic training, (b) measures of special deficiencies and tests to place students academically, (c) unit tests of attainment, and (d) estimates and

measures of "readiness" for assignment to regular Army training.

Tests of Ability to Profit from Academic Training

Every enlisted man of the Army is required to take the Army General Classification Test. If an individual gives evidence that he is unable to read or write, or is so limited in the use of these abilities that he cannot succeed on this highly verbalized paper and pencil test, he is required to take another test in which verbal factors are reduced to a minimum. Directions for this group performance test are given through pantomime; performance is sought on various non-verbal paper and pencil items. If a man attains a rating below the critical score on this test, he is referred to the personnel consultant. This military psychologist interviews the man and gives such additional individual tests as he believes are required to understand and classify him properly. Some doubtful cases whose scores are slightly above the critical level are also referred to the personnel consultant for further study.

The personnel consultant is provided with a battery of individual tests developed by Dr. David Wechsler for the Army. This assembly, the Wechsler Mental Ability Scale-Form B, does not differ greatly in scope and function from the Bellevue-Wechsler Battery. However, it includes a few additional items which appear to be especially appropriate in the military situation. In its present form, this scale contains 16 sub-tests; seven of these are verbal, and nine are performance tests.

Included in the verbal group are the following sub-tests: vocabulary, information, arithmetic, general comprehension, sentence completion, analogies-similarities, and digit-span. The performance group contains the following types: picture completion, picture arrangement, digit symbol, series completion, picture similarities, mazes, paper form-boards, object assembly, and block design.

The personnel consultants are advised to use as many of the sub-tests as possible, but are informed that time limitation may make it necessary to reduce these to an effective minimum. This is usually accomplished by selecting the three most discriminating tests in each group: arithmetic, verbal similarities, and comprehension in the verbal group; and block design, digit symbol, and series completion in the non-verbal battery. Although these tests are recommended, the personnel consultant may make substitutions when the need arises.

The personnel consultant does not rely upon test results alone in arriving at a decision about a man's ability and promise. Facts concerning each man's emotional, educational, social, and vocational background are duly considered. But this battery of tests does yield data of utmost significance in helping the personnel consultant reach a decision about the man's educability. After consideration of all data, the personnel consultant recommends that the man be (a) returned to his regular unit, (b) be sent to a Special Training Unit, or (c) recommended for honorable discharge from the Army under appropriate regulation.

Determining Areas of Deficiency and Placement in Appropriate Training Groups

It is essential, in seeking maximum instructional efficiency, to ascertain the chief limitations or deficiencies of each man in reading, language, and arithmetic. This is accomplished through the use of a placement test. The present placement test, known by the symbols DST-6: X-1, is divided into three sections: (a) word meaning, (b) reading, and (c) arithmetic. Ability in handwriting is estimated from the penmanship used in answering the test questions.

The individual who is completely illiterate is readily detectable and must of necessity begin his academic instruction on the lowest level. On the other hand, men who score well on the placement test are assigned initially to more advance classes. Thus, time is saved by the elimination of needless repetition. Classes are organized on different levels in many camps. Moreover, instructional materials are designed for differentiated instruction. For example, the new Private Pete Readers are a carefully graded series which can be used for men on four levels of reading proficiency. Other instructional materials similarly are designed to be used at different levels.

Although the placement test, DST-6: X-1, has been employed successfully, it is not particularly well-adapted for use with the Private Pete Readers and the new arithmetic textbook developed for Special Training Units. Moreover, we believe that this test does not sufficiently explore or gauge the language background of men in the lowest levels of literacy. Accordingly, a new test has been devised. It

is published in two forms and is called the Army Illustrated Literacy Test (DST-11a and DST-11b).

Each form of this test includes 59 items. Five of these are practice items which are presented in association with their replicas on large cards. The samples are simply worded statements such as: "This is a" Below each statement is a large, clearly drawn picture of the object to be named.

The directions for this test require very little language. The student simply writes one word in the blank for each test item. The content of the test covers a wide variety of objects which are essential in everyday life. Although the selection of items is broad, it is in every instance on a level which requires only the most rudimentary language acquisitions. Moreover, the test material does not penalize the soldier from the rural district since there is a balance in objects familiar to the men from both rural and urban areas.

The status of this test is still experimental. It seems to have rather great promise, particularly when it is used in conjunction with other tests and observations.

Preliminary findings in standardizing this test have shown that it has a satisfactory range. It appears, however, that a simple weighting scheme for some items may be necessary to allow for variance in colloquial usages and for inaccurate spelling.

