

DOCUMENT RESUME

ED 066 511

TM 001 995

TITLE Reproduction Specialist (print. & pub.) 97--Technical Report on Development of USES Aptitude Test Battery.

INSTITUTION Manpower Administration (DOL), Washington, D.C. U.S. Training and Employment Service.

REPORT NO S-382

PUB DATE Sep 66

NOTE 18p.

EDRS PRICE MF-\$0.65 HC-\$3.29

DESCRIPTORS *Aptitude Tests; *Cutting Scores; Evaluation Criteria; Job Applicants; *Job Skills; Norms; Occupational Guidance; *Personnel Evaluation; Printing; Publishing Industry; *Reprography; Test Reliability; Test Validity

IDENTIFIERS GATB; *General Aptitude Test Battery; Reproduction Specialist

ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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Development of USES Aptitude Test Battery for

Reproduction Specialist

(print. & pub.) 97XX

U.S. DEPARTMENT OF LABOR
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BUREAU OF EMPLOYMENT SECURITY
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Technical Report on Development of USES Aptitude Test Battery

For

Reproduction Specialist 97XX

S-382

U. S. Employment Service
in Cooperation with
Pennsylvania State Employment Service

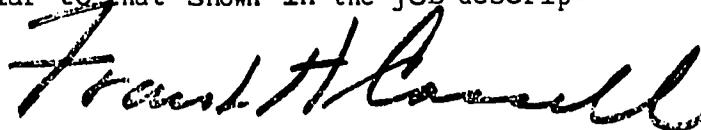
September 1966

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.



Frank H. Cassell, Director
U. S. Employment Service

DEVELOPMENT OF USES APTITUDE TEST BATTERY

For

Reproduction Specialist 97XX

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Reproduction Specialist 97XX. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
G - General Learning Ability	90
N - Numerical Aptitude	80
S - Spatial Aptitude	90

RESEARCH SUMMARY

Sample:

79 trainees (62 male and 17 female) in Manpower and Development Training (MDTA) courses at Erie, Harrisburg and Monroeville (Pittsburgh), Pennsylvania.

Criterion:

Supervisory ratings

Design:

Longitudinal (tests were administered at the beginning of training and criterion data were collected at the end of training).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations, aptitude-criterion correlations and selective efficiencies.

Predictive Validity:

Phi Coefficient = .50 ($P/2 < .0005$)

Effectiveness of Norms:

Only 65% of the non-test-selected trainees used for this study were good trainees; if the trainees had been test-selected with the above norms, 85% would have been good trainees. 35% of the non-test-selected trainees used for this study were poor trainees; if the trainees had been test-selected with the above norms, only 15% would have been poor trainees. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Trainees	65%	85%
Poor Trainees	35%	15%

SAMPLE DESCRIPTION

Size:

N = 79

Occupational Status:

Trainees

Training Setting:

Trainees were enrolled at three schools:

Technical Memorial High School
Erie, Pennsylvania

William Penn High School
Harrisburg, Pennsylvania

Forbes Trail Area Technical School
Monroeville, Pennsylvania

School Selection Requirements:

Education: High school graduates are preferred, but individuals who have completed the tenth grade are considered.

Previous Experience: None

Tests: None

Principal Activities:

This training course covers several different jobs in order to assist employers with small duplicating departments who require workers to do all of the tasks contained in the job description. The job duties and the course outline are shown in the Appendix.

Minimum Experience:

All individuals in the sample were trainees.

TABLE 2

Means, Standard Deviations (SD), Ranges, and Pearson Product-Moment Correlations with the Criterion (r) for Age and Education

	Mean	SD	Range	r
Age (years)	27.6	9.0	18-53	-.138
Education (years)	12.1	.9	10-17	-.034

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002, Form A, were administered prior to the start of training.

CRITERION

The criterion data consisted of instructors' ratings on each individual at the completion of training.

Rating Scale:

A descriptive rating scale for trainees was used. (See Appendix.) The scale consists of eight items covering different aspects of job performance. Each item has five alternatives corresponding to different degrees of job proficiency.

Reliability:

Only one rating was obtained; no measure of criterion reliability was computed.

Criterion Score Distribution:

Possible Range:	8-40	Mean:	24.5
Actual Range:	8-40	Standard Deviation:	9.0

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 35% of the sample in the low group to correspond with the percentage of trainees considered unsatisfactory or marginal. Trainees in the high criterion group were designated as "good trainees" and those in the low group as "poor trainees."

APTITUDES CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes P and Q which do not have a high correlation with the criterion were considered for inclusion in the norms because the qualitative analysis indicated that these aptitudes were important for the job duties and the sample had had a relatively high mean score on both aptitudes and a restricted range of scores (low standard deviation) on aptitude Q. Tables 3, 4 and 5 show the results of the qualitative and statistical analyses.

