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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)

B-649
S-369

United States Employment Service Technical Report

March 1966

Development of USES Aptitude Test Battery

for

Printer-Slotter Operator

(paper goods) 651.782

U.S. DEPARTMENT OF LABOR
W. Willard Wirtz, Secretary
MANPOWER ADMINISTRATION
BUREAU OF EMPLOYMENT SECURITY
Washington, D.C. 20210

Technical Report on Development of USES Aptitude Test Battery

For .....

Printer-Slotter Operator (paper goods) 4-42.315
(651.782)

B-649 or S-369

U. S. Employment Service
in Cooperation with
California, Florida, Michigan, Minnesota, New Jersey,
New York, Pennsylvania, Tennessee, Texas and Wisconsin
State Employment Services

March 1966

GATB #2597

Development of USES Aptitude Test Battery

For

Printer-Slotter Operator (paper goods) 4-42.315
651.782

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Printer-Slotter Operator 4-42.315. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
P - Form Perception	75
F - Finger Dexterity	80
M - Manual Dexterity	85

RESEARCH SUMMARY

Sample:
70 male employees of the Owens-Illinois Corporation working in company plants located in ten States.

Criterion:
Supervisory ratings

Design:
Concurrent (test and criterion data were collected at approximately the same time)

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.

Concurrent Validity
Phi Coefficient = .51 (P/2 less than .0005)

Effectiveness of Norms:
Only 67% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 83% would have been good workers, 33% of the non-test-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 17% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	67%	83%
Poor Workers	33%	17%

SAMPLE DESCRIPTION

Size: N = 70

Occupational Status: Employed workers

Work Setting: Dr. John H. Rapparlie, Industrial Psychologist, Department of Personnel Relations, Owens-Illinois, was instrumental in obtaining management approval for the USES and affiliated State Employment Services to work cooperatively with plant management in obtaining samples from the following locations:

Los Angeles, California
Oakland, California
Hialeah, Florida
Detroit, Michigan
Shakopee, Minnesota
Newark, New Jersey
Long Island, New York
Bradford, Pennsylvania
Memphis, Tennessee
Dallas, Texas
Milwaukee, Wisconsin

Employer Selection Requirements:

Education: Varies from none to high school graduate.

Previous Experience: None

Tests: None

Other: Personal interview, physical examination, ability to read and write English.

Principal Activities:

The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience:

All workers had at least one month's job experience. At some plants workers were hired as helpers first, then moved to full operators after demonstrating sufficient skill.

TABLE 2

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

	Mean	SD	Range	r
Age (years)	32.16	7.17	21-55	-.153
Education (years)	10.90	1.77	6-16	.087
Experience (months)	60.96	67.38	1-300	.197

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B were administered during December 1964 and 1965.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as the tests were administered with a time interval of from two to eight weeks between the two ratings.

Rating Scale: USES Form SP-21 "Descriptive Rating Scale." The scale (see Appendix) consisted of nine items (each on separate sheets of paper) with five alternatives for each item. The alternatives indicate the different degrees of job proficiency.

Reliability: A reliability coefficient of .914 was obtained between the two ratings. Therefore, the final criterion consists of the combined scores of the two ratings

Criterion Score Distribution:

Possible Range:	18-90
Actual Range:	35-90
Mean:	65.5
Standard Deviation:	12.9

Criterion Dichotomy: The criterion distribution was dichtomized into low and high groups by placing 33% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal by management. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers." The criterion critical score was 59.

