A CORRELATIONAL STUDY OF THE INDUSTRIAL ARTS APTITUDE

WOODWORKING TEST, THE WECHSLER ADULT INTELLIGENCE

SCALE, THE DIFFERENTIAL APTITUDE TESTS AND

HIGH SCHOOL GRADES

A Thesis

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by

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INTRODUCTION

"The most important concept associated with an apti-
tude is the measured capacity to learn or become successful
in a designated vocation or occupation."[1] The measurement of
aptitude has become an increasingly important task to busi-
ness, industry and education in recent years. With society
being as specialized and compartmentalized as it is, it is
becoming more imperative to people such as guidance counse-
lors and personnel managers to make correct and responsible
decisions in relation to their clients' selection and suc-
cess in a given career. Tests have become almost synony-
mous with aptitude measurement in school systems and pre-
diction of job success in business and industry.

Unfortunately the aptitude tests most school systems
have used over the years, no matter how valid and reliable,
have focused mainly on measuring the traditional verbal and
arithmetic abilities taught in the classroom. They have
emphasized separating students who were "college material"
from those who were not. The students who "did not measure

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[1] Dale Hogan, Elton Amburn and Keven Hogan, Manual for
Industrial Arts Aptitude Test Battery: Woodworking, Emporia
Kansas State College, July, 1974, p. 1.

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up" were encouraged to go into vocational fields that school officials had decided required less "intelligence."

In recent years the development, research and evaluation of vocational-type aptitude tests were not given the same priority by the schools as aptitude tests measuring traditional scholastic abilities. The vocational-type tests were relegated to a "second class" stature. Knowledge of the relationship between vocational-type abilities and general scholastic abilities was seriously lacking. High School counselors had little to aid them when advising students in problems related to this matter. How could a student's performance in a woodworking class be predicted from his performance in an algebra class?

This rationale can be carried to the business world and industry as well. The typical selection program of a company tries to fit particular applicants to specific jobs--to match jobs and people. This selection philosophy assumes that the requirements of a given job and the characteristics of a given applicant are sufficiently unique and explicit to make possible an intelligent match between them. Essentially, the selection process is one of prediction--making an informed estimate as to which of various applicants is suited for the jobs being filled, or have the highest odds for job success.[2] Personnel people having

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[2] George Strauss and Leonard Sayles, _Personnel, The Human Problems of Management_, Third Edition (Englewood Cliffs Prentice Hall, 1972), p. 417.

knowledge of the relationship among general type intellectual abilities and more specific vocational abilities could save countless hours for themselves in the selection process. They could also uncover qualifications and talent that would not otherwise be detected. Caution should be observed, however, in the selection of the tests used to assist in making these decisions.

Purpose of the Study

There were two main purposes to this study. The first purpose of the study was to investigate the relationships among a standardized intelligence test, a general aptitude test and a vocational woodworking aptitude test. Both the intelligence test and the general aptitude test have been standardized and recognized instruments for a number of years. They have been used frequently by schools and industries. The woodworking test has been standardized only recently and has not been previously compared with the other two instruments.

The second purpose of the study was to examine the relationships among selected subtests of these three instruments and high school grades. Information gained from knowing the relationships of these factors could help save time and repetitive testing for individuals involved in test administration and counseling such as high school guidance counselors and personnel managers. The instruments used in this study were the Industrial Arts Aptitude

Woodworking Test, the Wechsler Adult Intelligence Scale and the Differential Aptitude Tests.

THE PROBLEM

The problem centers around the relationship of the Industrial Arts Aptitude Woodworking Test (IAAWT) and its parts to the Wechsler Adult Intelligence Scale (WAIS) and its selected subtests, the Differential Aptitude Tests (DAT) and its selected subtests and High School Grades for two selected groups of individuals. The parts of the Industrial Arts Aptitude Woodworking Tests were Vocabulary, Comprehension, Analogies and Total. The subtests selected from the Wechsler Adult Intelligence Scale were Vocabulary, Arithmetic, Comprehension, Similarities, Verbal Total, Picture Completion, Object Assembly, Block Design, Performance Total and Full Scale Total. The subtests selected from the Differential Aptitude Tests were Verbal Reasoning, Numerical Ability, Abstract Reasoning, Space Relations and Verbal Reasoning plus Numerical Ability Total. The High School Grades were grouped into three categories. The first category was the grades of verbal-type subjects. The second category was the grades of performance-type subjects. The third category was cumulative grades.

Statement of the Problem

What relationship exists among the subtests and total of the Industrial Arts Aptitude Woodworking Test, the

selected subtests and totals of the Wechsler Adult Intelligence Scale, the selected subtests and total of the Differential Aptitude Test and high school grades?

Statement of the Hypotheses

There are no significant relationships among the Vocabulary Subtest of the Industrial Arts Aptitude Woodworking Test; the Vocabulary Subtest of the Wechsler Adult Intelligence Scale; the Verbal Reasoning Subtest of the Differential Aptitude Tests and the grades of verbal-type subjects.

There are no significant relationships among the Comprehension Subtest of the Industrial Arts Aptitude Woodworking Test; the Arithmetic, Comprehension and Similarities Subtests of the Wechsler Adult Intelligence Scale; the Numerical Ability Subtest of the Differential Aptitude Tests and the grades of verbal-type subjects.

There are no significant relationships among the Analogies Subtest of the Industrial Arts Aptitude Woodworking Test; the Picture Completion, Block Design and Object Assembly Subtests of the Wechsler Adult Intelligence Scale; the Abstract Reasoning and Space Relation Tests of the Differential Aptitude Tests and the grades of performance-type subjects.

There are no significant relationships among the Total Score of the Industrial Arts Aptitude Woodworking Test; the Verbal Section Total, the Performance Section Total and the Full Scale Total of the Wechsler Adult Intelligence

Scale; the Verbal Reasoning plus Numerical Ability Total of
the Differential Aptitude Tests; the grades of verbal and
performance-type subjects and cumulative grades.

There are no significant relationships among the
Total Score of the Industrial Arts Aptitude Woodworking
Test; the Verbal, Performance and Full Scale Totals of the
Wechsler Adult Intelligence Scale; the Abstract Reasoning
and Space Relations Subtests of the Differential Aptitude
Tests and Cumulative Grades.

DEFINITION OF TERMS

When working with a number of tests, it is helpful
to define the abbreviated terms and the various components
associated with them. The following terms are defined
as used in this study.

AR

The Abstract Reasoning Test of the Differential
Aptitude Tests is a non-verbal measure of the ability to
perceive relationships in abstract figure patterns. It
requires the perception of an operating principle in a
changing diagram. An individual must discover the princi-
ple or principles governing the change of the figures and

give evidence of his understanding by designating the dia-
gram which should logically follow.[3]

Building Trades Majors

Those students selected from the enrollment of the
Flint Hills Vocational Technical School. The areas studied
by the students are those of the skilled construction trades.
These include carpentry, masonry, plumbing and electrical
wiring. The program employs field training and class
activity.

Cumulative Grades

The grades earned by high school students. These
represented the total number of completed high school
courses. Verbal Grades and Performance Grades were com-
bined to make Cumulative Grades.

DAT

The Differential Aptitude Tests are a group of
seven tests which measure general aptitude. They are used
mainly as a counseling instrument for junior high school and
senior high school students. The tests are: Verbal Reason-
ing, Numerical Ability, Abstract Reasoning, Clerical Speed
and Accuracy, Mechanical Reasoning, Space Relations,
Language Usage I: Spelling and Language Usage II: Grammar.
They are group administered tests.

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[3]George K. Bennet, Harold G. Seashore, Alexander G.
Wesman, Differential Aptitude Tests Manual, Fourth Edition
(New York: The Psychological Corporation, Forms L & M, 1966),
p. 7.

General Aptitude

An individual's general potential ability as measured by the Differential Aptitude Tests.

Factor

The unit represented by one subtest, total or grade category of the IAAWT, the WAIS, the DAT and High School Grades. Each factor was numbered specifically. There were twenty-two factors in this study. They are all defined in this section.

IAAWT

The Industrial Arts Aptitude Woodworking Test is an instrument designed for the measurement of woodworking aptitude. It includes three parts, Vocabulary, Analogies and Comprehension. It is a seventy-five item, multiple choice, group administered test.

IAAWT Analogies

A subtest of the Industrial Arts Aptitude Woodworking Test. It measures an individual's ability to identify correct relationships of terms and concepts related to woodworking.[4]

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[4] Hogan, p. 2.

IAAWT Comprehension

A subtest of the Industrial Arts Aptitude Woodworking Test. It evaluates an individual's understanding, thinking, reasoning and problem solving skills related to woodworking.[5]

IAAWT Vocabulary

A subtest of the Industrial Arts Aptitude Woodworking Test. It evaluates an individual's knowledge of terms, concepts and words related to the field of woodworking.[6]

IQ

A value representative of an individual's intelligence according to the Wechsler Adult Intelligence Scale.

NA

The Numerical Ability Test of the Differential Aptitude Tests. The test evaluates an individual's understanding of numerical relationships and facility in handling numerical concepts. It measures the ability to reason with numbers, to manipulate numerical relationships and to deal intelligently with quantitative materials. The problems are framed in the item-type usually called "arithmetic computation" rather than "arithmetic reasoning."[7]

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[5]Hogan, p. 2.

[6]Ibid.

[7]Bennet, Seashore, and Wesman, p. 7.

Performance Grades

   The grades earned by each high school student in
performance related courses. The courses emphasized motor-
type abilities. Visual motor acuity, physical coordination
and perceptual organization and concentration were examples
of the abilities stressed by these subjects.