TABLE 3

Qualitative Analysis
(Based on the job analysis, the aptitudes indicated appear
to be important to the work performed)

Aptitude	Rationale
G - General Learning Ability	Must use judgment in planning and performing operations involved in printing a variety of graphic arts products.
S - Spatial Aptitude	Necessary to ascertain that materials to be reproduced are in proper alignment with equipment being used. Necessary in positioning negatives, plates, copy and other materials.
P - Form Perception	Must be able to perceive detail in reproduced black and white and colored printed material, distinguishing shapes, colors, shadings and layout.
Q - Clerical Perception	Must possess the ability to proofread numerical and narrative data.
M - Manual Dexterity	Necessary in operation of printing reproduction equipment.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB

Aptitude	Mean	SD	Range	r
G - General Learning Ability	99.3	13.1	69-134	.406**
V - Verbal Aptitude	99.8	12.8	74-137	.242*
N - Numerical Aptitude	98.6	12.6	71-128	.234*
S - Spatial Aptitude	99.8	18.0	65-156	.328**
P - Form Perception	101.5	16.1	63-146	.216
Q - Clerical Perception	105.7	13.2	80-137	-.004
K - Motor Coordination	103.1	16.6	58-140	-.058
F - Finger Dexterity	93.4	21.4	8-135	.043
M - Manual Dexterity	99.3	21.1	48-155	.157

*Significant at the .05 level
 **Significant at the .01 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important	X			X	X	X			X
Irrelevant									
Relatively High Mean					X	X	X		
Relatively Low Standard Dev.	X	X	X			X			
Significant Correlation with Criterion	X	X	X	X					
Aptitudes to be Considered for Trial Norms	G	V	N	S	P	Q			

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of a comparison of the degree to which trial norms consisting of various combinations of aptitudes G, V, N, S, P and Q at trial cutting scores were able to differentiate between the 65% of the sample considered good workers and 35% of the sample considered poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms. For four-aptitude norms,

cutting scores slightly lower than one standard deviation below the mean will eliminate about 1/3 of the sample; for two-aptitude norms, cutting scores slightly higher than one standard deviation below the mean will eliminate about 1/3 of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of G-90, N-80 and S-90 provided the highest degree of differentiation for the occupation of Reproduction Specialist 97XX. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .50 (statistically significant at the .0005 level).

TABLE 6

Predictive Validity of Test Norms
G-90, N-80, and S-90

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Trainees	12	39	51
Poor Trainees	21	7	28
Total	33	46	79

Phi Coefficient (ϕ) = .50
Significance Level = $P/2 < .0005$

Chi Square (X^2) = 19.67

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 36 OAP's included in Section II of the Manual for the General Aptitude Test Battery. The data for this sample will be considered for future groupings of occupations in the development of new occupational aptitude patterns.

A-P-P-E-N-D-I-X

RATING TRAINEES
DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score _____

RATING SCALE FOR _____
(DOF Title and Code for Training Course)

Directions: Please read "RATING TRAINEES - SUGGESTIONS TO RATERS" and then complete this rating scale. In making your ratings, only one box should be checked for each question.

Name of trainee (print) _____
(Last) (First)

Sex: Male _____ Female _____

A. How much aptitude or facility does he have for the vocational training?
(Trainee's adeptness or knack for performing the work easily and well.)

- 1. Has great difficulty doing the work. Not at all suited for the training.
- 2. Usually has some difficulty doing the work. Not too well suited for the training.
- 3. Does the work without too much difficulty. Fairly well suited for the training.
- 4. Usually does the work without difficulty. Well suited for the training.
- 5. Does the work with great ease. Exceptionally well suited for the training.

B. How much ability does he have for maintaining adequate production in the vocational activity for which he was trained?

- 1. Capable of very low work output. Can perform only at an unsatisfactory pace.
- 2. Capable of low work output. Can perform at a slow pace.
- 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.
- 4. Capable of high work output. Can perform at a fast pace.
- 5. Capable of very high work output. Can perform at an unusually fast pace.

C. How good was the quality of his work during the vocational training?

- 1. Performance was inferior and almost never met minimum quality standards.
- 2. Performance was usually acceptable but somewhat inferior in quality. The grade of his work could stand improvement.
- 3. Performance was acceptable but usually not superior in quality.
- 4. Performance was usually superior in quality.
- 5. Performance was almost always of the highest quality.

D. How quickly did he learn the instructional units of the vocational training?

- 1. Learned the work very slowly. Needed careful and repeated instructions.
- 2. Learned the work somewhat slower than most.
- 3. Learned most of the work in the usual amount of time.
- 4. Learned most of the work quickly.
- 5. Learned all of the work very rapidly. Needed only the minimum amount of training or instructions for even the difficult aspects.

