CORRELATION OF STUDENT COMPETENCY ACHIEVEMENT TEST SCORES IN SELECTED OKLAHOMA VOCATIONAL PROGRAMS

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PREFACE

This study is concerned with administering the Student Occupational Competency Achievement Test, (SOCAT), and performing statistical correlation analysis on the test scores. The students were 1982 completers of selected vocational education programs offered in Oklahoma area schools.

SOCAT was designed to establish levels of occupational competency, based on industrial task analysis, needed for job placement. Competencies, indicated by test results, also have teaching effectiveness implications.

The author wishes to express his appreciation to his major adviser, Dr. Cecil W. Dugger, for his guidance and assistance throughout this study. Appreciation is also expressed to the other committee members, Dr. Lloyd L. Wiggins, Dr. Clyde B. Knight, and Dr. James Kenneth St. Clair, for their invaluable assistance.

This study is dedicated to my wife, Reba, and special gratitude is expressed to her and our sons, Bob, Charles and James for their understanding, encouragement, and sacrifices. A special thanks to Bob who transcribed, on audio cassette tape, more than 600 questions and answers used for study in preparation for qualifying exams; to Charles for his inspiring endless support and attitude of optimism; and to James for his computer assistance, who is now a t-test expert.

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CHAPTER I

INTRODUCTION

Vocational educators like other occupational educators have addressed themselves to almost every conceivable question in the field of education except the importance of setting standards of competence to be used for job qualification and placement.

Many fields in the business world have taken the initiative to certify levels of accomplishment; perhaps it is expedient for Vocational Educators to develop levels of competence for the various educational programs.

Oklahoma and the states of Alabama, Florida, Maryland, New Jersey, and Ohio formed a consortium effort to develop a competency testing program for graduates of vocational programs. This consortium effort is referred to as SOCAT, Student Occupational Competency Achievement Testing (8). The developed pilot performance test of the consortium was administered with a written achievement test provided by the Ohio Instructional Materials Laboratory. The administering agency of SOCAT is NOCTI, National Occupational Competency Testing Institute (19).

SOCAT is divided into three parts:

1. California Academic Aptitude Test (Short Form);
2. Written Examination (Ohio Vocational Achievement Test);
3. Performance Test.

Oklahoma was responsible for field testing seven program areas in 1980. The program areas were, electricity, heating and air conditioning, auto body repair, auto mechanics, machine trades, horticulture, and industrial electronics.

Welding, brick laying, general merchandising, and drafting were added to SOCAT in 1981.

Nature of the Problem

This study will involve the administering of the SOCAT in selected vocational education areas. Measuring student competencies will indicate the important factor ability of students to perform the tasks they will encounter on the job. During the past, competency measures of vocational education students has been left to the individual instructor.

There are three essential parts of a competence based education program, according to Oliver (11):

1. Specifying the job-related task in advance;
2. Providing instruction in the task; and,
3. Measuring and certifying that students can perform the task (p. 48).

Only the third essential part given above will be involved in this study. Therefore, the goal of this study is to equip vocational schools with a measure for decision making, assist in accountability, and to determine mastery of selected program areas listed in the study indicating job competency. Significant correlation between the written and performance test of SOCAT would strengthen the usefulness of SOCAT as a measure of mastery of selected vocational education programs.

Statement of the Problem

The SOCAT program has been established to develop and validate a series of vocational performance examinations. These examinations have been designed to be used with completers of selective vocational programs from secondary and post-secondary vocational schools. After validation, program statistical correlation studies were made between the written exam and the performance exam. Significant correlation would reinforce SOCAT, as a tool of mastery of a vocational program, and support efforts to develop students with skills and knowledge at standards acceptable to employers in business and industry. In the past determination of competency measures of vocational education students was left to the instructors. A more objective standard measure of student vocational competencies is needed.

Purpose of the Study

The purpose of this study is to determine statistical correlation between the written exam and the performance (skill) exam of SOCAT administered in Oklahoma. This study is based on the following premises:

1. Significant statistical correlation would indicate that either the written exam or the performance exam or both could be administered without affecting indication of mastery.

2. Significant statistical correlation would strengthen the usefulness of SOCAT as a tool in determining mastery of selected vocational programs.

3. Significant statistical correlation would equip schools with

a decision-making tool and accountability for selected vocational programs.

Mr. Robert Patton, Director of the SOCAT Project in Oklahoma, suggested that these correlation studies be conducted. A positive indication of these premises would provide a standard objective measure to secondary or post-secondary student achievement competency in selected vocational fields. Mr. Robert Patton is with the Oklahoma State Department of Vocational Technical Education.

Definition of Terms

For the purposes of this study, the following definitions of terms are used:

AACJC - American Association of Community and Junior Colleges.

AVA - American Vocational Association.

Achievement Test - A test designed to measure formal or school-taught learning.

AVTS - Area Vocational-Technical Schools.

Competency Based Education - A system of education which places high emphasis on the specification, learning, and demonstration of those competencies which are centrally important to the effective practicing of a given profession or career.

GATB - General Aptitude Test Battery.

NOCTI (National Occupational Competency Testing Institute) - The administering agency of SOCAT.

Performance Test - An examination providing an opportunity for the candidate to demonstrate his/her level of proficience in the manipulative skills and judgements essential to carry on the work

required in the occupation.

SOCAT (Student Occupational Competency Achievement Testing Program) - A consortium effort of five states; Oklahoma, Alabama, Florida, Maryland, and New Jersey to develop and field test competency achievement tests for vocational programs.

T & I Education (Trade and Industrial Education) - A division of the State Department of Vocational Education that comprises the trade and technical courses offered under Provision of Vocational Education.

Vocational Education - A means of acquiring the basic skills essential for equal competition in the business and industry arena.

Scope of the Study

This study will be limited to correlation of test scores of 1982 completers of selected Oklahoma vocational programs. The testing instrument was SOCAT.

Assumptions

It is assumed that SOCAT was validated and is a reliable competency measuring instrument. It is further assumed that reliable scoring procedures for performance exams have been developed (15).

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The purpose of this study is to determine Program Statistical Correlation of the Student Competency Achievement Test Battery Administered in Oklahoma. This chapter presents a review of literature related to the problem outlined in Chapter I.