PRO

   The symbol indicative of a prorated score used in
connection with the Wechsler Adult Intelligence Scale. The
scores are tabulated with the Verbal Section and Performance
Section subtests separately. The Full Scale Total is never
prorated. It is possible to prorate four Verbal Tests by
multiplying the sum of their scaled scores by 3/2 and to
prorate three Performance tests by the fraction of 5/3.[8]

Scaled Score

   A value used in connection with the Wechsler Adult
Intelligence Scale. It is computed by means of correspondence
with a series of raw scores or actual points scored on the
test. The scaled scores are used to compute IQ's.[9]

SR

   The Spatial Relations Test of the Differential Apti-
tude Tests. The test measures the ability to visualize a

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   [8]David Wechsler, <u>Manual for the Wechsler Adult Intel-
ligence Scale</u> (New York: The Psychological Corporation, 1955),
p. 31.
   [9]Ibid., p. 3.

constructed object from a picture of a pattern and the ability

to imagine how an object would appear if rotated in various

ways.[10]

Verbal Grades

The grades earned by each high school student in

verbal related courses. The courses emphasized verbal-type

abilities. Reading speed and comprehension, writing

ability, vocabulary and linguistic ability were examples

of the abilities stressed in these courses.

Vocational Aptitude

The measurement of an individual's potential ability

in the areas of the skilled construction trades. The trades

include the fields of mechanics, carpentry, electricity,

plumbing and masonry.

VR

The Verbal Reasoning Test of the Differential Apti-

tude Tests. The test measures an individual's ability to

understand concepts framed in words, and evaluates ability

to abstract or generalize and to think constructively.[11]

VR + NA

The combined quantity of the scores of the Verbal

Reasoning and Numerical Ability Tests of the Differential

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[10]Bennet, Seashore, and Wesman, p. 8.

[11]Ibid., p. 1-6.

Aptitude Tests. It is used as a measure of general learning ability.[12]

WAIS

The Wechsler Adult Intelligence Scale is an instrument designed to measure general intelligence. It contains six Verbal subtests and five Performance subtests. It is administered individually and was constructed for individuals ranging from sixteen years old to seventy-five and over.

WAIS Arithmetic

A Verbal subtest of the Wechsler Adult Intelligence Scale. It measures the ability to reason numerically at a required speed, capacity for sustained effort and ability to concentrate.[13]

WAIS Block Design

A Performance subtest of the Wechsler Adult Intelligence Scale. It measures manipulative and perceptual speed, visual motor coordination, perceptual organization and capacity for sustained effort.[14]

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[12]Bennet, Seashore, and Wesman, p. 7.

[13]Joseph Matarazzo, Wechsler's Measurement and Appraisal of Adult Intelligence, Fifth Edition (Baltimore: Williams and Wilkins, 1972), p. 96.

[14]Matarazzo, p. 98.

WAIS Comprehension

A Verbal subtest of the Wechsler Adult Intelligence Scale. It measures the ability to evaluate past experience in a "common sense" frame of reference and the ability to make judgments in practical social situations.[15]

WAIS Full Scale Total

The value indicative of the accumulated scores of the Verbal and Performance subtests of the Wechsler Adult Intelligence Scale.

WAIS Object Assembly

A Performance subtest of the Wechsler Adult Intelligance Scale. It measures the ability to differentiate familiar configurations, to perceive relationships of unknown objects and manipulative and perceptual speed.[16]

WAIS Performance Total

The value indicative of the accumulated scores of Performance subtests of the Wechsler Adult Intelligence Scale as defined in this section.

WAIS Picture Completion

A Performance subtest of the Wechsler Adult Intelligence Scale. It evaluates awareness of environmental details, concentration and visual conceptual ability.[17]

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[15]Matarazzo, p. 97.

[16]Ibid.   [17]Ibid., p. 98.

WAIS Similarities

A Verbal subtest of the Wechsler Adult Intelligence Scale. It measures the ability to form verbal concepts at either the abstract or concrete level and the extent to which the individual can modify his thinking in terms of rigidity or flexibility.[18]

WAIS Verbal Total

The value indicative of the accumulated score of Verbal Subtests of the Wechsler Adult Intelligence Scale as defined in this section.

WAIS Vocabulary

A Verbal Subtest of the Wechsler Adult Intelligence Scale. It measures accumulated verbal learning and the quality and character of thought processes.[19]

Woodworking Aptitude

An individual's potential ability in woodworking as measured by the Industrial Arts Aptitude Woodworking Test.

The Variables

The dependent variables in this study were the Industrial Arts Aptitude Woodworking Tests and its subtests. The independent variables were the Wechsler Adult Intelligence Scale and its selected subtests, the Differential

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[18]Ibid., p. 97.   [19]Ibid., p. 95.

Aptitude Tests and their selected subtests and high school grades. The controlled variables in this study were major area of study, experience in woodworking, age, sex and grade level in high school of the individuals tested.

LIMITATIONS OF THE STUDY

There were a number of limitations in this study. The population size was forty. This sample size limits the conclusions that can be drawn. The considerable time spent in administering the battery of tests was a major reason for keeping the population size as small as it was.

The selection of the subtests of the WAIS and DAT for use in the study was subjective. The writer and his academic advisor made decisions after consultations as to which subtests should be included or withheld from the study. These decisions were based on logic and reasoning. The subtests which were considered to be the most reliable in measuring verbal and performance ability were selected. The subtests that were elminiated were judged not to make significant contributions to the investigation. The elimination of certain subtests was also necessary because of the length of administration and tabulation. A lengthy battery of tests was not convenient for administration to students with limited class time and leisure time.

Another limitation was that the population sample was all male. There were no female students found enrolled in a Building Trades program at the Flint Hills Vo-Tech

school. This, of course, eliminated women from any conclusions being drawn from this study.

Lastly, the population sample was a restricted one in that all the subjects came from Emporia, Kansas and the adjoining vicinity. The results of the study should be interpreted accordingly.

Chapter 2

REVIEW OF THE LITERATURE

Investigation of the research reported with the
DAT, WAIS and IAAWT revealed no direct comparison among
the tests as a group. There were tests, however, of some
related field correlated and compared to two of the three
instruments. The writer categorized the studies found into
seven general areas.

1. The DAT and the WAIS.

2. The DAT and Vocational Aptitude Measures.

3. The DAT and General Intelligence Tests.

4. The WAIS and Vocational Aptitude.

5. The WAIS and General Aptitude Tests.

6. General Intelligence Tests and Mechanical
Aptitude Tests.

7. Mechanical Aptitude Tests and Woodworking.

There were no studies found involving the Industrial
Arts Aptitude Woodworking Test. There was only one study
found involving a Woodworking test and any other instrument.
This necessitated finding some work undertaken with tests
in the same general field as the IAAWT to provide some sort
of broad background material. Mechanical Aptitude and
Vocational Aptitude Tests were involved in an overwhelming
majority of studies concerned with the project. Since there

are conceivably some related abilities measured by both
Mechanical and Woodworking Tests such as manual dexterity,
visual-hand coordination and visual-motor perception, these
studies were included in the review of literature. The
purpose of this review was to find a link between intelli-
gence, aptitude and woodworking or fields related to wood-
working.

The DAT and the WAIS

Tsai and Haines conducted an experiment with sixty-two
college seniors and graduate students in which the scores of
the authors' TSAI Number Joining Test were correlated with
performances on the DAT and the WAIS. The TSAI Number Join-
ing Test was designed as an intelligence test. Pearson pro-
duct moment correlations were much higher for the DAT than
for the WAIS. Correlations with the performance, verbal
and full scale WAIS IQ's were .31, .00 and .13 respectively.
Subtest correlations ranged from .35 (Digit Symbol) to .02
(Digit Span). The DAT correlations were much higher, with
Spelling .65, Verbal Reasoning .61, Grammar .47, Abstract
Reasoning .36, Clerical Speed and Accuracy .25, Numerical
Ability .23, Space Relations .21, and Mechanical Reasoning
.08.[1]

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[1]Loh S. Tsai and Richard B. Haines, "Tsai Number
Joining Test Scores Correlated with College Students' Perfor-
mance on the WAIS and DAT," Perceptual and Motor Skills,
XXXIII, (1) (August, 1971), 35-44.

Ross took forty-eight deaf subjects between the ages of sixteen and twenty-one and administered the Space Relations Test of the DAT and the Full Scale WAIS. He used two different methods of testing. One was Simultaneous and the other was Oral-Written. The study was based on the hypothesis that the deaf subjects would perform better on tests when administered by a communication technique that included manual language, which was the Simultaneous method. The experimentor's hypothesis was accepted because significant differences were found between testing methods on the WAIS' Comprehension, Digit Span, Vocabulary and Picture Completion subtests as well as the Verbal and Full Scale IQ. The Simultaneous method was the better method in all cases.[2] Although the main objective of the above study did not coincide with the objective of the present study, the fact that the DAT and the WAIS were used as acceptable instruments of measurement was significant.

Finally, in a 1957 investigation, 254 male federal reformatory inmates ranging in age from seventeen to twenty-four, were given the DAT's Verbal Reasoning and Numerical Ability Tests and the Full Scale WAIS. The inmates were selected from three institutions. The combined Verbal Reasoning and Numerical Ability scores correlated with the Full Scale WAIS IQ yielded coefficients ranging from .74

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[2]Donald R. Ross, "Test Performance of Deaf Adults Under Two Modes of Test Administration," <u>Dissertation Abstracts</u>, 28 (8-A), (1968), 2992.

to .79. The subjects were categorized into three age groups, each with their own correlation coefficient with the two tests. This was the only direct comparison between these two tests and by far the most helpful and useful, although use of additional subtests of the DAT would have been beneficial.[3]

The DAT and Vocational Aptitude Measures

One of the authors of the DAT, Seashore, along with two colleagues, Doppelt and Odgers, attempted to validate the DAT for auto mechanics and machine shop students. The DAT scores and ratings of students in vocational courses were compared. The prediction of overall accomplishment of auto mechanics was not satisfactory, but for machine shop students, the relationships between DAT scores and ratings showed several significant correlations. Significant relationships were found between ratings and Mechanical Reasoning, Abstract Reasoning and Space Relations subtests of the DAT.[4]

Two other tests, the General Aptitude Test Battery and the Iowa Tests of Educational Development, were used with the DAT to determine their predictive ability with students in Idaho Area Vocational Schools. The findings

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[3]Bennet, Seashore, and Wesman, p. 5-47.