E. How much ability does he have for using the equipment of the vocational training?

- 1. Has very limited ability. Cannot use the equipment adequately.
- 2. Has little ability. Can use the equipment to "get by."
- 3. Has a moderate amount of ability. Can use the equipment to do fair work.
- 4. Has high ability. Can use the equipment to do good work.
- 5. Has very high ability. Can use the equipment to do excellent work.

F. How large a variety of job duties can he perform efficiently?

- 1. Cannot perform different operations adequately.
- 2. Can perform a limited number of different operations efficiently.
- 3. Can perform several different operations with reasonable efficiency.
- 4. Can perform many different operations efficiently.
- 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is he in coping with work situations that are different or out of the ordinary?

- 1. Almost never is able to figure out what to do. Needs help on even minor problems.
- 2. Often has difficulty handling new situations. Needs help on all but simple problems.
- 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.
- 4. Usually able to handle new situations. Needs help on only complex problems.
- 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. Considering all the factors already rated, and only these factors, how acceptable was his performance during vocational training?

- 1. Performance was unsatisfactory.
- 2. Performance was not completely satisfactory.
- 3. Performance was satisfactory.
- 4. Performance was good.
- 5. Performance was outstanding.

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FACT SHEET

Job Title :

Reproduction Specialist 97XX

Job Summary :

Plans and performs operations involved in printing a variety of graphic arts products by the cold type method on office-type lithographic presses.

Work Performed :

Vari-Typist

Vari-types price lists, circular letters, memos, manuals, tables, graphs, charts, reports and booklets. Selects suitable size and style of type. Recommends to originator the layout and format to be used. Uses drafting table, T-square, ruling pen and other drafting tools to obtain desired results. Vari-types copy according to specifications. Makes finished format on vari-type master from copy. Rules, cuts and strips major headings and photographs in copy. Operates Headliner Machine to set bold headings. Finishes rough copy and makes ready for photographic master. Keeps log on jobs and hourly distribution.

Opaquer/Stripper

Prepares combination negative masking jobs including basic color separation, Ben Day screens and set-up job for hairline separation. Strips negatives and positives. Outlines, spots and opaques negatives. Assembles and performs paste-up of type proofs and illustrations.

Cameraman

Fastens the work to a large copyboard and photographs or copies it with a camera. Develops film; examines film and corrects or retouches if necessary. Maintains camera equipment in efficient working order. Maintains production schedule and customer negative files. Mixes solutions for developing negatives; maintains stock of negatives, photographic paper and solutions.

Platemaker

Strips or tapes together several negatives in their proper positions on a sheet of orange paper. Cuts windows in paper to expose printing areas (transparent) of the negatives. Takes thin aluminum or paper plate coated with a light sensitive emulsion and places in vacuum printing frame. Positions negative assembly over it and exposes it to a bright light. Removes plate from printing frame after exposure, covers it with a thin coating of ink and flushes it in plain water. Checks negatives for exposure according to humidity and light strength. Makes solutions per standard formulas, cleans and maintains equipment and work area in a neat and orderly condition. Maintains stock of essential solutions, masters and supplies. Assists in maintenance of production schedule plate files.

Offset Duplicator Operator

Operates offset duplicating machine to reproduce multiple copies from typed, photographic or pre-sensitized masters. Makes necessary adjustments on machine involving ink, water and pressure to insure optimum results. Adjusts copy according to specifications. Follows instructions from job ticket concerning color, position, binding margin, registration, quantity and quality. Keeps production log and saves representative samples.

Binding

Operates binding equipment including cutter, drill, plastic bindery collator and electric stapler according to instructions. Cuts stock to required size before running on duplicator. Minimizes spoilage, overage and waste. Keeps record of various paper stocks.

Performance Requirements

Must have thorough knowledge of all operations. Must have demonstrated finger and manual dexterity. Must be neat and orderly in work. Must consistently contact public in a tactful and courteous manner.

Physical Requirements

Good physical and mental health. Good eyesight and color discrimination.

Course Outline

Orientation	15 hours
Varietyper and Headliner	210 hours
Basic Camera Instruction	300 hours
Lithography	300 hours
Binding	75 hours
Class Problems	600 hours
Total =	<u>1500 hours</u>

There were slight variations in the number of hours for the Erie course.

(This sheet is printed in duplicate. One copy should remain as part of the Appendix in order to complete the technical report. The other copy can be removed by employment service personnel who wish to set up separate fact sheet files.)

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Opaquar/Stripper

Prepares combination negative masking jobs including basic color separation, Ben Day screens and set-up job for hairline separation. Strips negatives and positives. Outlines, spots and opaques negatives. Assembles and performs paste-up of type proofs and illustrations.

Cameraman

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