The author was disappointed to learn that there is a lack of information about correlation studies of competency performance testing in vocational education. Vocational education, perhaps more than any other field of education, has been remiss in its responsibility for developing objective means of assessing student performance in the area of competency testing. To some extent, the evaluation process has been subjectively based instead of objectively based. During the past years vocational education instructors have looked for a more reliable and objective process of evaluating graduates of vocational programs.

The literature search included: ERIC search, published and unpublished dissertations, journals, books, and personal interviews.

The literature search is divided into three sections:

1. Historical background of occupational competency testing;
2. Test development process; and,

3. Concept of competency testing.

Historical Background and Concepts of Occupational Testing

The purpose of the historical background is not to provide a complete treatise on historical development of testing, but rather a listing of some of the more significant literature as it relates to competency testing.

A large portion of efforts in the development of occupational competency testing has been for the purpose of selecting prospective teachers. New York State was among the first to use competency tests, and has used them for several years. Reilly and Koenigsberg (15), in 1967-68, conducted a study to determine the reliability and validity of the written and performance test used in New York State to select candidates for teacher preparation in trade and industrial programs. This study was limited in that only three vocational programs were selected for investigation.

The literature on general achievement and aptitude testing is plentiful. However, early evaluation of occupational competency seems to attract attention only during periods of emergencies.

During World War I, an oral trade test was developed by the United States Army to more effectively classify personnel for the many army occupations (1). During the depression years, millions of unemployed persons needed occupational information. Efforts were made by the United States Employment Service to classify people according to certain skill levels in 150 trade areas.

World War II prompted the need for better evaluation instruments in addition to the oral trade test, which was improved. This limited measure of occupational competency was used almost exclusively during World War II by the United States Employment Service (12). While these tests fulfilled a need for mass screening of people wanting to enter one of the military trades, they were inadequate in measuring competencies. The Employment Service continued to use this question approach for the identification of training needs and job placement during the late forties, but this practice ended in 1947 with the development of other measures, such as the General Aptitude Test Battery (21). Perhaps this was the result of a widening belief, that there is a low relationship between knowledge of an occupation and the actual skill an individual must possess to carry out the more complex task of the job (20).

One of the most ambitious and successful undertakings in the field of standardized testing in vocational education, as it related to competency testing, was done by the Instructional Materials Laboratory of the Ohio State University. This undertaking originated in 1958 (1).

This project led to the formation of Ohio Trade and Industrial Education Services in 1966. The Ohio Trade and Industrial Education Services developed a series of achievement tests which now is a part of SOCAT.

In 1966, the United States Office of Education funded a project to develop a series of tests for post high school trade and technical education. Baldwin (1) was the chief investigator, and it was an effort between North Carolina State and the University of Illnois.

Both of these studies lacked correlation data between written and performance tests.

Reilly and Koenigsberg (15) utilizing proficiency exams currently in use in New York State, performed correlation studies between written and performance exams. The three most widely used exams--Auto Mechanics, Cosmetology, and Machine Shop, were selected for the investigation. The correlations were found to be very low, with .31 between the written and performance exams in Auto Mechanics, which was the highest. Although the correlation between written and performance exams was low, an important finding was that the interreliability of one of the performance tests was very high, indicating that it is possible to develop reliable scoring procedures for performance exams.

Three other efforts in the development of competence measures should be mentioned. These are:

1. National Occupational Competency Testing Institute (NOCTI);

2. The Vocational-Technical Education Consortium of States (V-TECS); and,

3. A joint project of the American Vocational Association and the American Association of Community and Junior Colleges.

Each of the three efforts is important as they relate to competency measures, but in three different aspects. However, each aspect plays an important role in the total competency testing in general.

NOCTI is intended to assist in the development, administration, and evaluation of written and performance test wherever occupational competency evaluation may be fundamental to employment, upgrading or promotion (12). This would include competency testing of trade

and industrial teachers for college credit or candidates for teacher training education programs (4).

V-TECS was formed in 1973 with the purpose of developing catalogs of performance objectives and criterion-referenced measures in occupational education. This endeavor addressed curriculum development (3).

The joint project between the AVA and AACJC relates to articulation of graduates from the fast-growing area vocational-technical school entering college. Occupational competency measures are a means of granting advanced credit toward associate degrees.

As indicated from the literature search, there are a number of good development projects of competency activities, but they are fragmented. There is, in fact, much work to be done in the whole area of competency testing and their uses. One such use, that has been somewhat overlooked, is suggested by Popham (14). He indicates there are some possibilities for using competency tests results in program evaluation. One possibility is to determine what is happening in several programs that teach and measure the same competencies. Normative data could be collected and comparisons made between students success on performance tests and their success on the job.

There are many other ways to use test results, but it is first necessary to perform a complete correlation analysis between and among all three tests of SOCAT.

These correlation studies are the basis of this research endeavor.

Test Development Process

Test development procedures will be limited to those procedures used in development of SOCAT performance test administered in Oklahoma.

National Occupational Competency Testing Institute lists the purpose of SOCAT as follows (13):

1. To provide an organization responsive to states' needs in articulating efforts in student occupational competency achievement testing across all vocational fields for completers of secondary and post-secondary curriculums in occupational specialities.

2. To establish the feasibility of developing and administering valid and time-stabilized written and performance measures that are (a) acceptable to the states, and (b) economically beneficial to apply.

3. To cooperatively pool financial, material, and human resources within the several states so that the end results are economically sound to test students in all vocational education curriculum.

4. To provide evidence based on student test results which may aid State Directors of Vocational Education (where a state so elects) with a basic tool for program assessment, leading to supervision for purposes of improving instructional effectiveness.

5. To provide continuous updating of written and performance measures based on current occupational analysis in support of vocational education efforts to develop students with skills and technology at standards acceptable to employers and labor (9, p. 10).