[4]J. Doppelt, H. G. Seashore and J. G. Odgers, "Validation of the Differential Aptitude Tests for Auto Mechanics and Machine Shop Students," Personnel Guidance Journal, XXXVII (1959), 648-655.

of the research revealed that there were several significant

relationships between students' scores on the three test

batteries and their grade point averages. Only two subtests

from the General Aptitude Test Battery, one from the DAT

(Language Usage: Grammar) and three from the Iowa Tests of

Educational Development showed obtained coefficients at or

above the .40 standard and were considered as useful pre-

dictors. On the basis of this data, they concluded that the

validity of the three test batteries for purposes other than

counseling vocational students would be questionable.[5]

The DAT and General Intelligence Tests

Embree conducted a longitudinal study with the DAT,

the Henmon-Nelson Test of Mental Ability and the American

Council on Education Psychological Examination for College

Freshmen. In this experiment, ninety-nine boys and eighty-

three girls were tested in junior high school with the Henmon-

Nelson Test of Mental Ability and their IQ determined from

this. At the beginning of their sophomore year in high

school, they were given the DAT. The same DAT was repeated

three years later. That same year, the students were given

the American Council on Education Psychological Examination

for College Freshmen. A multiple correlation of .77 was

found to exist between IQ's determined during junior high

and the Verbal Reasoning, Numerical Ability and Abstract

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[5]Kenneth E. Armstrong, "A Comparative Validity Study
of the General Aptitude Test Battery, the DAT, and the Iowa
Schools," Dissertation Abstracts International, 32 (6-B),
(December, 1971), 3613.

Reasoning subtests of the DAT. This relationship was
sufficiently high to suggest that using the IQ's and a com-
posite of these three DAT scores might be of some use in
counseling and predicting scholastic ability.[6]

Doppelt and Wessman conducted two experiments which
compared the DAT to other general intelligence and achievement
tests. In their first endeavor, Iowa high school pupils were
given the DAT and a year later the Iowa Tests of Educational
Development. Each of the DAT subtests showed a significant
relationship with at least one section of the Iowa Test of
Educational Development. There were four coefficients above
.80.

In Doppelt and Wessman's second investigation, Ohio
and New Jersey children were given the DAT in grade nine
and tested with the Essential High School Content Battery
three years later. Even after this long interval, six of
the DAT subtests correlated at .50 or higher with some
section of the Essential High School Content Battery. Ver-
bal Reasoning and Sentences showed rather high correlations
with most of the achievement test sections, a fact which not
only shows the large part played by the longitudinal factor
in such tests but emphasizes the important role of verbal

[6]Royal B. Embree, Jr., "A Longitudinal Study of Per-
formances on the Henmon-Nelson Test of Mental Ability, the
DAT and the American Council on Education Psychological
Examination for College Freshmen," American Psychologist, V
(1950), 352.

ability as a contributor to achievement in all the areas measured.[7]

In 1962, the California Test of Mental Maturity (1957 Short Form, Junior High Level) and the complete DAT tests were given to sixty-eight boys and seventy-three girls in the Sacramento, California area. The highest coefficients of correlation were found between the combined Verbal Reasoning and Numerical Ability Tests of the DAT and the Language and Total IQ's of the California Test of Mental Maturity. This ranged from .75 for boys to .84 for girls. The poorest subtest of the DAT was the Clerical Speed and Accuracy Test which had a low of .13 and a high of .47 in comparison to the Non-Language IQ, Language IQ and Total IQ of the California Test of Mental Maturity. All other correlation coefficients of the various DAT subtests ranged from .45 to .84. These relationships were among the Total, Language and Non-Language IQ's of the California Test of Mental Maturity.[8]

In the most extensive study, the Lorge-Thorndike Intelligence Tests (Form A. Level 4) which consisted of Verbal and Non-Verbal scores and the full DAT were given to 520 students in the eighth, ninth, eleventh and twelfth grades

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[7]Jerome E. Doppelt and Alexander G. Wessman, "The DAT As A Predictor of Achievement Test Scores," _Journal of Educational Psychology_, XLIII (1952), 210-217.

[8]Bennet, Seashore and Wesman, pp. 8-12.

in Buchanan, Michigan. The highest coefficients were again in the Verbal Reasoning and Numerical Ability Tests of the DAT and the Verbal Ability sections of the LTIT. The range in this relationship was from .54 to .86. The poorest subtest of the DAT was, once again, the Clerical Speed and Accuracy Test. With few exceptions, other subtests of the DAT correlated quite well with the Lorge-Thorndike Intelligence Tests.[9]

The DAT and the Otis Quick-Scoring Mental Ability Tests (Form Gamma FM) were compared using 308 tenth grade boys and girls in Clairton, Pennsylvania in 1962. The correlations of the DAT were highest again in the Verbal Reasoning and Numerical Ability Tests, and the combined total of these two subtests. There was only one total score for the Otis test. The coefficients ranged from .45 in Clerical Speed and Accuracy to .85 for the combined Verbal Reasoning and Numerical Ability.[10]

The School and College Ability Tests (Form 2A) was given to 130 males and females in Sacramento, California along with the DAT. SCAT scores were in Verbal, Quantitative and Total categories. The highest correlation coefficient was found between the total score of the SCAT and the Verbal Reasoning plus Numerical Ability Total of the DAT. This was .90 and was also the highest correlation coefficient found between any DAT Test and any intelligence test. Excluding

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[9]Ibid.   [10]Ibid.

the Clerical Speed and Accuracy Test of the DAT, the co-
efficients of the other DAT Tests ranged from .34 in
Mechanical Reasoning and Verbal in the SCAT, to a .87 re-
lationship between Verbal Reasoning (DAT) and Total (SCAT).[11]

The preceding report of findings between the DAT and
intelligence tests was the most up-to-date statistics found
in print and concerned Forms L and M of the DAT. There have
been numerous other studies between earlier forms of the DAT
and other intelligence tests but the latest studies were
judged to be the most pertinent. The results have demonstra-
ted that the Verbal Reasoning plus Numerical Ability score
in the DAT serves the same purpose as any general mental
ability test.

The WAIS and Vocational Aptitude

Schofield and Kunce organized a short form of the
WAIS by selecting subtests that were consistently related
to vocational workshop performance with three groups of work-
shop clients totaling 340. The Similarities, Comprehension,
Digit Symbol and Block Design subtests were selected as the
most reliable in measuring workshop ability. The sum of
the scores on the four subtests was significantly related
to Full Scale WAIS IQ's and to workshop performance as rated
by instructors and course grades.[12] The above study was the

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[11]Ibid.

[12]Larry F. Schofield and Joseph T. Kunce, "A WAIS
Adaptability Scale and Vocational Behavior," Journal of Vo-
cational Behavior, I, (4) (October, 1971), 355-360.

only experiment found in this category. No vocational, woodworking or mechanical aptitude tests were found correlated to the WAIS.

The WAIS and General Aptitude

A 1969 investigation by Kerpelman at the University of Massachusetts compared the Control Test AA (CTAA) and the WAIS. The Control Test AA is an instrument originally designed to provide researchers with a measure of aptitude or ability in order to control that variable in making comparisons with other characteristics among groups of college students. The test contains nine antonym items, twelve quantitative comparison items and nine verbal analogy items. It is a group test and takes only twelve minutes to administer. The Control Test AA and the WAIS were given to twenty-three freshmen students in Psychology. The tests were administered twice. The order in which each test was given was reversed. The data for the twenty-three subjects was combined with a resulting CTAA-WAIS Pearson r of .34. The authors concluded that this r represented a low but slight correlation between the two tests. The r was not significant at the .05 or .01 levels of confidence.[13]

Watson and Klett in a 1972 project compared four general group ability tests to the WAIS. The instruments

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[13]Larry Kerpelman, "Concurrent Validity of a Brief Test of Academic Aptitude," _Educational and Psychological Measurement_, XXIX, 4 (1969), 891-894.

involved were the Science Research Association Tests of Educational Ability, the California Short Form Test of Mental Maturity, the Schubert General Ability Battery and the Verbal Power Test. The five tests were administered to 120 subjects in a psychiatric setting. Linear regression formulae were given for each comparison so that WAIS Full Scale scores could be predicted from the group test scores. The results showed that the Science Research Association Tests of Educational Ability was the closest measure to WAIS IQ and could be used as a WAIS surrogate.[14]

Shore, Shore and Pihl correlated performances of the WAIS and the Category Test, a general aptitude instrument. The tests were administered to twenty-nine subjects between the ages of sixteen and twenty-five. Product-Moment correlations were significant for 102 of the 108 comparisons between subtests and factors of the Category Test and the WAIS. The WAIS Full Scale Total was found to be the best predictor of Category Test performance.[15]

General Intelligence Tests and
Mechanical Aptitude Tests

A 1943 research effort by Traxler compared a mechanical aptitude test, a mechanical comprehension test, and

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[14]Charles Watson and William G. Klett, "Prediction of WAIS Scores from Group Ability Tests," Journal of Clinical Psychology, XXIX, 1 (January, 1973), 46-49.

[15]Celia Shore, Howard Shore and R. O. Pihl, "Correlations Between Performance on the Category Test and the WAIS," Perceptual and Motor Skills, XXXII, 1 (February, 1971), 70.

a general intelligence test. The instruments used were the
Minnesota Paper Form Board Test, the Bennet Mechanical
Comprehension Test and the American Council on Education
Psychological Examination, 1940 High School Edition. The
experiment used 230 cadets from the Merchant Marine Corps.
The Minnesota Paper Form Board Test involves the identifica-
tion of spatial relationships in a series of geometric forms
of varying complexity. The Bennet Mechanical Comprehension
Test presents pictorally a series of mechanical situations
which is accompanied by three responses, one of which cor-
rectly identifies the situation. The results from the two
mechanical tests were tabulated and a correlation coefficient
of .393 was found to exist between the two tests. This was
a positive correlation but obviously low for two tests in
the same field. The American Council on Education Psychologi-
cal Examination was then compared with the same two instru-
ments. The comparisons resulted in a .417 correlation with
the Minnesota Paper Form Board Test and a .367 with the
Bennet Mechanical Comprehension Test. The statistics
indicated that the two mechanical tests were related to each
other to approximately the same degree as they related to a
test of general mental ability. Caution was urged by the
author to counselors, psychologists and responsible authori-
ties, not to randomly pick tests in the same field without
first investigating their validity with other tests.[16]

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[16]A. E. Traxler, "Correlations Between Mechanical
Aptitude and Mechanical Comprehension Scores," Occupations,
XXII (1943), 42-43.

