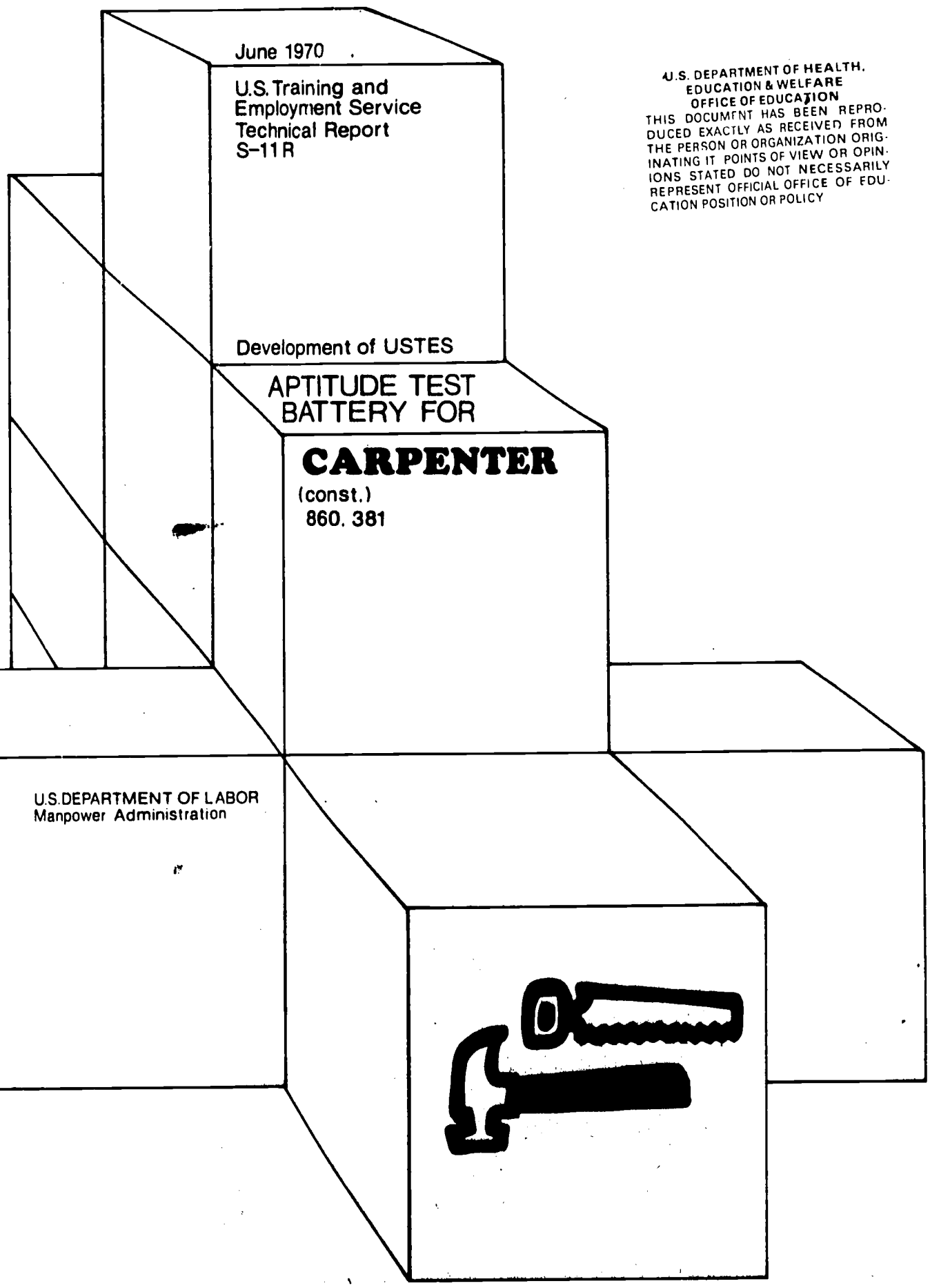
DOCUMENT RESUME

ED 059 289 TM 001 180

| | |
|---|---|
| TITLE | Carpenter (const.) 860.381--Development of USTES Aptitude Test Battery. |
| INSTITUTION | Manpower Administration (DOL), Washington, D.C. U.S. Training and Employment Service. |
| REPORT NO | TR-S-11R |
| PUB DATE | Jun 70 |
| NOTE | 10p. |
| EDRS PRICE | MF-$0.65 HC-$3.29 |
| DESCRIPTORS | *Aptitude Tests; *Carpenters; Evaluation Criteria; Job Applicants; *Job Skills; Norms; Occupational Guidance; *Personnel Evaluation; Test Reliability; Test Validity |
| IDENTIFIERS | 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)



Technical Report on Development of USTES Aptitude Test Battery

For . . . .

Carpenter (const.) 860.381

S-11R

(Developed in Cooperation with the Wisconsin and
District of Columbia State Employment Services)

U.S. Department of Labor
Manpower Administration

June 1970

## FOREWORD

The United States Training and 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.

GATB Study #668 and 723

# Development of USTES Aptitude Test Battery

# For

# Carpenter (const.) 860.381-030

# S-11R

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Carpenter (const.) 860.381-030. The following norms were established:

| GATB Aptitudes | Minimum Acceptable GATB Scores |
|---|---|
| N - Numerical Aptitude | 80 |
| S - Spatial Aptitude | 85 |
| K - Motor Coordination | 70 |
| M - Manual Dexterity | 80 |

## Research Summary

Sample:

119 male apprentices training in Wisconsin and the District of Columbia.

This study was conducted prior to the requirement of providing minority group information. Therefore, minority group status is unknown.

Criterion:

School grades and 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, aptitude-criterion correlations and selective efficiences.

Concurrent Validity:

Phi Coefficient = .57 ($P/2 < .0005$)

Effectiveness of Norms:

Only 76% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 92% would have been good workers. Twenty-four percent of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms, only 8% would have been poor workers. The effectivenees of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

| | Without Tests | With Tests |
|---|---|---|
| Good Workers | 76% | 92% |
| Poor Workers | 24% | 8% |

SAMPLE DESCRIPTION

Size:

N = 119

Occupational Status:

Apprentices.

Work Setting:

The apprentices were attending classes as well as receiving on-the-job training. The apprentices in Wisconsin were attending Madison Vocational School. The D. C. apprentices were attending Bell Vocational School in Washington, D. C.

Employer Selection Requirements:

Education: None required.

Previous Experience: None required.

Tests: None used.

Other: Personal interview in Wisconsin; a 30 day probationary work permit period in the District of Columbia.

Principal Activities:

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

Minimum Experience:

None.

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) | 22.2 | 4.2 | 16-35 | .442** |
| Education (years) | 10.9 | 1.9 | 5-14 | .311** |

**Significant at the .01 level.

EXPERIMENTAL TEST BATTERY

All 12 tests of the GATB, B-1001, with the exception of Part E, were administered during October and June of 1951. B-1001 scores have been converted to equivalent B-1002 scores.

CRITERION

The criterion for the Wisconsin sample consisted of school grades that each apprentice received at the end of the school year. The grades ranged from 65 to 100 with 70 as the minimum passing grade.

The criterion for the Washington, D. C. sample consisted of a rating by the Director of the Joint Carpentry Apprenticeship Committee based on school grades and on the job reports received.

Since both groups were undergoing substantially the same type of training and are similar in age and education, they have been combined into one total sample.

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 24% 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 sleected 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 S which does not have high correlations with the criterion, was considered for inclusion in the norms because the qualitative analysis indicated that the aptitude might be important for the job duties and the sample had relatively high mean score on this 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 performance)

| Aptitudes | Rationale |
|---|---|
| G - General Learning Ability | Required for success in classroom performance, in learning the job, and maintaining effective relationships. |
| N - Numerical Aptitude | Required to succeed in classroom training, to make necessary calculations of quantity, size and shape of articles to be made, and to prepare bids and estimates. |
| S - Spatial Aptitude | Required to visualize or perceive objects to be made in three dimensions, needed for reading blueprints. |
| M - Manual Dexterity | Required for skillful use of hands and arms in handling and use of tools. |