Student Occupational Competency Testing (SOCAT) was conceived in 1979, and by July, six State Directors of Vocational and Technical Education had affirmed their commitment to pool financial, material, and human resources in a common effort of performance test development. The state participants identified and agreed to develop and pilot test the performance tests as correlated with written achievement tests developed by the Ohio Instructional Materials Laboratory. Ten program

areas were identified. They are: Heating, Air Conditioning, Auto Body Repair, Auto Mechanics, Electricity, Drafting, General Merchandising, Horticulture, Electronics, and Welding. Oklahoma, under the direction of Robert Patton and Dr. Clyde Knight, developed performance tests for Construction Electricity and General Merchandising activities leading to field testing required one year for process development. The test development process summary and dates of events follows (9).

Representatives from the Ohio Curriculum Laboratories and NOCTI met on April 15, 1979 to work out several cooperative plans relating to SOCAT test development. On the same date a discussion with members of V-TECS was held requesting permission for use of their materials. Agreements were consummated with sub-consortium members on May 1, 1979.

Development of appropriate project guidelines ocurred on May 15, 1979, including role, function, actions needed, end products, and target dates. During the months of July and September, 1979, local test development plans with review functions were established.

Curriculum reviews, job and task identification, test item preparation, and drafting of preliminary tests occurred by October 30, 1979. Preparation of tests along with development of sampling design was complete by January 1, 1980. A review of progress by the planning committee was conducted January 15, 1980. Pilot test scheduling terms were determined.

Pilot testing took place in each member state by April 15, 1980. During May tests were scored, analyzed, and results prepared for the participants. June 1, 1980 the planning committee met to review progress, to discuss planning for new test development, and to

work out agreements for testing of modified exams to establish norms.

In Oklahoma, the following steps were used to develop the performance test:

1. Occupational areas were determined on which to work.

2. Curriculum materials were selected for each area covered.

3. Local instructors put together appropriate jobs with performance tasks, including criteria for both process and product outcomes.

4. Each task was assigned a weight on a five-point scale (5-25) depending upon the importance of the criterion in the occupation.

5. Each job had at least four process and four product measures.

6. The jobs and/or tasks were of such a nature that they can be tested in most school shops where the trade is taught.

7. A materials list and special setup instructions was prepared for each exam.

8. Each test contained at least three jobs.

9. Each job had a time limit based on what an average student should be able to complete.

10. Technical drawings, if needed, were included.

11. A committee of individuals competent in the occupation reviewed the material.

12. A small sample of students were given the jobs to complete as a pilot test.

13. Final drafts with support documentation were mailed to the Project Coordinator, NOCTI, 45 Colvin Avenue, Albany, New York 12206, January, 1980.

14. Drafts were edited, printed by NOCTI and reviewed by the

members of the Planning Committee.

15. A test design was worked out by NOCTI and implemented in each state and a pilot test given at least 300 students per title.

16. NOCTI prepared a set of norms, along with all necessary support materials for implementing a testing program.

17. Oklahoma administered the tests in April, 1980.

Similar field testing was conducted in consortium member states and information obtained through testing was used to establish levels of occupational competency for graduates in certain vocational areas.

Concepts of Competency Testing

Hornberger (6, p. 1) stated in a paper presented before the American Welding Society that, "lack of standardized programs results in more waste in vocational education than any other factor." Part of the answer for program standardization is found in competency based education. A major part of competency based education is competency testing.

A competency test requires an individual to perform a job-like task that is required of a skilled craftsman within an occupation according to industrial standards (12). Since tasks are an important part of competency testing, task analysis of an occupation or trade area must be done objectively, defining only those skills or tasks needed by industry and providing employability of graduates. Employability depends on several factors, one of utmost importance is the ability of graduates to perform the task they will encounter on the job. Here again, competency testing comes into play.

Why do vocational educators need competency measures? Competency testing is important because it helps to provide a systematic approach to instruction aimed at accountability, job-derived standards, and a feedback mechanism (16). This systematic approach to vocational education is accomplished through competency testing. Competency measures enable vocational educators and administrators to make informed judgments and decisions in four major areas. The four areas are competency, advanced standing, diagnostic concern and accrediation

One additional spin-off of competency testing is probably the most important but least recognized, and that is benefit to the students or graduates of vocational programs. The Ohio State Instructional Materials Laboratory lists three direct student benefits (19):

1. Test results provide information to teachers and counselors for job placement.
2. The teacher and student will have evaluative information concerning the student's ranking in local and state settings.
3. Students should obtain a better understanding of themselves and their potential (p. 5).

Occupational competency measures can help vocational students, parents, and vocational educators to achieve a sense of accomplishment. Acceptable measures of technical knowledge along with established competency performance levels should produce accountability and improvement in vocational education (5).

Summary

The purpose of competency testing is to determine whether graduates have required competencies for job placement. Competency testing is

also useful in certifying competencies to prospective employers. In addition, competencies, indicated by test results, have teaching effectiveness implications.

SOCAT has been designed to be used with completers of vocational programs in order to establish levels of occupational competency.

Although there is a lack of information found in literature regarding correlation studies of performance testing, hopefully this study will be successful and will enlarge and reinforce the whole competency based education concept.

CHAPTER III

METHODOLOGY

Introduction

The purpose of this study was to determine program statistical correlation of the Student Occupational Competency Achievement Test scores in selected Oklahoma vocational programs. To achieve the purpose of this study, five steps were followed. Those were:

1. Review of literature.
2. Field test procedures.
3. Collection of data.
4. Analysis of data.
5. Forming conclusions and recommendations.

Research Questions

The following research questions were formulated to provide a focus for the systematic investigation of correlation studies of competency testing:

1. What are some problems that may be encountered in performance testing?
2. Is it possible to differentiate between a person's knowledge of an occupation and the actual skill an individual must possess in the performance of the job tasks?
3. How are performance test results used?

Review of the Literature

The first phase of this study was to conduct a selected review of literature research in the areas of:

1. Competency based education.
2. Trade and industrial education and vocational education as each relates to competency testing.
3. Equivalence test and performance testing.
4. National and state competency testing activities.

The review of literature provided a historical background of competency testing and many suggestions as to competence test development process, applications, statistical methods, and many ideas used in this study.