Milne, Culver, Suzman, Wilkens and Jakl collaborated on a project by testing 202 boys and girls between the ages of eleven and seventeen. They were given the South African Group Intelligence Tests and the Stienquest Mechanical Aptitude Test. The results found little difference in the capacity of the students in the twenty-five schools visited and the correlations between intelligence and mechanical aptitude as measured were negligible.[17]

Lucio and Resch used groups of officers and enlisted men, totaling over 200, going through an Air Force counseling center for their research. The instruments used in their investigation were the Army Individual Test (verbal performance and total scores), the Kuder Preference Record (mechanical and interest scores), the Bennet Mechanical Comprehension Test and the O'Rourke Mechanical Ability Test. The experimenters were testing the relationship of general intelligence, vocational interest, and mechanical ability. Results obtained from comparisons of the various instruments were that there was a positive correlation (significant at the one percent level) between the verbal component of the Army Intelligence Test and the literary category of the Kuder Preference Record. Similarly there was a significant relationship between the performance component of the Army

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[17]F. T. Milne, et al, "Does a Physiological Correlation Exist Between Basic Intelligence and the Physical Efficiency of School Children," Journal of Genetic Psychology, LXIII (1943), 131-140.

Intelligence Test and the Mechanical Interest category of the Kuder Preference Record. It was found that total intelligence test scores gave non-significant correlations with vocational interest. The mechanical ability tests did not correlate significantly higher with vocational preference than did the performance parts of either the Army Intelligence Test or the Wechsler-Belvue Scale. Finally, the Wechsler-Belvue Scale may prove of use in vocational counseling when high verbal intelligence scores agree with strong literary or related interests or when high performance intelligence scores agree with strong mechanical or allied interests.[18]

Mechanical Aptitude Tests and Woodworking

The only study found in this area was a Japanese one conducted in 1959. Mosuda, Tonaka, Hakonishi and Seke randomly selected sixty-one boys from the eighth grade of three secondary schools. The subjects performed three fundamental tasks of woodworking: sawing, planing and holemaking. They also were measured by a mechanical aptitude test and a vocational aptitude test. The results were compared and it was found that there were no significant correlations among the scores except one between quantities of sawing and

[18]William Lucio and Frank Resch, "Relationships Among Tests of Intelligence, Vocational Interest and Aptitude," _California Journal of Educational Research_, VIII (1957), 198-203.

holemaking. It was hypothesized that both tasks contained the same factor of speed.[19]

SUMMARY OF THE LITERATURE REVIEWED

The literature reviewed showed that most of the studies relevant to this thesis were conducted with the DAT. The Verbal Reasoning and Numerical Ability Subtests of the DAT show a high correlation to most general intelligence tests and give a good indication of general mental ability. There was a paucity of investigations, however, between DAT Subtests which measure vocational ability such as Space Relations and Abstract Reasoning and vocationally oriented tests.

The Full Scale WAIS (using all subtests) and the complete battery of the DAT were used in only one research effort. They were, however, not correlated with one another, but each was correlated with another instrument. Only one study was found where some subtests of the DAT were correlated with the Full Scale WAIS. The VR + NA Total was correlated with the Full Scale WAIS and yielded correlations ranging from .74 to .79. There were no studies found that analyzed the relationships between Performance Subtests of the WAIS and Subtests of the DAT which measure vocational

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[19]Koichi Masuda, et al, "Educational Psychological Study of Teaching Methods of Vocation as a Subject of Secondary School," Psychological Abstracts, 34 (October, 1960), 804. Japanese Journal of Educational Psychology, 7 (1959), 170-175.

ability. The WAIS has not been compared to any test such as the Industrial Arts Aptitude Woodworking Test.

Records reveal that investigations into correlations between intelligence tests and vocational tests other than woodworking tests have had mixed results. Some studies have shown that tests in these two categories show a high relationship, while other studies show negligible relationships. It appears no conclusions can be drawn from tests in these two categories.

Chapter 3

METHODS AND PROCEDURES

The problem investigated in this study was the re-
lationships among the Industrial Arts Aptitude Woodworking
Test, the Wechsler Adult Intelligence Scale, the Differen-
tial Aptitude Tests and High School Grades. This chapter
describes the study itself and includes the population
analyzed, a description of the instruments used, the design
followed during the research, the procedure employed in col-
lecting the data, the statistical approach used in analyzing
the data and the criteria used for acceptance or rejection
of hypotheses.

Population and Sampling

The population consisted of forty male students
ranging from sixteen to nineteen years of age. The students
were randomly selected from three educational institutions in
the vicinity of Emporia, Kansas.

Twenty students were selected from the Flint Hills
Area Vocational-Technical School in Emporia, Kansas. The
students were all enrolled in a "Building Trades" major pro-
gram. The "Building Trades" program consisted of "on-the-job"
and classroom instruction in the areas of the skilled con-
struction trades. The fields studied were carpentry, masonry,
plumbing and electrical wiring. All of the students were

simultaneously attending regular high school classes during part of their day and participating in the Building Trades program for another part of the day. The group consisted of eight juniors and twelve seniors. The students were assumed to have some degree of interest in woodworking because of the major field of study they had chosen. This group was the experimental group.

Ten students each were selected from Olpe High School in Olpe, Kansas and Northern Heights High School in Allen, Kansas. There were eleven juniors and nine seniors in this group. All twenty of the students were in a college preparatory or general type of high school program. None were attending vocational school. Their interest in woodworking was assumed to be of a lesser degree than those who attended the Vo-Tech School. This group was the control group.

Materials and Instruments

As stated in Chapter 1, the instruments selected for use in this study were the Industrial Arts Aptitude Woodworking Test, the Wechsler Adult Intelligence Scale, the Differential Aptitude Tests and high school grades.

The IAAWT is a group administered test and was normed in the Fall of 1973 for junior high school, senior high school and college students. The junior high school sample was made up of 300 subjects. The senior high school sample was 106 individuals. The college sample consisted of 110

subjects. The subjects were randomly selected from schools all over Kansas. The reliability index, using the Kuder Richardson formula, was .90. The means increased for each grade level from 30 at the seventh grade level to 45 at the college level. The standard error of measurement was 3.56.[1]

The Wechsler Adult Intelligence Scale was standardized in 1955 and was based on a nationwide sample of 1700 adults, prorated according to 1950 U.S. Census, including a proportionate representation of the non-white population. It is a revision of the Wechsler-Belvue Intelligence Scale which was published first in 1939. Over the years, it has established for itself a solid place as a basic psychological diagnostic instrument.[2] The norms were based on groups considered representative of United States adults. A stratified sampling method was used and the variables which governed the stratification were age, sex, geographic region, urban-rural residence, race and occupation. Seven age groups ranging from sixteen to sixty-four were used in the norming.[3] The reliability coefficients and standard errors of measurement, in that order, are Verbal IQ .96 and 3.00, Performance IQ .93 and 3.97 and Full Scale IQ .97 and 2.60. The reliability coefficients were estimated from the formula for the correlation between two sums of equally weighted scores.[4]

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[1]Hogan, Amburn, and Hogan, p. 2.

[2]Wechsler, p. iii.

[3]Ibid., p. 5.   [4]Ibid., pp. 12-13.

The Differential Aptitude Tests were developed in 1947 to provide an integrated, scientific and well-standardized procedure for measuring the abilities of boys and girls in grades eight through twelve for purposes of educational and vocational guidance. While the tests were constructed primarily for use in junior and senior high schools, they have been used also in the educational and vocational counseling of young adults out of school and in the selection of employees.[5] The DAT is also a group administered test.

In 1963, the DAT was updated to meet demands of large and small guidance programs. There was complete restandardization on a nationwide sample of more than fifty thousand cases.[6] Reliability coefficients for Forms L and M (which are the latest form for which this data is available) were computed for each of the seven tests, separately for each sex in each grade, for a sample of students drawn from the standardization population.

The average reliability coefficients, mean scores and standard deviations for 913 boys in grades eight through twelve are reported in Table 1 because the population represented related closely to the population used in this study.

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[5]Bennet, Seashore and Wesman, p. 1-1.

[6]Ibid., p. 1-2.

Table 1

Average Reliability Coefficients, Mean Scores
and Standard Deviations of Form L
of the DAT for 913 Boys
Grades 8-12[7]

Test	Average r	Average Mean	Average SD
VR	.92	25.3	9.8
NA	.90	22.5	7.8
VR + NA	.94	47.8	16.3
AR	.91	32.0	9.6
Clerical Speed and Accuracy	--	49.4	11.8
Mechanical Reasoning	.87	47.4	8.8
SR	.94	31.1	12.1
Language Usage I Spelling	.93	63.0	15.3
Language Usage II Grammar	.89	27.8	9.4

The correlation coefficient used for all tests except Clerical Speed and Accuracy was the split-half coefficient corrected by the Spearman-Brown formula.

The high school grades which included the students' last completed academic year were compiled and grade point averages were then computed. The grades were grouped into three categories: grades of Verbal-type subjects, grades of Performance-type subjects and Cumulative grades.

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[7]Ibid., p. 6-1.

The grades of verbal-type subjects were comprised of courses which placed primary emphasis on verbal-type abilities. Reading speed and comprehension, writing ability, vocabulary and linguistic ability were examples of the abilities stressed by the courses. English, History, Speech and Geography were examples of the subjects.