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N=119

| | Mean | SD | Range | r |
|---|---|---|---|---|
| G - General Learning Ability | 98.6 | 15.3 | 63-122 | .394** |
| V - Verbal Aptitude | 90.9 | 15.0 | 63-148 | .224* |
| N - Numerical Aptitude | 95.8 | 17.7 | 57-136 | .488** |
| S - Spatial Aptitude | 109.6 | 17.7 | 63-157 | .150 |
| P - Form Perception | 98.6 | 12.2 | 62-132 | .232* |
| Q - Clerical Perception | 88.2 | 14.5 | 59-131 | .285** |
| K - Motor Coordination | 94.1 | 16.4 | 56-138 | .419** |
| F - Finger Dexterity | 102.7 | 17.0 | 67-151 | .308** |
| M - Manual Dexterity | 103.2 | 16.5 | 64-150 | .234* |

*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 |
| Irrelevant | | | | | | | | | |
| Relatively High Mean | | | | X | | | | X | X |
| Relatively Low Standard Dev. | | | | | X | X | | | |
| Significant Correlation With Criterion | X | X | X | | X | X | X | X | X |
| Aptitudes to be Considered for Trial Norms | G | V | N | S | P | Q | K | F | M |

## DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of the degree to which trial norms consisting of various combinations of aptitudes G, V, N, S, P, Q, K, F, and M at trial cutting scores were able to differentiate between the 76% of the sample considered to be good workers and the 24% of the sample considered to be 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 ofthe sample with three-aptitude norms. For four-aptitude trial norms, cutting scores of slightly less that one standard deviation below the mean will eliminate about one-third of the sample; 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. The Phi Coefficient was used as a basis for comparing trial norms. Norms of N-80, S-85, K-70 and M-80 provided optimum differentiation for the occupation of Carpenter (const.) 860.381-030. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .57 (statistically significant at the .0005 level).

TABLE 6
Concurrent Validity of Test Norms
N-80, S-85, K-70, and M-80

| | Nonqualifying Test Scores | Qualifying Test Scores | Total |
|---|---|---|---|
| Good Workers | 12 | 78 | 90 |
| Poor Workers | 22 | 7 | 29 |
| Total | 34 | 85 | 119 |

Phi Coefficient = .57 Chi Square ($X^2_y$) = 39.0
Significance Level = P/2 .0005

## DETERMINATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study met the requirements for incorporating the occupation studied into OAP-37 which is shown in the 1970 edition of Section II of the Manual for the General Aptitude Test Battery. A Phi Coefficient of .19 is obtained with the OAP-37 norms of N-80, S-95, and M-85.

FACT SHEET

Job Title

Carpenter (const.) 860.381-030

Job Summary

Assists carpenter in construcing wooden forms and building frames and in installing fittings and trim; performs the more simple and elementary tasks while receiving instruction in carpentry; works under close supervision of carpenter journeyman.

Work Performed

Assists in building and placing wooden forms for molding concrete. Cuts, fits, and joins lumber to construct wooden framing of structures including sill, walls, roof, floor and partitions. Saws and nails plaster grounds in place; lays sub-flooring. Covers sheathing with building paper; erects siding and nails on wooden shingles. Assists in the installation of door and window frames. Assists in sawing, fitting and erecting exterior trim such as cornices, columns, and railings. Assists in hanging doors and installing wooden sashes. Assists in sawing, fitting and gluing interior trim such as baseboard, wainscoting, decorative ceiling beams and mantels. Assists in the installation of interior fittings such as cabinets, book-cases, and dining nooks. May erect temporary structures such as scaffolding, runways, pouring chutes for concrete and barricades.

Effectiveness of Norms

Only 76% of the non-test-selected workers used for this study were good workers; if the workers had been test-selected with the S-11Rnorms, 92% would have been good workers. 24% of the non-test-selected workers used for this study were poor workers; if these workers had been test-selected with S-11Rnorms, only 8% would have been poor workers.

Applicability of S-11RNorms

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



GPO 898.807