Field Test Procedure

Oklahoma administered eleven test areas which are as follows:

1. Construction Electricity.
2. Heating and Air Conditioning.
3. Auto Body.
4. Auto Mechanics.
5. Machine Trades.
6. General Office Clerk.
7. Industrial Electronics.
8. Welding.
9. Small Engine Repair.
10. Drafting.
11. Horticulture.

A total of sixty students were tested within each test area. The test was divided into three parts. Part one was the California Aptitude Test, requiring 45 minutes to complete. Part two was the written exam requiring five hours to complete. Part three was the performance test requiring three hours to complete except the machine trades test which required four hours to complete.

The performance tests were set up by the host school and a representative of the State Department of Vocational and Technical Education. The Performance tests were scored by the host school instructor and the instructors from the participating school.

All paper work related to the field test was completed and returned to the State Department of Vocational and Technical Education, Division of Curriculum and Instruction. NOCTI graded the test and returned to each participating school a student report which illustrated achievement in the areas of aptitude, written examination and skill performance. The report computed norm/mean score in each area by school and compared schools with the state mean/norm.

Collection of Data

The SOCAT battery was conducted during April, 1982, with 16 area vocational-technical schools participating. Five area vocational-technical schools hosted other schools involved in the testing program. The host schools were:

1. Great Plains Area Vocational-Technical School, Lawton, Oklahoma.

2. Indian Meridian Area Vocational-Technical School, Stillwater, Oklahoma.

3. Southern Oklahoma Area Vocational-Technical School, Ardmore, Oklahoma.

4. Canadian Valley Area Vocational-Technical School, El Reno, Oklahoma.

5. Central Area Vocational-Technical School, Drumright, Oklahoma.

Each host school had a supervisor that coordinated all local aspects of the testing program with the State Department of Vocational-Technical Education, Stillwater, Oklahoma. The host school was also the testing site.

Students, taking a certain vocational program test, would meet at the host school on a prearranged date for testing.

Test security was of utmost importance at all times, in order to protect the validity of the tests.

The host school coordinator was available during the administration of the tests to handle unexpected problems.

After testing was complete and upon receipt of test materials from the examiners, the following procedure was observed:

1. Checked materials received from test examiners with those issued to each examiner. Resolved any discrepancies immediately.

2. Checked to be sure that a Performance Evaluation Worksheet for each student who took a performance test was included.

3. Indicated all materials being returned on the packing list.

4. Stored all used and unused materials as they were returned to the supervisor and are checked, sealed in cartons and put in a locked cabinet.

All testing material was returned within 24 hours following the

completion of testing to:

Mr. Ray Rinderer
Instructional Materials Laboratory
Trade and Industrial Education
The Ohio State University
1885 Neil Avenue
Columbus, Ohio

As test results became available, dissemination of printouts were received by the state coordinator. The state coordinator for SOCAT mailed test results to all participating schools.

Statistics Performed

Programs used in this study were divided into two groups. Group I, bench type programs including general office clerk, electronics, electricity, drafting, and heating and air conditioning. Group II consisted of heavy industrial type programs, welding, auto body repair, auto mechanics, machine shop, and small engine repair.

Test scores from the administered aptitude, written, and performance tests of the SOCAT test were arranged for correlation studies.

The following Pearson "r" correlation studies were made:

Set 1 Aptitude/Written

Set 2 Written/Performance

Set 3 Aptitude/Performance

The statistical hypothesis used for the Pearson "r" correlations studies was stated as a null hypothesis. The observations are drawn from a population in which the correlation between the variables is zerowas the general hypothesis. There are three specific hypotheses.

1. In the population being sampled, the correlation between the

scores on the aptitude test and scores on the written test is zero.

2. In the population being sampled, the correlation between the scores on the written test and scores on the performance test is zero.

3. In the population being sampled, the correlation between the scores on the aptitude test and scores on the performance test is zero.

T-test determination of variance was performed on test sets 1, 2, and 3. Statistical hypothesis for the t-test was stated as a null hypothesis concerning differences. The general hypothesis was: The sample means were drawn from populations having the same means. The three specific hypotheses were:

1. The mean of the test scores for both the aptitude and written tests were drawn from populations having the same means.

2. The mean of the test scores for both the written and performance tests were drawn from populations having the same means.

3. The mean test scores for both the aptitude and performance tests were drawn from populations having the same means.

Analysis of variance was performed on the aptitude, written, and performance test. The hypothesis was:

There was no significant differences among the means of achievement scores of graduates taking the aptitude, written, and performance tests and the population means from which they were drawn.

Analysis of data, using descriptive statistics, was based upon the research questions, serving as the focus for this investigation.

CHAPTER IV

ANALYSIS OF DATA

Introduction

The SOCAT consortium[1] is currently made up of the states of Oklahoma, New Jersey, Florida, and Maryland. Listed on the next page in Table I by test titles, are the number of students tested in Oklahoma during 1982.

Ten test titles from programs offered at Canadian Valley Area Vocational-Technical School were selected for statistical studies. The ten program areas are: drafting, auto body repair, auto mechanics, construction electricity, general office clerk, heating and air conditioning, industrial electronics, small engine repair, welding and machine trades.

SOCAT consists of two parts--written and performance. A mental aptitude test is available for administration if those utilizing SOCAT request it.

Correlation studies, Pearson "r", were made between the written and performance, written and aptitude, performance and aptitude tests.

Correlated t-test was also run on each of the above test groupings.

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[1] Alabama and Ohio, original member of the SOCAT withdrew from the consortium effort.

TABLE I

TEST TITLES AND THE NUMBER
OF STUDENTS TAKING
EACH TEST

	Test Titles	Number of Students
1.	Accounting/Bookkeeping	37
2.	Agriculture Mechanic	34
3.	Auto Body Repair	94
4.	Auto Mechanic	129
5.	Bricklaying	55
6.	Construction Electricity	82
7.	General Merchandising	46
8.	General Office Clerk	221
9.	Heating and Air Conditioning	68
10.	Industrial Electronics	40
11.	Machine Trades	88
12.	Printing	58
13.	Small Engine Repair	20
14.	Welding	123
15.	Fashion Construction Services	11
16.	Horticulture	10
17.	Radio and TV Repair	8
18.	Drafting	52
	Total	1,176

Analysis of variance was performed on the aptitude test, written test and performance test.