The grades of performance-type subjects consisted of courses which placed major emphasis on motor-type skills. Visual-motor acuity, physical coordination, perceptual organization and concentration were examples of abilities stressed by the subjects. Mathematics, Shop, Physical Education and Mechanical Drawing were examples of the subjects.

Cumulative grades were simply the combination of Verbal and Performance grades. They were the total grades of all courses for the students' last completed academic year.

Design

The officials of the Flinthills Vo-Tech School, Olpe High School and Northern Heights High School were contacted and the purpose and scope of the study was explained to them. Permission was granted to test the individuals with a minimum of interference with their scheduled school classes and activities. Permission was also given to use official high school grades on file to compare with the test results. It was agreed that all individual grades of students were to be kept strictly confidential. The tests were administered in this order: 1) IAAWT, 2) WAIS and 3) DAT. The order

was used strictly in all cases to keep inequities to a minimum and to provide balance in the type of test administered. All tests were administered between September 16, 1974 and November 1, 1974. There was no more than one test administered on any given day and there was at least a one-week waiting period between the administration of each test. The above schedule was followed in order to cooperate with the students' scholastic schedules and to keep their interest high. No student was given a test against his will and an optimum effort was made to provide for adequate testing conditions.

Data Collection

The nature and content of each test was explained to each student before administration. The procedures and rules for the administration of all three instruments as stipulated in the manuals were followed. Questions asked by students during testing were answered within the criteria allowed for by each testing manual. The answers for the IAAWT and the DAT were placed on separate answer sheets and were scored manually. Scoring keys were obtained to expedite the scoring process on these two instruments. The scoring of the WAIS was accomplished by following the manual's recommended procedures.

Photostatic copies of all students' high school grades including their last completed scholastic year were obtained from the files of each institution. The grades were recorded along with the results of the three tests.

Data Analysis

There were two steps employed in the analysis of data obtained in this study. The first was the calculation of grade point averages for verbal-type courses, performance-type courses and total courses. The second step was the calculation of correlation coefficients between all factors named in the Statement of the Hypotheses.

Calculation of Grade Point Averages. The grade point averages of verbal-type courses, performance-type courses and total courses were calculated by letting a letter grade equal a specific numerical value. The value of each letter grade was:

A = 4 points

B = 3 points

C = 2 points

D = 1 point

F = 0 points

These points were named grade points. The grade points were added and totaled for each of the three grade categories. The grade point totals were then divided by weight factor totals. A weight factor represented the value of a specific course. The scheduled frequency of a course during a week and the scheduled longevity of a course during a semester determined the value of a specific course. For example, a course that was scheduled five days a week for an entire semester was given a weight factor of 1. A course that was

scheduled for five days a week and was taught for one-half
of a semester was given a weight factor of .5. An example
of how the process was computed follows:

Weight Factor	Grade	Grade Point
1.0	A	4
.5	B	3
1.0	C	2
2.5		9

$$\frac{9}{2.5} = 3.6 \text{ Grade Point Average}$$

All computations of grade point averages were made with a
hand calculator.

Calculation of Correlation Coefficients. After the
computation of the grade point averages was completed and
recorded correlation coefficients were computed between each
of the factors named in the Statement of the Hypotheses.
The Pearson Product-Moment method (formula #30) was used for
the calculation of all r's.[8] This formula is:

$$r = \frac{N\Sigma XY - \Sigma X \times \Sigma Y}{\left[N\Sigma X^2 - (\Sigma X)^2\right]\left[N\Sigma Y^2 - (\Sigma Y)^2\right]}$$

where, N = the number of subjects in the population
   X = the mean raw score of the first factor to
     be correlated
   Y = the mean raw score of the second factor
     to be correlated
   Σ = the sign for the sum of

The population size used in all calculations was forty. All
relationships were analyzed in a linear fashion. The

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[8]Henry Garret, Statistics in Psychology and Education, Sixth Edition (New York: David McKay Company, Inc., 1971), p. 143.

calculations were performed by a computer programmed to process the data using the above formula.

Acceptance of Hypotheses

Hypotheses were accepted or rejected at the .05 level of significance. The critical values used to determine the acceptance or rejection of hypotheses were taken from _Statistics_ _in_ _Psychology_ _and_ _Education_ by Garret.[9]

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[9] Ibid., p. 201.

Chapter 4

ANALYSIS OF THE DATA

In this chapter, the process in which the data was
analyzed is discussed. Specifically, the analysis of the
relationships between the factors named in the Statement of
the Hypotheses is presented.

Analysis of the Factors

In the following analysis, five tables were used to
examine the significance of the relationships between
selected factors. A strong effort was made to select and
group these factors in a way which would produce useful and
meaningful information for the user.

Subtests which were supposed to measure approximately
the same abilities were selected from each instrument and
grouped together to see if they produced significant rela-
tionships. In other words, a subtest which was supposed to
measure verbal ability was matched with a subtest from another
instrument which was supposed to measure verbal ability. The
same type of grouping also was used for subtests measuring
performance-type abilities. The same rationale was used for
the grade categories. The totals from each instrument were
also examined together.

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Statistical Analysis

      Within the five groups of relationships, there was a total of sixty-seven correlation coefficients analyzed between the twenty-two factors. Intercorrelations between subtests and totals of the same instrument were not calculated. The forty subjects described in Chapter 3 were used in all calculations. The Product-Moment method described in Chapter 3, page 41, was used to calculate all correlations.

      Table 8, in the Appendix, page 78, is a master table and shows all the correlation coefficients that were calculated. Tables 2 through 6 were derived from Table 8. There are 167 correlations in Table 8. There were 100 relationships listed in Table 8 that were not analyzed in the present study. The content of the factors that made up the 100 unused relationships were judged not to make significant contributions to the investigation. Decisions were made by the writer and his academic advisor as to which relationships should be included or withheld from the research. These decisions were based on logic and reasoning. Table 8 provides a record of the factors that were involved with these relationships.

      Tables 2 through 6 used the same measuring criteria for determining the significance of each correlation coefficient. Thirty-eight degrees of freedom (N-2) were used in all cases. A value of $\pm$ .312 was needed for significance at the .05 level of confidence. A value of $\pm$ .403 was needed for significance at the .01 level. These values were

interpolated from <u>Table</u> <u>25</u>, <u>Correlation</u> <u>Coefficients</u> <u>at</u> <u>the</u>
<u>5%</u> <u>and</u> <u>1%</u> <u>Levels</u> <u>of</u> <u>Significance</u>, Garret.[1]

Additional criteria were used to assist in the
analysis of the obtained data. Correlations between factors
ranging from ± .000 to ± .200 were denoted as having in-
different or negligible relationships. Correlations ranging
from ± .201 to ± .400 were denoted as slight or low. Co-
efficients with a range from ± .401 to ± .700 were judged
as substantial or marked. A high correlation was represented
by coefficients ranging from ± .701 to ± 1.00.[2]

The coefficients were also judged with regard to the
nature of the factors involved, the reliability of each
instrument, the variability of the group and the purpose for
computing the r's.[3]

Coefficients between measures of general intelligence
(factors of the WAIS and the DAT) and school grades (Verbal,
Performance and Cumulative Grades) should range from .400
to .600 to be serviceable. Correlations between vocational
tests (the IAAWT) and measures of aptitude represented by
various criteria (WAIS and DAT) rarely rise above .50 and
smaller r's are often serviceable. Relationships between
instruments in the same general field should be substantial
(.400 to .600).[4]

The purpose for computing the r's was to forecast the
likely achievement of a restricted group of individuals.

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[1]Ibid.   [2]Ibid, p. 176.   [3]Ibid.   [4]Ibid.

Another purpose was to measure the minimum relationship present in each of the factors named.

Vocabulary Referenced Subtests

Table 2 shows the correlation coefficients among the Vocabulary Subtest of the Industrial Arts Aptitude Woodworking Test (IAAWT-VOCAB), the Vocabulary Subtest of the Wechsler Adult Intelligence Scale (WAIS-VOCAB), the Verbal Reasoning Subtest of the Differential Aptitude Test (DAT-VR), and the grades of verbal-type courses (VERB-GR). The group of subtests is vocabulary referenced. The subtests on this table are labeled in the far left hand margin and in the upper margin. The table is read by finding the name of a specific subtest from the left hand margin and then looking in the upper margin for the name of another specific subtest. The column where two straight lines would intersect shows the relationship between the two specific subtests. For example, the relationship between the WAIS Vocabulary and the IAAWT Vocabulary is .387. Tables 3 through 5 are read in the same manner.

Among the six relationships on Table 2, five were significant at the .05 level of confidence. Of the five relationships significant at the .05 level, three were significant at the .01 level as well. The significant relationships ranged from a high of .658 (DAT-VR and WAIS-VOCAB) to a low of .374 (DAT-VR and IAAWT-VOCAB).

Table 2

Correlation Coefficients Among the IAAWT
Vocabulary Subtest, the WAIS Vocabulary
Subtest, the DAT Verbal Reasoning Sub-
test and Grades of Verbal-Type
Courses

Subtests	IAAWT-VOCAB	WAIS-VOCAB	DAT-VR
WAIS-VOCAB	.387*		
DAT-VR	.374*	.658**	
VERB-GR	.179	.506**	.470**

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

On the basis of the data, the null hypothesis was
rejected except for one relationship. The relationship was
between the IAAWT-Vocabulary and the WAIS-Vocabulary.

The IAAWT-Vocabulary Subtest showed significant but
slight relationships with the WAIS-Vocabulary and the DAT-
Verbal Reasoning Subtests. Although the correlations were
slight, they were important because they involved subtests
from divergent types of instruments.

Several relationships from Table 2 showed substan-
tial correlations. The DAT-Verbal Reasoning Subtest and
the WAIS-Vocabulary subtest demonstrated that they measure
many of the same abilities. The WAIS-Vocabulary and the DAT-
Verbal Reasoning subtests are valuable predictors of accom-
plishment in verbal-type courses.

The relationship between the IAAWT-Vocabulary and Verbal Grades was negligible and not significant. The IAAWT-Vocabulary is not an adequate indicator of grades in verbal-type courses.