It is planned to combine the Army Illustrated Literacy Test and parts of the Stanford Primary Achievement Test with the Unit Tests to determine the initial placement of the individual in the Special Training Unit.

Measurement of Attainment

The Unit Tests, DST-12, 13, 14 and 15, have been carefully developed to measure the student's mastery of the subject matter in the Private Pete Readers. Since the entire academic program is articulated about these textbooks, unit tests which are based upon them afford a fairly reliable index of the student's attainment and place in the course. Although the tests do sample the books thoroughly and reliably, they are not designed to be used alone. They simply form the core for an evaluation program which estimates the student's growth in terms of his gains in subject matter and his ability to make intelligent and meaningful application of his newly acquired academic skills.

Measurement of Readiness for Transfer to Regular Military Training

The soldier who has made sufficient progress in basic academic skills to proceed in a regular training unit is transferred to an appropriate unit as promptly as possible. The measurement of this level of attainment is accomplished in part through the use of an achievement test (DST-7: X-1). This test is similar to the placement test in seeking to measure progress from the time the student begins until he completes his training. This test, now undergoing revision, is considered an extension of the placement test. It will be more comprehensive, and will include a broader sampling of the areas covered by the entire course. Used as a final evaluative instrument, it will supplement and extend the results of the other tests.

Success in a Special Training Unit is determined only in part by the student's gains in the classroom. The

academic part of his training occupies only three hours daily; the remainder of his training is military. The success with which the student is able to apply academic acquisitions is reflected in his progress in becoming an efficient soldier. A fairly accurate measure of soldier performance is secured by the use of the Soldier's Performance Scale. This is a graphic rating instrument designed to evaluate the performance of a soldier, his attitude, his social competence in the military environment, and his overall behavior as estimated by the officers and enlisted men responsible for his training.

Concluding Statement

A brief description of the psychometric techniques used in measuring the competence and attainment of men who are assigned to Special Training Units is presented in this paper.

It should be noted that throughout the program, tests are employed in judging a man's progress toward becoming an efficient, useful soldier. Thus far, these objective tests have proved to be successful guides to one important aspect of soldier performance. Seldom do we find that academically qualified men from Special Training Units fail as soldiers. Occasionally, the performance of men as soldiers is markedly successful while their academic performance is poor. These cases constitute the exceptions. The task in training soldiers seems to call for an integration of academic skills with competency in soldier performance. The testing program in the Special Training Unit is providing an efficient basis for judging the success of our program in accomplishing this goal.

Personnel Testing *in* Wartime

By FLOYD L. RUCH

*Associate Professor of Psychology
and Chairman of the Department of Psychology
The University of Southern California*

FOR the first time in a quarter of a century American industry is operating in the face of an increasing shortage of manpower. Shortages, real and threatened, have already brought some form of job stabilization to all of the larger industrial communities of this country. Present indications are that the situation will become more and more acute. Selective service is competing vigorously with industry for the male youth of the country. In many communities both are definitely "scraping the bottom of the barrel."

Under the impact of war conditions, the role of scientific measurement of human abilities and aptitudes has been changed but its importance has at the same time increased. Five years ago industry looked upon the psychological test solely as a means of screening out undesirables and incompetents. This practice resulted in numerous gains of efficiency. Screening programs of this nature, quite naturally, yielded the greatest gains when the ratio of jobs open to applicants at the gate was smallest. The present shortage has changed this picture.

In a recent conversation with the writer the personnel manager of a large war industry asserted that he was "too busy hiring people to bother about getting good ones." The era of testing for rejection is as much a thing of the

past as our old complacent notion that the Atlantic and Pacific Oceans were adequate protection from enemy attack. Industry's chief personnel problem now is to discover the latent aptitudes and abilities in persons who have never worked before or in individuals who have been dislocated from their usual employment and are seeking temporary wartime jobs.

The old employment psychology attempted to find the best man for the job, leaving to the field of vocational guidance the socially significant function of finding the best job for the man. These principles sometimes came in conflict because it can happen that the best man for the job—once he has been discovered—will in turn discover that the job was not best for him. Today these occasional conflicts have been greatly reduced. Any large industrial organization tends to become a little world in itself which provides employment at a wide variety of jobs in the office or in the shop. The notable exception is the fact that the function of the salesman is not very much in demand today in most war industries.

Manpower shortages have forced the industrialist to approach the problem of buying the service of the human individual in much the same way he customarily purchases machines or materials. Industry has recognized for a