Random samples, from each selected test, were obtained by computer for all statistical calculations.

Description of Subjects

SOCAT was designed to be used with completers of a particular occupational curriculum from secondary and post-secondary schools.

The subjects are completers of occupational programs from thirteen area vocational-technical schools throughout Oklahoma. The area schools and locations are listed in Table II.

The completers graduated from one of the area vocational-technical schools in May, 1982. Each completer attended the training program for two years, except completers of the general office clerk program, which is a one-year program.

Description of Data

Each vocational test examines the student to establish a completer level of occupational competency in representative job of an occupation.

> The examinations, both written and performance, are based on occupational and task analysis and a determination of critical job competencies required by employers of beginning workers in each occupation, coupled with the judgment of skilled workers and instructors of the occupation (10, p. 31).

The completer's skill was determined by using jobs and tasks that would be expected of an entry-level worker. Knowledge of the occupation was obtained by administering a multiple choice test of items based on each occupation. Tests were rated by an experienced examiner, an

TABLE II

AREA VOCATIONAL-TECHNICAL SCHOOLS
AND LOCATION OF COMPLETERS

Area School	Location
Great Plains AVTS	Lawton, Oklahoma
Caddo-Kiowa AVTS	Fort Cobb, Oklahoma
Red River AVTS	Duncan, Oklahoma
Burns Flat AVTS	Burns Flat, Oklahoma
Indian Meridian AVTS	Stillwater, Oklahoma
Pioneer AVTS	Ponca City, Oklahoma
Southern Oklahoma AVTS	Ardmore, Oklahoma
Kiamichi AVTS	Hugo, Oklahoma
Central Tech AVTS	Drumright, Oklahoma
Tri County AVTS	Bartlesville, Oklahoma
Indian Capital AVTS	Muskogee, Oklahoma
Canadian Valley AVTS	El Reno, Oklahoma
Moore-Norman AVTS	Moore, Oklahoma

instructor in the occupation and an advisory committee member.

Test scores from completers of each participating area schools were assigned numbers by program areas. Numbers were randomly selected, using a computer, and the corresponding test scores used for statistical analysis.

The program areas and number of subjects selected are listed in Table III.

Analysis of Data

Pearson "r" Correlations

Not only does Pearson "r" describe a mathematical relationship between pairs of scores, it can also be used to make inferences regarding the amount of relationship between two variables (2). This can be done by establishing confidence intervals using table values of "r" for the .05 and .01 levels of significance.

Pearson "r" was obtained for each program area studied, for Aptitude/Written, Written/Performance, and Aptitude/Performance test sets.

Correlation data for general office clerk is given in Table IV. The calculated Pearson "r" for the Aptitude/Written test for the program general office clerk was .72. Table values of "r" at the .05 and .01 levels of significance are 0.279 and 0.361 respectively. The degrees of freedom is 48. The degrees of freedom is equal to N-2, where N = the number of pairs of scores. Since the calculated "r" of .72 is larger than confidence intervals established by table values of "r" at the .05 and .01 levels of significance, it can be concluded that

TABLE III

PROGRAM COMPLETERS AND NUMBERS
RANDOMLY SELECTED

Program	Completers Taking Test	Completers Randomly Selected
Drafting	52	30
Auto Mechanics	129	50
Electricity	82	30
Auto Body	94	30
Heating and Air Conditioning	68	30
Machine Trades	70	30
Business and Office	217	50
Electronics	40	30
Welding	123	30
Small Engine Repair	20	17
Total	895	327

TABLE IV

GENERAL OFFICE CLERK CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	.72	.52	.279	.361	48
Written/Performance	.448	.20	.279	.361	48
Aptitude/Performance	.530	.28	.279	.361	48

"r" is not zero, therefore the null hypothesis was not accepted. There is a significant relationship between the Written/Aptitude test scores. From these calculations, the relationship would occur, by sampling error alone, less than one percent of the time.

The calculated "r" for the Written/Performance was 0.448. Table values of "r" at the .05 and .01 levels are 0.279. and 0.361 respectively. Since the calculated "r" .45 is greater than the table values of "r", a significant relationship exists at the .01 level of significance.

Correlation between the Aptitude/Performance is also significant since the calculated "r", 0.530, is greater than the table values.

General Office Clerk is the only program that has significant correlation at both the .05 and .01 levels of significance for all three test sets.

Calculated "r" for Aptitude/Written was 0.638, Written/Performance 0.212, and Aptitude/Performance 0.017, as reported in Table V. Table values of "r" were 0.316 and 0.463 at the .05 and .01 level of significance. The degrees of freedom were 28.

Since "r" for the Aptitude/Written test for the electricity program is larger than the confidence levels established by table values of "r" at the .05 and .01 levels of significance, it can be concluded that a relationship exists. The null hypothesis was not accepted and the true "r" is some value other than zero. No significant correlation is present between the other two test sets, therefore the null hypothesis was accepted.

Pearson "r" correlation data for the drafting tests are reported in Table VI. The calculated "r" for the Aptitude/Written and the Aptitude/

TABLE V

ELECTRICITY CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	.638	.41	.361	.463	28
Written/Performance	.212	.04	.361	.463	28
Aptitude/Performance	.017	.0002	.361	.463	28

TABLE VI

DRAFTING CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	.51	.26	.361	.463	28
Written/Performance	.36	.13	.361	.463	28
Aptitude/Performance	.63	.39	.361	.463	28

Performance tests were greater than the table values of "r" at both the .05 and .01 levels of significance. Calculations, based on the confidence levels established by table values of "r" were significant indicating the true "r" was not zero, therefore the null hypothesis was not accepted.

The Written/Performance tests are significant only at the .05 level of significance indicating a relationship.

As reported in Table VII the only significant correlation of tests administered in the Electronics program is between the Aptitude/Written test. Calculated Pearson "r" is 0.435, which is greater than table values of "r" (.361) at the .05 level of significance. Therefore, the true "r" is significantly different from zero and there is a relationship between the Aptitude test and the Written test.

Two test sets, Aptitude/Written and Aptitude/Performance, indicate significant correlations. The Aptitude/Written is significant at both the .05 and .01 levels of confidence of "r". There is a relationship between the Aptitude and Written test, therefore the null hypothesis that the population correlation equals zero was not accepted.