Subtests of Verbal-Type Abilities

Table 3 shows the correlation coefficients among the Comprehension Subtest of the Industrial Arts Aptitude Woodworking Test (IAAWT-COMP), the Arithmetic, (WAIS-ARITH), Comprehension (WAIS-COMP) and Similarities (WAIS-SIM) subtests of the Wechsler Adult Intelligence Scale, the Numerical Ability Subtest of the Differential Aptitude Test (DAT-NA) and the grades of verbal-type courses. The group contains subtests that are supposed to measure verbal-type abilities.

On Table 3, ten relationships out of a total of twelve were significant at the .05 level of confidence. Four of these relationships were also significant at the .01 level. The significant relationships ranged from .593 (DAT Numerical Ability and WAIS Comprehension) to .317 (WAIS Similarities and IAAWT Comprehension).

On the basis of the data, the null hypothesis was rejected except for two relationships. The relationships were between the IAAWT-Comprehension and the WAIS-Arithmetic and the WAIS-Arithmetic and Verbal Grades.

Table 3

Correlation Coefficients Among the IAAWT
Comprehension Subtest, the WAIS Compre-
hension, Arithmetic, and Similarities
Subtests, the DAT Numerical Ability
Subtest and the Grades of Verbal-
Type Courses

Subtests	IAAWT-COMP	WAIS-ARITH	WAIS-COMP	WAIS-SIM	DAT-NA
WAIS-ARITH	.265				
WAIS-COMP	.324*				
WAIS-SIM	.317*	***	***		
DAT-NA	.351*	.344*	.593**	.568**	
VERB-GR	.381*	.107	.487**	.325*	.470**

*Significant at the .05 level of significance
**Significant at the .01 level of significance
***Intercorrelations between these subtests were
not calculated

The IAAWT-Comprehension subtest demonstrated signi-
ficant but low correlations with the WAIS-Comprehension and
Similarities subtests. The correlations were not high
enough to warrant using these subtests interchangeably, but
they were important. The subtests were from different types
of tests and thus the correlations were notable. The IAAWT-
Comprehension subtest showed a significant but low correla-
tion with grades in verbal-type courses. Although the rela-
tionship was significant, it was not high enough to warrant
using the IAAWT-Comprehension subtest as an accurate indi-
cator of grades in verbal-type courses.

The WAIS-Arithmetic and the DAT-Numerical Ability subtests showed a significant but low correlation. The two subtests were from similar types of instruments. The relationship was not high enough for the two subtests to be used interchangeably.

The DAT-Numerical Ability subtest correlated substantially with the WAIS-Comprehension and Similarities subtests. The subtests showed that they measure comparable abilities.

The WAIS-Comprehension and the DAT-Numerical Ability subtests presented marked relationships with grades in verbal-type courses. The above subtests indicated that they are valuable predictors of achievement in verbal-type courses. The WAIS-Similarities subtest showed a significant, but low, correlation with verbal grades. The above relationship was too low to demonstrate importance.

The relationship between the IAAWT-Comprehension and the WAIS-Arithmetic subtests was slight and not significant. The WAIS-Arithmetic subtest showed a negligible relationship with the grades of verbal-type courses.

Subtests of Performance-Type Abilities

Table 4 shows the correlation coefficients among the Analogies Subtest of the Industrial Arts Aptitude Woodworking Test (IAAWT-ANAL), the Picture Completion (WAIS-PC), Block Design (WAIS-BD) and Object Assembly (WAIS-OA) Subtests of the Wechsler Adult Intelligence Scale, the Abstract

Reasoning (DAT-AR), and Space Relations (DAT-SR), subtests of the Differential Aptitude Tests and the Grades of Performance-type courses (PERF-GR). The group represents subtests that are supposed to measure performance-type abilities.

Data from Table 4 shows eight relationships significant at the .05 level of confidence. There was a total of seventeen relationships analyzed on the table. Four relationships were significant at the .01 level. The significant relationships yielded correlation coefficients ranging from .641 (DAT-Space Relations and Performance-Grades) to .344 (WAIS-Picture Completion and IAAWT-Analogies).

On the basis of the data, the null hypothesis was rejected except for nine relationships. The relationships were between the IAAWT-Analogies and the WAIS-Block Design, the IAAWT-Analogies and the WAIS-Object Assembly, the IAAWT-Analogies and the DAT-Abstract Reasoning, the WAIS-Picture Completion and the DAT-Abstract Reasoning, the WAIS-Picture Completion and the DAT-Space Relations, the WAIS-Picture Completion and Performance Grades, the WAIS-Object Assembly and the DAT-Abstract Reasoning, the WAIS-Object Assembly and the DAT-Space Relations and the WAIS-Object Assembly and Performance Grades.

Table 4

Correlation Coefficients Among the IAAWT Analogies
Subtest, the WAIS Picture Completion, Block
Design and Object Assembly Subtests, the
DAT Abstract Reasoning and Space Rela-
tions Subtests and the Grades of
Performance-Type Courses

Subtests	IAAWT-ANAL	WAIS-PC	WAIS-BD	WAIS-OA	DAT-AR	DAT-SR
WAIS-PC	.344*					
WAIS-BD	.069	***				
WAIS-OA	.084	***	***			
DAT-AR	.247	.242	.462**	.166		
DAT-SR	.333*	.175	.367*	.135	***	
PERF-GR	.503**	.236	.394*	.090	.580**	.641**

*Significant at the .05 level of significance
**Significant at the .01 level of significance
***Intercorrelations of these subtests were not
calculated

The IAAWT-Analogies subtest showed significant but
low correlations with the WAIS-Picture Completion and DAT-
Space Relations subtests. The DAT-Space Relations and the
WAIS-Block Design subtests also showed a significant but low
correlation. The above subtests were supposed to measure
performance related ability. The low correlations indicate
they do not measure the same type of performance ability. A
significant but low correlation was found between the WAIS-
Block Design subtest and Performance Grades. The WAIS-Block
Design subtest is not an accurate predictor of grades in
performance-type courses.

A substantial relationship was found between the DAT-Abstract Reasoning and WAIS-Block Design subtests. The correlation was high enough to indicate the subtests measure comparable abilities. Marked relationships were also found among Performance Grades and the IAAWT-Analogies, the DAT-Abstract Reasoning and the DAT-Space Relations subtests. The IAAWT-Analogies and DAT-AR and SR are adequate predictors of grades in performance-type courses.

Negligible relationships were found between the following subtests: the WAIS-Block Design and the IAAWT-Analogies, the WAIS-Object Assembly and the IAAWT-Analogies, the DAT-Abstract Reasoning and the IAAWT-Analogies, the DAT-Abstract Reasoning and the WAIS-Picture Completion, the DAT-Space Relations and the WAIS-Picture Completion, the WAIS-Object Assembly and the DAT-Space Relations. The above subtests indicate they do not measure the same types of performance abilities.

Indifferent relationships were obtained with Performance Grades and the WAIS-Picture Completion and WAIS-Object Assembly subtests. The subtests are not of valuable use in predicting achievement in performance-type courses.

Total Scores of All Instruments

Table 5 shows the correlation coefficients among the Total Score of the Industrial Arts Aptitude Woodworking Test (IAAWT-TOT), the Verbal Total (VT), Performance Total (PT), and Full Scale Total (FS) of the Wechsler Adult

Intelligence Scale, the Verbal Reasoning plus Numerical
Ability Total of the Differential Aptitude Tests (DAT VR + NA),
the Grades of Verbal-type courses (VERB-GR), the Grades of
Performance-type courses (PERF-GR) and Cumulative Grades
(ACC-GR). The group contains correlations among the totals
of each instrument and grade category.

Twenty out of twenty-two relationships were signi-
ficant at the .05 level on Table 5. Seventeen relationships
were also significant at the .01 level of confidence. Signi-
ficant relationships ranged from .755 (DAT-Verbal Reasoning
plus Numerical Ability Total and WAIS-Verbal Section Total)
to .364 (WAIS-Performance Total and Grades of Verbal-type
Courses).

On the basis of the data, the null hypothesis was
rejected except for two relationships. The relationships
were between the IAAWT Total and the WAIS Performance Total
and the IAAWT Total and Verbal Grades.

The WAIS-Performance Section Total revealed signi-
ficant but slight correlations with the DAT-Verbal Reasoning
plus Numerical Ability Total and the Grades of Verbal-type
Courses. The WAIS-Performance Total and the DAT VR + NA
Total do not appear to measure comparable abilities. The
WAIS Performance Total indicates it does not accurately
predict grades in verbal-type courses.

Table 5

Correlation Coefficients Among the IAAWT Total,
the WAIS Verbal, Performance and Full Scale
Totals, the DAT Verbal Reasoning plus
Numerical Ability Total, the Grades
of Verbal-Type Courses, the Grades
of Performance-Type Courses and
Cumulative Grades

TOTALS	IAAWT-TOT	WAIS-VT	WAIS-PT	WAIS-FS	DAT VR + NA	VERB-GR	PERF GR
WAIS-VT	.482**						
WAIS-PT	.241	***					
WAIS-FS	.465**	***	***				
DAT VR + NA	.466**	.755**	.365*	.707**			
VERB-GR	.289	.494**	.364*	.532**	.559**		
PERF-GR	.419**	.651**	.404**	.669**	.562**	***	
CUM-GR	.461**	.652II	.401*	.666**	.635**	***	***

*Significant at the .05 level of significance
**Significant at the .01 level of significance
***Intercorrelations between these test totals
and grades were not calculated

The IAAWT Total revealed marked relationships with
the WAIS Verbal Section Total, WAIS Full Scale Total, the
DAT Verbal Reasoning plus Numerical Ability Total, Perfor-
mance Grades and Cumulative Grades. The IAAWT Total measures
many of the same abilities as the WAIS Verbal Section Total
and WAIS Full Scale Total. The IAAWT Total is an accurate
indicator of total grades and grades in performance-type
courses.

The WAIS Verbal Section Total showed substantial relationships with grades in verbal-type courses, grades in performance-type courses and total grades. The WAIS Verbal Total is a valuable predictor of grades in all categories.