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. Aptitude M, which does not have a high correlation with the criterion, was considered for inclusion in the norms because the qualitative analysis indicated that the aptitude was important for the job duties and the sample had a relatively high mean score on the aptitude. 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	Makes judgments in setting up and operating slotting machine.
S - Spatial Aptitude	Positions scoring, slotting and slitting knives on proper shafts. Positions and mounts dies on cylinder.
P - Form Perception	Necessary to perceive detail in printing and forming of shipping cartons.
Q - Clerical Perception	Must complete load tickets accurately.
M - Manual Dexterity	Turns valves to adjust flow of ink; starts and adjusts rollers for impression using wrenches and levers.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlation with the Criterion (r) for the Aptitudes of the GATB; N=70

Aptitudes	Mean	SD	Range	r
G - General Learning Ability	92.04	16.47	45-134	.160
V - Verbal Ability	89.34	13.07	61-123	-.022
N - Numerical Aptitude	89.74	17.96	32-120	.134
S - Spatial Aptitude	101.46	19.87	61-160	.282*
P - Form Perception	96.84	22.51	52-150	.284*
Q - Clerical Perception	97.88	17.40	60-143	.250*
K - Motor Coordination	103.66	20.21	58-146	.184
F - Finger Dexterity	96.36	20.37	51-141	.313**
M - Manual Dexterity	107.86	24.00	58-159	.141

* 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		0							
Relatively High Mean				X			X		X
Relatively Low Standard Dev.		X							
Significant Correlation with Criterion				X	X	X		X	
Aptitudes to be Considered for Trial Norms				S	P	Q		F	M

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 S, P, Q, F and M at trial cutting scores were able to differentiate between the 67% of the sample considered good workers and 33% 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 trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample; for two-aptitude trial norms cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. Norms of P-75, F-80 and M-85 provided the highest degree of differentiation for the occupation of Printer-Slotter Operator 4-42.315. The validity of these norms is shown in Table 6.

TABLE 6

Concurrent Validity of Test Norms, P-75, F-80 and M-85

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	7	40	47
Poor Workers	15	8	23
Total	22	48	70

Phi Coefficient (ϕ) = .51 Chi Square (x^2) = 18.13

Significance Level = P/2 less than .0005

DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-32 which is shown in Section II of the Guide to the Use of the General Aptitude Test Battery. A Phi Coefficient of .47 is obtained with the OAP-32 norms of P-75, F-80, M-80.

SP-21
Rev. 2/61

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

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

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

Sex: Male_____ Female_____

Company Job Title: _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

☐ 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.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

☐ 3. Performance is acceptable but usually not superior in quality.

☐ 4. Performance is usually superior in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.

☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.

☐ 3. Makes mistakes occasionally. Work needs only normal checking.

☐ 4. Makes few mistakes. Work seldom needs checking.

☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.

☐ 2. Has little knowledge. Knows enough to "get by."

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.

☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.

☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his job without difficulty. Well suited to this kind of work.

☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

☐ 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 when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 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. How many practical suggestions does he make for doing things in better ways? (Worker's ability to improve work methods.)

☐ 1. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ 5. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and only these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

☐ 1. Would be better off without him. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

S-369

March 1966

FACT SHEET

Job Title

Printer-Slotter Operator 4-42.315 (651.782)

Job Summary

Sets up, checks and approves set up and operates a one, two or three-color corrugated paper, board printing, scoring and slotting machine, with the assistance of a first helper, to print and form shipping cartons.

Work Performed

Receives job order giving grade of materials, quantity, size and printing and slotting instructions for work to be done. Obtains dies from die mounter and positions and mounts dies on cylinder using stapling gun and ruler to 1/16 inch. Pours ink into fountain, thins to proper consistency and adds retarder or drier as required. Directs first helper to position corrugated board and set and lock side gages and kicker; positions and locks scoring, slotting and slitting knives on proper shafts using ruler and wrenches to place and lock them in position; may direct first helper to set knives. Turns valves to adjust flow of ink; starts and adjusts rollers for impression using wrenches and levers; adjusts speed of machine according to job; operates machine and directs first helper to feed and control automatic stacker; moves full loads of corrugated cardboard in and out of work area; cleans ink rollers and fountain with solvent and cloth every evening and when job color is changed. Completes load ticket for each loaded skid giving date, skid number, order number, customer, case number, size, number of bundles, number per bundle and names of operator and bundler. Performs other related work as assigned by foreman.

(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.)

GPO 906-209

S-369

March 1966

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