Heating and Air Conditioning correlation data are reported in Table VIII. Significant correlation between the Aptitude and performance occurs only at the .05 level of significance, indicating a relationship betwen the aptitude and performance test scores.

As observed in Table IX the calculated "r" (0.489) is larger than the confidence intervals established by the table values of "r" at the .05 and .01 levels of significance. It can be concluded that a relationship exists between the Aptitude/Written test score for auto mechanics. There is also a relationship at the .05 level of significance for the

TABLE VII

ELECTRONIC CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	.44	.31	.361	.463	28
Written/Performance	.36	.13	.361	.463	28
Aptitude/Performance	.63	.39	.361	.463	28

TABLE VIII

HEATING AND AIR CONDITIONING CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	.56	.31	.361	.463	28
Written/Performance	.13	.02	.361	.463	28
Aptitude/Performance	.38	.14	.361	.463	28

TABLE IX

AUTO MECHANICS CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	0.48	.24	0.279	0.361	48
Written/Performance	0.35	.12	0.279	0.361	48
Aptitude/Performance	0.07	.006	0.279	0.361	48

Written/Performance test. Therefore, the null hypothesis for both of the auto mechanics tests was not accepted, since the calculated "r" has a greater value than the table value of "r". The means of the population "r" is therefore significantly different from zero.

Information listed in Table X indicated the Apritude/Written was the only test of the Machine Shop set that indicates a significant correlation. The calculated Pearson "r", .466, is greater than the table values of "r" at both the .05 and .01 levels of significance. Therefore, the null hypothesis for this test was not accepted. No significant relationship exists between the other Machine Shop test sets.

Data listed in Table XI describes two test sets for welding, Aptitude/Written and Written/Performance, at the .05 level of significance indicate significant correlation. (It is merely a coincidence that both calculated Pearson"r" are the same for the two test sets.) It can be concluded that there is a significant relationship between the tests, since the calculated "r" is greater than the confidence intervals established by table values of "r" at the .05 level of significance. The null hypothesis was not accepted. The population mean is some value other than zero.

Table XII reports information that significant correlation was obtained for two auto body test sets, Apritude/Written, at the .05 level, and Aptitude/Performance at both the .05 and .01 level of significance. Calculated "r" of 4.84 was greater than table values of "r" indicating a significant relationship between the Aptitude/Performance test.

Significant correlation was obtained between the Aptitude/Written at the .05 level.

As has been stated earlier, the number of students taking the small

TABLE X

MACHINE TRADES CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	0.46	.22	0.361	0.463	28
Written/Performance	0.33	.11	0.361	0.463	28
Aptitude/Performance	0.24	.06	0.361	0.463	28

TABLE XI

WELDING CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	0.46	.21	0.361	0.463	28
Written/Performance	0.46	.21	0.361	0.463	28
Aptitude/Performance	0.16	.02	0.361	0.463	28

TABLE XII

AUTO BODY CORRELATION DATA

Test	Pearson "r"	r^2	Table Value of "r" .05	.01	df
Aptitude/Written	0.39	.15	0.361	0.463	28
Written/Performance	0.21	.04	0.361	0.463	28
Aptitude/Performance	0.48	.23	0.361	0.463	28

engine repair SOCAT were not sufficient to perform a valid correlation study. There was one test described in Table XIII, Written/Performance, that indicated a correlation at the .05 level of significance. According to literature Bartz (2) indicates that confidence intervals should be avoided if the sample size is less than 30. The sample size for the test that indicated correlation was 10. Sample size less than 30 tends to distort the shape of the normal curve and the sampling distribution of "r" would provide non-normal confidence intervals.

T-Test Data

Tables XIV, XV and XVI contain t test data for the written/performance aptitude/written and aptitude/performance SOCAT test data.

The t test data from all programs indicated that the differences between the written and performance tests are significant. Since the calculated t values at the .05 level is greater than table values of t all null hypotheses were not accepted. The statistical conclusion suggests that if these observations were drawn from populations having the same means, means as different as these would occur less than 5 percent of the time by chance. Therefore the author concludes that the written and performance tests measure two different essence of vocational knowledge.

Four programs, from the aptitude/written tests, after application of the t statistic indicated that the differences between their means were not significant. For these four programs the null hypotheses was accepted. The four programs were machine trades, welding, auto body,

TABLE XIII

SMALL ENGINE REPAIR CORRELATION DATA

Test	Pearson "r"	r^2	Table of Value of "r" .05	.01	df
Aptitude/Written	0.17	.031	.482	.707	8
Written/Performance	0.52	.270	.482	.707	8
Aptitude/Performance	0.11	.014	.482	.707	8

TABLE XIV

WRITTEN/PERFORMANCE T TEST DATA AT THE .05 LEVEL OF SIGNIFICANCE

Program	$Mean_w$	$Mean_p$	t Value Cal.	Table	Standard Error	df
General Office Clerk	58.54	81.78	11.227	2.009	2.070	49
Electricity	52.57	77.00	7.576	2.045	3.220	29
Drafting	75.16	54.43	4.376	2.045	4.737	29
Electronics	42.36	78.16	15.500	2.045	2.310	
Heating and Air Conditioning	49.90	66.23	5.353	2.045	3.050	29
Auto Mechanics	56.58	67.90	3.519	2.009	3.216	49
Machine Trades	59.93	78.10	5.785	2.045	3.139	29
Welding	55.06	76.13	8.076	2.045	2.608	29
Auto Body	51.73	80.10	9.360	2.045	3.030	29
Small Engine Repair	52.09	69.27	3.240	2.228	5.302	10

