DOCUMENT RESUME

ED 068 542 TM 002 023

TITLE	Carder (dental equip.) 712.887; Assembler (dental equip.) 712.887--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-411
PUB DATE	Mar 68
NOTE	10p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Aptitude Tests; Assembly (Manufacturing); *Cutting Scores; Evaluation Criteria; Industrial Training; Job Applicants; *Job Skills; Laboratory Equipment; Norms; Occupational Guidance; *Personnel Evaluation; Test Reliability; Test Validity
IDENTIFIERS	Assembler (Dental Equipment); Carder (Dental Equipment); GATB; *General Aptitude Test Battery

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 is included. (AG)

March 1968 United States Employment Service Technical Report S-411

S-411

Development of USES Aptitude Test Battery

for

Carder

(dental equip.) 712.887

Assembler

(dental equip.) 712.887

U.S. DEPARTMENT OF LABOR

MANPOWER ADMINISTRATION

Technical Report on Development of USES Aptitude Test Battery

For . . . . .

Carder (dental equip.) 712.887

Assembler (dental equip.) 712.887

S-411

(Developed in Cooperation with the Pennsylvania State Employment Service)

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March 1968

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.

Charles E. Odell

Charles E. Odell, Director
U. S. Employment Service

GATB Study #2687

DEVELOPMENT OF USES APTITUDE TEST BATTERY

FOR

Carder (dental equip.) 712.887-005

Assembler (dental equip.) 712.887-008

S-411

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupations of Carder (dental equip.) 712.887-005 and Assembler (dental equip.) 712.887-008. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB, B-1002 Scores
Q - Clerical Perception	105
K - Motor Coordination	95
M - Manual Dexterity	85

RESEARCH SUMMARY

Sample:

58 female workers employed as Carders and Assemblers in Pennsylvania.

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 = .63 (P/2 less than .0005)

Effectiveness of Norms

Only 64% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-411 norms, 89% would have been good workers. Thirty-six percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-411 norms, only 11% 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	64%	89%
Poor Workers	36%	11%

SAMPLE DESCRIPTION

Size:

N = 58

Occupational Status:

Employed workers

Work Setting:

Workers were employed at the Dentist's Supply Company of New York, York, Pennsylvania.

Employer Selection Requirements :

Education: None

Previous Experience: None

Tests: None

Other: Interview

Principal Activities :

The job duties of each worker are comparable to those shown in the job descriptions in the Appendix.

Minimum Experience :

All workers in the sample had at least six months total job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Biserial Correlations with the Criterion (r_{bis}) for Age, Education and Experience

	Mean	SD	Range	r_{bis}
Age (years)	39.4	10.9	19 - 59	- .469 *
Education (years)	10.5	1.8	7 - 12	.021
Experience (months)	122.6	111.8	6 - 360	- .065

*Significant

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1002B, were administered during November 1966.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as test data were collected. The supervisors rated workers into one of two categories, good or poor.

Reliability

Since only one rating was obtained, no measure of criterion reliability is available.

Criterion Dichotomy

The criterion distribution was dichotomized into low and high groups by placing 36% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers."

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. 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
P - Form Perception	Must be able to distinguish between uppers, lowers, rights and lefts.
F- Finger Dexterity	Assembles porcelain shade guide teeth to the plastic or metal blade which is to be inserted into the shade guide holder.
M - Manual Dexterity	Cards anterior and posterior teeth or small strips of wax placed in plastic or aluminum casings.

TABLE 4

Means, Standard Deviations (SD), Ranges and Biserial Correlations with the Criterion (r_{bis}) for the Aptitudes of the GATB

Aptitudes	Mean	SD	Range	r_{bis}
G - General Learning Ability	93.8	15.7	49-138	.304
V - Verbal Aptitude	93.7	14.1	65-137	.153
N - Numerical Aptitude	98.6	17.7	46-146	.428*
S - Spatial Aptitude	93.0	17.9	68-124	.339*
P - Form Perception	108.9	21.6	42-159	.644*
Q - Clerical Perception	110.7	14.5	67-144	.612*
K - Motor Coordination	108.5	15.2	60-148	.482*
F - Finger Dexterity	98.7	17.8	63-149	.331*
M - Manual Dexterity	107.4	16.3	78-148	.395*

*Significant

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
Irrelevant			O						
Relatively High Mean					X	X	X		
Relatively Low Standard Dev.		X				X			
Significant Correlation with Criterion			X	X	X	X	X	X	X
Aptitudes to be Considered for Trial Norms				S	P	Q	K	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, K, F and M at trial cutting scores were able to differentiate between the 64% of the sample considered good workers and the 36% 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 two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. For four-aptitude trial norms, cutting score of slightly less 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. The optimum differentiation for the occupations of Carder 712.887-005 and Assembler 712.887-008 was provided by norms of Q-105, K-95 and M-85. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .63 (statistically significant at the .0005 level.

TABLE 6

Concurrent Validity of Test Norms, Q-105, K-95, and M-85

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	5	32	37
Poor Workers	17	4	21
Total	22	36	58

Phi Coefficient = .63
Chi Square (x^2_y) = 23.1
Significance Level = P/2 less than .0005

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 in the development of new occupational aptitude patterns.

FACT SHEET

Job Title:

Assembler (dental equip.) 712.887-008

Work Performed:

Assembles porcelain shade guide teeth to the plastic or metal blade which is to be inserted into the shade guide holder. Teeth having metal pins are attached to the blade and washers by riveting the end of the pin in a rotating tool mounted in a drill press. Teeth having the porcelain lug are attached to the washers and blades by crimping a washer around the lug in a fixture.

Assembles shade guide blades to Bioblend holders by peaning the rivet in an arbor press. May also be required to debur the rivet after it has been peaned. Assembles the bladed shade guide teeth into their respective holders according to shade number.

Packs the assembled shade guide units into cartons for shipment to the trade.

May be required to treat gold pins with soldering flux. Solders pins into the coils moulded into anterior teeth when pins are washed with soda ash and water.

Job Title:

Carder (dental equip.) 712.887-005

Work Performed:

Cards anterior and posterior teeth on small strips of wax placed in plastic or aluminum casings. Presses teeth on each wax filled casing according to mould size and shade - eight teeth on the posterior card and six on the anterior card.

Must be able to distinguish between uppers, lowers, rights and lefts. Stamps wax according to mould and shade.

Rejects defective teeth if seen while carding. Classifies teeth according to defect type.

Effectiveness of Norms:

Only 64% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with S-411 norms, 89% would have been good workers. 36% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with S-411 norms, only 11% would have been poor workers.

Applicability of S-411 Norms

The aptitude test battery is applicable to jobs which include majority of the job duties described above.

GPO 861.068

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