The WAIS Performance Section Total showed marked relationships with grades in performance-type courses and Cumulative Grades. The WAIS Performance Total adequately indicates achievement in performance-type courses and total courses.

The WAIS Full Scale Total and the DAT Verbal Reasoning plus Numerical Ability Total demonstrated substantial correlations with grades in all three categories. The two totals are reliable predictors of accomplishment in all high school courses.

The DAT Verbal Reasoning plus Numerical Ability Totals obtained high correlations with the WAIS Verbal Total and the WAIS Full Scale Total. A score obtained on the DAT VR + NA Total would give a high indication of achievement on the WAIS Verbal and Full Scale Totals.

The IAAWT Total did not produce significant correlations with the WAIS Performance Total and Verbal Grades. The IAAWT Total should not be used to predict achievement on the WAIS Performance Section or in verbal-type courses.

DAT Performance-Type Subtests and Totals

Table 6 shows the correlation coefficients among the Verbal Total (WAIS-VT), Performance Total (WAIS-PT)

and Full Scale Total (WAIS-FT) of the Wechsler Adult Intel-
ligence Scale, the Abstract Reasoning (DAT-AR) and Space
Relations (DAT-SR) Subtests of the Differential Aptitude
Tests and Cumulative Grades. The group consists of the
total of the IAAWT and the WAIS and DAT Subtests which are
supposed to measure performance-type abilities.

The data from Table 6 showed that eight relationships
out of a total of ten were significant at the .05 level of
confidence. Seven relationships were also significant at
the .01 level. Significant relationships ranged from a high
of .621 (DAT-Abstract Reasoning and the WAIS-Full Scale Total)
to a low of .385 (DAT-Space Relations and the WAIS-Performance
Total).

On the basis of the data, the null hypothesis was
rejected except for two relationships. The relationships
were between the IAAWT Total and the DAT Abstract Reasoning
and the IAAWT Total and the DAT Space Relations.

The WAIS-Performance Total and the DAT-Space Rela-
tions Subtest showed a significant but low correlation. The
correlation was not high enough to warrant the use of the
DAT-Space Relations as a WAIS-Performance Total surrogate.

The DAT-Abstract Reasoning subtest demonstrated sub-
stantial relationships with the WAIS-Verbal Total, Perfor-
mance Total, Full Scale Total and Cumulative Grades. The
DAT-Abstract Reasoning subtest appears to be a useful re-
placement for the Total Scores of the WAIS. The DAT-Abstract
Reasoning is a valuable predictor of total high school grades.

Table 6

Correlation Coefficients Among the IAAWT Total, the
WAIS Verbal Total, Performance Total and Full
Scale Total, the DAT Abstract Reasoning
and Space Relations Subtests and
Cumulative Grades

Subtests	DAT-AR	DAT-SR
IAAWT-TOT	.255	.269
WAIS-VT	.534**	.522**
WAIS-PT	.524**	.385*
WAIS-FT	.621**	.560**
CUM-GR	.580**	.641**

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

The DAT-Space Relations subtest showed marked rela-
tionships with the WAIS-Verbal, Full Scale Total and Cumu-
lative Grades. The WAIS-Verbal Total and Full Scale Total
appear to measure many of the same abilities as the DAT-
Space Relations. The DAT-Space Relations is an accurate
indicator of total grades in high school courses.

The IAAWT Total did not correlate significantly with
the DAT-Abstract Reasoning and Space Relations subtests. The
Total Score of the IAAWT would not be useful in predicting
scores on the DAT-Abstract Reasoning or Space Relations
subtests.

SUMMARY OF THE ANALYSIS OF THE DATA

The data from the preceding five tables produced the following quantitative analysis. Fifty-one relationships were significant at the .05 level of confidence out of a total of sixty-seven relationships examined (76.1 percent). Thirty-four relationships were significant at the .01 level (50.7 percent).

Table 2 contained vocabulary referenced subtests and verbal grades. The results showed that 83.3 percent of the relationships examined were significant at the .05 level of confidence.

Table 3 consisted of subtests which were supposed to measure verbal-type abilities and verbal grades. In this group, 83.3 percent of the relationships studied were significant at the .05 level.

Table 4 contained subtests that were supposed to measure performance-type abilities and the grades of performance-type courses. The table produced significant relationships in 48.8 percent of the cases.

Table 5 consisted of the analysis of the total scores of the IAAWT, the WAIS, the DAT, and the grades of Verbal, Performance and Total courses. In this group, 90 percent of the relationships examined were significant at the .05 level.

Table 6 contained the analysis of the Total Scores of the IAAWT and the WAIS and Cumulative Grades. This table

showed that 80 percent of the relationships studied were significant at the .05 level.

The IAAWT and its subtests showed significant relationships with 79 percent of the verbal-type factors in the study. The IAAWT demonstrated significance with 40 percent of the performance-type factors.

The WAIS and the DAT demonstrated significant correlations in 100 percent of their verbal-type subtests and totals, and in 50 percent of their performance-type subtests and totals. There were significant correlations in 78.9 percent of their combined subtests and totals.

The verbal subtests and totals of the WAIS showed significant correlations with verbal grades in 80 percent of the relationships studied. The performance subtests and totals of the WAIS showed significant correlations with performance grades in 50 percent of the cases.

The verbal subtests and totals of the DAT correlated significantly with verbal grades in 100 percent of the relationships examined. The performance-type subtests of the DAT showed significant relationships with performance grades in 100 percent of the cases studied.

Chapter 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

The measurement of aptitude has become an increasingly important task to business, industry and education in recent years. Tests have become almost synonymous with aptitude measurement in our school systems and prediction of job success in business and industry. The large quantity of tests available on the market today make it difficult for individuals responsible for the assessment of potential to choose instruments which will accurately assess talent in different areas. The problem of limited time also arises when the measurement of aptitude is involved. Ample time is needed to accurately assess an individual's strengths and weaknesses in different areas. Time for test administration is not always available or convenient.

With the above ideas in mind, it was believed that correlational studies among various selected tests from different fields would prove to yield valuable information for individuals involved in talent assessment. New tests correlated with more established instruments could help determine the usability and worth of the new tests. Correlational studies could help save time in test administration

and uncover talent in individuals which would not be detected
by other means.

The present study involved a correlational examination
among a newly developed vocational woodworking aptitude test,
a recognized intelligence test, a recognized general aptitude
test and high school grades. The instruments involved were
the Industrial Arts Aptitude Woodworking Test (IAAWT), the
Wechsler Adult Intelligence Scale (WAIS) and the Differen-
tial Aptitude Tests (DAT).

It was hypothesized that if the relationships among
selected subtests and totals of these three instruments
were studied, valuable information could be derived. The
relationships could be compared to achievement in the form
of grades. The selected subtests and totals of the three
instruments were grouped into five different categories so
that they could be studied more readily. Subtests which
were supposed to measure approximately the same abilities
were selected from each instrument and grouped together to
see if they produced significant relationships. Verbal sub-
tests were matched together and performance subtests were
examined together. Test totals were also grouped together
and examined. Grades were examined with certain selected
subtests and test totals.

Forty subjects were used in this study. They were
randomly selected from three educational institutions in the
Emporia, Kansas vicinity.

Twenty students were selected from the Flint Hills Area Vo-Tech School in Emporia, Kansas. These students were enrolled in a "Building Trades" program. The content of the program involved instruction in the skilled construction trades, namely carpentry, masonry, plumbing and electrical wiring. This group was the experimental group.

Ten students each were also selected from Olpe High School, Olpe, Kansas and Northern Heights High School, Allen, Kansas. These students were enrolled in a general or college preparatory program. They were the control group.

The three instruments were administered to the forty students and their high school grades were obtained. The grades were grouped into three categories: Verbal grades (i.e., English, History) and Performance grades (i.e., Shop, Physical Education) and Cumulative Grades. Grade point averages were then calculated for verbal, performance and total courses. Using the Pearson Product-Moment method, the correlations were then calculated for sixty-seven different relationships in five different groupings.

Results of the calculations showed that out of the sixty-seven relationships examined, fifty-one were significant at the .05 level (76.1 percent). Thirty-four relationships were significant at the .01 level (50 percent). The null hypothesis was rejected with exceptions in all five cases. There were significant relationships in all five groups.

The first group of factors consisted of subtests which were vocabulary referenced and verbal grades. Five out of six relationships were significant (83.3 percent).

The second group contained subtests that were supposed to measure other verbal-type abilities and verbal grades. Ten out of twelve relationships were significant (83.3 percent).

The third group contained subtests that were supposed to measure performance ability and performance grades. Eight out of seventeen relationships were significant in the group (48.8 percent).

The fourth group contained totals from all three instruments and all grade categories. Twenty out of twenty-two relationships were significant here (90 percent).

The last group contained the analysis of the total scores of the IAAWT and the WAIS, subtests of the DAT which measured performance ability and Cumulative Grades. Eight out of ten relationships were significant in this group (80 percent).

CONCLUSIONS

The IAAWT

There were a number of observations concerning the IAAWT in the present study. The relationships among the IAAWT's subtests and total with the WAIS and the DAT and their subtests and totals showed mixed results.

The IAAWT is an instrument designed to measure aptitude in the field of woodworking. Woodworking is a field which requires an individual to possess a substantial amount of performance-type skill. The subtests and total of the IAAWT showed substantially more and higher relationships with verbal-type subtests as opposed to performance-type subtests (74 percent to 40 percent). The IAAWT did not show a significant relationship with the WAIS Performance Total, WAIS Block Design, WAIS Object Assembly, the DAT Abstract Reasoning or the DAT Space Relations. It did, however, show a marked relationship to Performance Grades. The IAAWT Total Score was an adequate predictor of achievement in performance-type courses. The above findings led to the conclusion that the IAAWT measures different kinds of performance-type abilities than the performance-type abilities measured by the WAIS and the DAT. Only further study will help to find more conclusive results.