TABLE XV

APTITUDE/WRITTEN T TEST DATA AT THE
.05 LEVEL OF SIGNIFICANCE

Program	$Mean_w$	$Mean_p$	t Value Cal.	t Value Table	Standard Error	df
General Office	66.68	58.54	3.046	2.009	2.360	29
Electricity	67.53	52.57	4.452	2.045	3.361	29
Drafting	63.23	75.16	3.316	2.045	3.601	29
Electronics	78.16	42.36	12.79	2.045	2.790	29
Heating and Air Conditioning	67.66	49.90	5.90	2.045	2.991	29
Auto Mechanics	64.70	56.58	3.453	2.009	2.350	49
Machine Trades	63.40	59.93	1.033	2.045	3.350	29
Welding	59.70	55.06	1.542	2.045	3.001	29
Auto Body	57.00	51.73	1.681	2.045	3.130	29
Small Engine Repair	58.94	53.53	1.210	2.120	4.480	16

TABLE XVI

APTITUDE/PERFORMANCE T TEST DATA AT THE
.05 LEVEL OF SIGNIFICANCE

Program	$Mean_a$	$Mean_p$	t Values Cal.	t Values Table	Standard Error	df
General Office Clerk	66.68	81.76	5.893	2.009	2.561	49
Electricity	67.53	77.00	2.567	2.045	3.690	29
Drafting	63.23	54.43	1.867	2.045	4.713	29
Electronics	78.16	78.16	0	2.045	2.37	29
Heating and Air Conditioning	67.66	66.23	0.431	2.045	3.32	29
Auto Mechanics	64.70	67.90	0.893	2.009	3.58	49
Machine Trades	63.40	78.10	4.241	2.045	3.466	29
Welding	59.70	76.13	5.838	2.045	2.810	29
Auto Body	57.00	80.10	6.952	2.045	3.321	29
Small Engine Repair	61.12	71.12	1.686	2.365	5.93	7

and small engine repair. They make up four of the five programs in treatment Group II.

It can therefore be concluded the means of the aptitude test and written test are similar and the score data have a limited predictive value. A strength-of-association measure was calculated.

According to Table XVI the aptitude/performance t test data indicated that five programs had no significant differences between their means. The programs were drafting, electronics, heating and air conditioning, auto mechanics, and small engine repair. For these programs the null hypothesis was accepted. A general conclusion would be that persons receiving a high score on the aptitude test would tend to perform well on the job. A strength-of-association measure was calculated.

CHAPTER V

SUMMARY, FINDINGS, AND CONCLUSIONS

Introduction

The general purpose of this study was to determine if a significant relationship between a written achievement test and a skill performance test in a selected vocational program exists.

Three types of stastical measures were used in the study - Pearson "r", t test, and ANOVA. Based on the results of the number and magnitude of significant measures obtained in this study, it can be concluded that a student's knowledge of a trade area or job is different from the performance of the job skill in an industrial environment. They are two different aspects of vocational competency.

Only four programs in both the Written/Performance and Aptitude/Performance indicated significant correlation. Nine programs in the Aptitude/Written test set had a significant relationship. Refer to Table XVIII for more detailed information. The correlation tends to reinforce the correlation studies done by Reilly and Koenigsburg (15). They found the correlation between the Written/Performance for auto mechanics to be 0.31. This study found the correlation to be .354. Considering a simple relationship betwen the Written/Performance, a correlation of 0.354 would be low. However, if one establishes confidence intervals using table values of "r", there would be a significant

inference regarding the amount of relationships. Strength-of-association calculations were made.

Calculations

Strength-of-association measures were calculated for all treatments that indicated a significant relationship.

Four programs in the aptitude/written test set with application of the t statistic indicated a relationship. The programs are machine trades, welding, auto body, and small engine repair.

The computational formula used is:

$$\eta^2 = \frac{t^2}{t^2 + df}$$

η^2 = eta squared

t = calculated t values

df = degrees of freedom

Machine trades calculation is:

$$\eta^2 = \frac{(1.033)^2}{(1.033)^2 + 29} = \frac{1.067}{1.067 + 29} = \frac{1.067}{30.067} = .035.$$

an acceptable strength-of-association value is .75 as compared to welding $\eta^2 = .075$, auto body $\eta^2 = .088$ and small engine repair $\eta^2 = .083$. Therefore the relationship obtained by the t test statistic was very weak.

Two different strength-of-association measures were used for the ANOVA statistic eta squared and omega squared. Association measures about the variables are indicated by using eta squared. For associations in the population omega squared is used.

The computational formula is:

$$\eta^2 = \frac{SS_x}{SS_{Total}} \quad \text{and}$$

$$\omega_A^2 = \frac{SS_A - (df_A)(MS_{error})}{MS_{error} + SS_{total}}$$

The calculated values for the strength-of-association for small engine repair are $\eta^2 = .24$ and $\omega^2 = .16$ respectively.

Measuring association strengths for Pearson "r" was determined by the coefficient of determination. This measure was calculated by squaring "r", the correlation coefficient. These values are found in tables under r^2, in Chapter IV.

Conclusions

The general purpose of this study was to determine if a significant relationship between a written achievement test and a skill performance test in selected vocational program exists. A significant correlation would indicate that a high score on a written test would actually predict a student's successful performance in an industrial job environment.

The predictive application of "r" can be obtained by establishing confidence intervals based on standard error of estimate, s_E. The formula for calculating the standard error of estimate is $s_E = S_y\sqrt{1-r^2}$.

s_E = standard error of estimate in predicting y variable from x variable.

S_y = standard deviation of the y variable distribution.

r = Pearson correlation coefficient between x and y.

For accuracy in predicting, it is necessary for the confidence interval about y variable be as small as possible, which means that s_E must be as small as possible (2). Standard error of estimate,

s_E, is a function of the size of "r". When "r" is 1.00, s_E is zero and there is no error in predicting y from x. As "r" gets smaller s_E gets larger and predicting accuracy is reduced. It is then obvious that the larger the value of "r" the predicting accuracy increases.

Confidence intervals can be calculated but they are available in most standard statistic texts as values of "r" at .05 and .01 levels of significance.

Four programs listed in Table XVII, in the Written/Performance test set, indicated a significant relationship according to confidence intervals established on table values. There were two programs from each test group. Group I, General Office Clerk, "r", 0.448 and Drafting, "r", 0.354. The "r" value indicates low to moderate correlation between the Written/Performance tests for the four programs. Six programs indicated no correlation at either the .05 or .01 levels of significance.