The IAAWT did show marked relationships with the WAIS Full Scale Total, the DAT VR + NA Total and to Cumulative Grades. The IAAWT Vocabulary subtests showed a moderate relationship to the WAIS Vocabulary subtest. The above facts lead to the conclusion that all three instruments (IAAWT, WAIS and DAT) contain the capacity to measure verbal-type abilities to a considerable degree. It appears that a test which requires reading and comprehension carries an inherent capacity to measure verbal-type abilities regardless of the

specific nature of the test. In this case, the specific field was woodworking.

The WAIS and the DAT

The present study showed the WAIS and the DAT to be interchangeable instruments to a high degree. The WAIS and the DAT showed significant relationships in 100 percent of their verbal-type subtests and totals and 50 percent of their performance-type subtests and totals. The results indicate that the WAIS and the DAT measure the same kind of verbal abilities. The results also show that their specific performance-type subtests measure slightly different abilities. The WAIS Full Scale Total and the DAT VR + NA Total showed a high degree of correlation (.707). This relationship is very important because the two totals are used extensively.

The WAIS Verbal Section Total was an adequate indicator of grades in verbal-type courses. The WAIS Performance Section Total was an excellent predictor of achievement in performance-type courses. The WAIS Full Scale Total was an excellent indicator of grades in all categories.

The DAT Verbal Reasoning plus Numerical Ability Total was an adequate predictor of grades in all categories. The DAT Abstract Reasoning and Space Relations subtests were excellent indicators of grades in performance-type courses.

There were a number of other interesting relationships between the WAIS and the DAT. The WAIS Arithmetic

and the DAT Numerical Ability showed a moderately significant relationship (.344), but not as high as expected for two subtests which are supposed to measure the same ability. This disparity may be explained by noting that there are two different methods for answering the numerical computation problems. In the WAIS Arithmetic, the subject is required to work the problems without the aid of pencil and paper. This requirement sometimes creates a psychological barrier against smooth administration. The DAT Numerical Problems are more complex, but the subject has the advantage of seeing the numbers in front of him and using his manipulative skills to solve the problems.

Lastly, the DAT Abstract Reasoning and the WAIS Block Design Subtests showed a marked relationship (.462). This would indicate that there is a substantial amount of the abstract thinking process taking place when trying to manipulate blocks to fit a certain pattern.

Significance With Other Studies

There were two direct bases for comparison between the present study and other conducted in the past. The first one concerns a study reported in Chapter 2, by Bennet. It involved 254 subjects who were given the DAT VR + NA and the Full Scale WAIS. The combined VR + NA scores correlated with the Full Scale WAIS yielded coefficients

ranging from .74 to .79.[1] The coefficient obtained measuring the same relationship in the present study was .707.

The second comparison is taken from Chapter 3, Table 1. In Table 1, the average reliability coefficients, mean scores and standard deviations of Form L of the DAT for 913 boys in grades eight through twelve were reported.[2] There were calculations made in the present study for mean scores and standard deviations for the DAT's VR, NA, VR + NA, AR and SR. The comparisons of the two studies are shown in the following table.

Table 7

Comparison of Mean Scores and Standard Deviations
Between A Study with 913 Boys and
A Study with 40 Boys

DAT Subtests	AV. MEAN		AV. SD	
	913 Boys	40 Boys	913 Boys	40 Boys
VR	25.3	26.1	9.8	10.4
NA	22.5	21.4	7.8	8.0
VR + NA	47.8	47.6	16.3	17.4
AR	32.0	36.1	9.6	5.6
SR	31.1	35.4	12.1	11.7

A comparison of the present study with the two previously stated investigations shows the results to be

[1]Bennet, p. 6-1.   [2]Ibid.

very similar. The size and scope of the previously men-
tioned investigations was much greater than the present
study. The results of the comparisons demonstrate that the
present study was conducted with at least a moderate degree
of scientific discipline.

Further comparisons to other studies can be made.
In Chapter 2, it was reported that correlations between
intelligence tests and vocational tests had mixed results.
Traxler reported, using 230 male subjects, a .417 correla-
tion between the American Council on Education Psychologi-
cal Exam and the Minnesota Paper Form Board Test. A .367
relationship was found between the American Council on
Education Psychological Exam and the Bennet Mechanical
Comprehension Test in the same study.[3]

Milne and others, using 202 boys and girls, found
little relationship between the Stienquest Mechanical Apti-
tude Test and the South African Group Intelligence Test.[4]
Lucio reported a significant relationship between the Army
Individual Test's performance component and the Mechanical
Interest category of the Kuder Preference Record.[5] The pre-
ceding findings can be compared to the .465 relationship
found between the IAAWT Total and the WAIS Total in the
present study. The total scores of the WAIS and the IAAWT

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[3]Traxler, pp. 42-43.

[4]Milne, pp. 131-140.

[5]Lucio, pp. 198-203.

demonstrate that they measure a considerable amount of the same abilities. The evidence seems to indicate that there is a moderate correlation between intelligence tests and written vocational tests.

Lastly, it was also reported in Chapter 2 that there was a lack of studies dealing with the comparison of WAIS Performance Subtests and DAT Performance-type Subtests. This task was undertaken in the present investigation. The relationships examined in the present study which fit the above description were between the WAIS Performance Total and the DAT Abstract Reasoning (.524) and the WAIS Performance Total and the DAT Space Relations (.385). The results indicate significant relationships, but further studies with more of the DAT Performance-type Subtests will have to be undertaken before any conclusions can be drawn.

RECOMMENDATIONS

For future research in this area, it is recommended that the IAAWT be examined with other more established vocationally oriented tests using much larger populations. It is a difficult task to judge the merits of a new instrument in a study such as this with its limited scope. Perhaps, if the IAAWT shows high degrees of relationship with other vocationally oriented instruments, the results of the present study can be interpreted differently. Regardless of the paucity of studies in the field, it was observed that

some valuable relationships have been found concerning the IAAWT in the present research effort.

Use of the DAT and the WAIS in further research in this area offers much promise. These two instruments have shown themselves to be flexible and comprehensive in their measurement of talent. Further studies between WAIS Performance Subtests and vocational tests are recommended. The work will also help clarify results found in the present study. It is recommended that a study be undertaken comparing the complete DAT to the Full Scale WAIS. Much valuable information could be derived from this.

Additional comparative investigations between performance-type subtests of the DAT and vocationally oriented instruments would provide important information. A recommendation to the authors of the DAT would be to somehow develop a total composite score of all DAT Tests to compliment the existing scores. A total score would make comparisons to other instruments much easier.

Lastly, a recommendation is offered to guidance counselors, personnel people and others who are responsible for selecting instruments to test individuals. It is important for these people to examine studies similar to this one. By taking extra time to investigate the research undertaken with different tests, instruments can be selected to fit appropriate needs. This process can also help to eliminate false and hasty conclusions. The final assessment

of an individual's talent is only as good as the instrument

used to measure it.

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APPENDIX

KEY TO TABLE 8

Factor Number	Factor Description
1	IAAWT Vocabulary
2	IAAWT Analogies
3	IAAWT Comprehension
4	IAAWT Total
5	WAIS Comprehension
6	WAIS Arithmetic
7	WAIS Similarities
8	WAIS Vocabulary
9	WAIS Verbal Total
10	WAIS Picture Completion
11	WAIS Block Design
12	WAIS Object Assembly
13	WAIS Performance Total
14	WAIS Full Scale Total
15	DAT Verbal Reasoning
16	DAT Numerical Ability
17	DAT Verbal Reasoning plus Numerical Ability Total
18	DAT Abstract Reasoning
19	DAT Space Relations
20	Verbal Grades
21	Performance Grades
22	Cumulative Grades

TABLE 8

CORRELATION COEFFICIENTS AMONG SUBTESTS AND TOTALS OF THE IAAWT, THE WAIS, AND THE DAT AND HIGH SCHOOL GRADES

	FACTORS		GRADES			DAT					WAIS									
			CG 22	PG 21	VG 20	SR 19	AR 18	VR + NA 17	NA 16	VR 15	FT 14	PT 13	OA 12	BD 11	PC 10	VT 9	VO 8	SIM 7	ARI 6	COM 5
D A T	SR	19	.641	.577	.573															
	AR	18	.580	.499	.517															
	VR + NA	17	.635	.562	.559															
	NA	16	.634	.515	.600															
	VR	15	.571	.540	.470															
W A I S	FULL TOT	14	.666	.669	.532	.560	.621	.707	.620	.701										
	PERF TOT	13	.401	.404	.364	.385	.524	.365	.268	.401										
	OBJ ASS	12	.090	.079	.233	.135	.166	.106	.054	.135										
	BL DES	11	.394	.282	.390	.367	.462	.331	.311	.312										
	PICT COMP	10	.236	.335	.028	.175	.242	.231	.118	.295										
	VERB TOT	9	.652	.651	.494	.522	.534	.755	.695	.724										
	VOCAB	8	.607	.618	.506	.502	.436	.653	.559	.658										
	SIMIL	7	.417	.392	.325	.333	.340	.588	.534	.568										
	ARITH	6	.255	.339	.107	.241	.339	.373	.382	.344										
	COMPRE	5	.461	.506	.487	.362	.371	.637	.609	.593										
I A A W T	TOTAL	4	.381	.419	.289	.269	.255	.466	.399	.470	.465	.241	.056	.122	.340	.482	.479	.371	.152	.465
	COMPRE	3	.381	.439	.210	.229	.348	.406	.351	.407	.418	.228	.087	.115	.220	.439	.395	.317	.265	.324
	ANAL	2	.503	.400	.350	.333	.247	.418	.385	.400	.379	.127	.084	.069	.344	.443	.400	.401	.017	.521
	VOCAB	1	.316	.260	.179	.144	.119	.354	.282	.374	.377	.258	.139	.123	.289	.338	.387	.208	.135	.327

A COEFFICIENT OF $\pm$ .312 IS NEEDED FOR SIGNIFICANCE AT THE .05 LEVEL.

A COEFFICIENT OF $\pm$ .403 IS NEEDED FOR SIGNIFICANCE AT THE .01 LEVEL.