Since the "r" values for the four programs were low to moderate and only four programs, of ten studied, indicated significant relationship. It can be concluded the accuracy of prediction would be low. Another conclusion that could be made would indicate there is a difference between a student's knowledge of an occupation and the skills required to perform the job in an industrial environment.

Correlation between Aptitude/Written followed an accepted established relationship. The "r" values are somewhat lower than expected, however, they are in the moderate to strong range. All programs in Group I indicated a significant correlation, at .05 level, or higher, using confidence intervals established by table values or "r".

TABLE XVII

PROGRAMS INDICATING A SIGNIFICANT
PEARSON "r" RELATIONSHIP

Test type/Program	Pearson "r"	r^2	Significance	Group
Written/Performance				
General Office Clerk	.45	.200	$p < .01$	I
Drafting	.36	.130	$p < .05$	I
Welding	.46	.213	$p < .05$	II
Auto Mechanics	.35	.125	$p < .05$	II
Aptitude/Written				
General Office Clerk	.72	.52	$p < .01$	I
Electricity	.64	.41	$p < .01$	I
Heating and Air Conditioning	.56	.31	$p < .01$	I
Drafting	.51	.26	$p < .01$	I
Electronics	.44	.19	$p < .05$	I
Auto Mechanics	.49	.24	$p < .01$	II
Machine Shop	.47	.22	$p < .01$	II
Welding	.46	.21	$p < 95$	II
Auto Body	.39	.15	$p < 95$	II
Aptitude/Written				
Drafting	.53	.28	$p < .01$	I
General Office Clerk	.53	.28	$p < .01$	I
Auto Body	.48	.23	$p < .01$	II
Heating and Air Conditioning	.38	.14	$p < .05$	I

Four programs in Group II indicated a significant relationship in the low to moderate values of "r" at the .05 level of significance. Small engine repair did not indicate a significant relationship. This could have been because of the small number of students that took the small engine repair SOCAT test.

Only four programs indicated a significant correlation in the Aptitude/Performance test set. Group I, had three programs with a significant relationship and Group II, had one program. The "r" values were on the average higher than the "r" values in the Written/ Performance test set, indicating the possibility of a greater relationship between the Aptitude/Performance than Written/Performance of a student's vocational skills.

Research question number two states: Is it possible to differentiate between a person's knowledge of his/her job field and his/her skill in the execution of the job? Based on the results of the number and magnitude of significant "r" values obtained in this study, it can be concluded that a student's knowledge of a trade area or job is different from the performance of the job skill in an industrial environment. They are two different aspects of vocational competency and achievement.

Analysis of variance (ANOVA) was determined using scores from the aptitude, written, and performance tests. Variance is a measure of variability for the mean. Only one program, small engine repair, indicated a significant relationship at the .05 level.

The null hypothesis, as stated in Chapter III, there is no significant difference among the means of achievement scores of graduates taking

the aptitude, written, and performance test was not rejected. The calculated F-ratio. 3.36, was less than the table value, 3.47 at the .05 level (refer to Table XVIII). It can be concluded that the probability is less than .05 the result happened by sampling error and the means are similar. It should be noted that only eight students were involved in this part of the study. Therefore, the basic conclusion based on the other nine programs indicating no relationship, the variability of the means of the three tests are large and the differences are questionable.

How are performance test results used? That is research question number three. The purpose of a performance test, as related to occupational education, is to be used with completers of vocational programs to establish job skills or competencies required in an industrial environment. This study is based on three premises as listed on page three. Premise number one states: significant statistical correlation would indicate that either the written exam or the performance exam, or both, could be administered without affecting indication of mastery. The conclusion, based on this study, is that the premise is false and competency testing used for job readiness must consist of administering both a written and performance test. The same conclusion is obtained for premise numbers two and three when considering mastery and accountability of selected vocational programs.

The Pearson "r" correlations that were found to be significant, based on calculated strength-of-association measures were very weak. Therefore, the correlations have little predictive value.

The low values of eta squared and omega squared, the two strength of association measures used, suggests that both the variables and

TABLE XVIII

ANOVA DATA AT .05 LEVEL OF SIGNIFICANCE

Program	$Mean_a$	$Mean_w$	$Mean_p$	F Ratio Value Cal.	Table	df
General Office Clerk	66.68	58.54	81.76	44.110	3.07	2,144
Electricity	67.53	52.57	77.00	24.909	3.14	2,87
Drafting	62.46	74.16	55.84	8.081	3.14	2,87
Electronics	78.16	42.16	78.14	136.36	3.14	2,87
Heating and Air Conditioning	67.66	49.90	66.23	19.92	3.14	2,87
Auto Mechanics	64.70	56.77	68.02	6.640	3.07	2,145
Machine Trades	61.16	59.93	76.06	15.489	3.14	2,87
Welding	58.80	55.06	76.13	33.81	3.15	2,86
Auto Body	57.00	51.73	80.10	45.490	3.14	2,87
Small Engine Repair	61.12	53.87	71.87	3.36	3.47	2,21

population were biased. This could be explained by the fact that vocational students are not good subjects, as far as the equal chance of random selection from the total population. Also the low value of η^2 and ω^2 would tend to have a weak effect that one variable would influence the other, in the samples that have been studied. Therefore, any relationship found would be weak. This would tend to support the idea that a persons knowledge of an occupation is different from knowledge and skills needed to perform a job task in an industrial environment.

It is the opinion of the author, as stated above, industrial input is needed in development of vocational programs that prepare students for actual jobs that exist in industry. Application of the triad model, as described in the recommendations, would provide the necessary industry/institution relationship that would increase the correlation between the Written/Performance and reinforce utilization of competency testing.

Recommendations

The author believes the low correlations found in the study was due to inadequate industrial input, developed in the training program, of actual job competencies as performed in an industrial setting. It has been my experience, after working with industry for 25 years, that it is difficult to obtain actual job tasks required for particular occupation. This is not because industry does not want to release the information, but rather, it is just not a simple activity. Another problem, in obtaining job tasks, is the difficulty in surveying the

proper people in industry. Therefore, there are two approaches that would help solve the problem with competency testing:

1. Develop a new competency testing system where real industrial input is obtained. The training program should be based on jobs performed in the specific industry.

2. Analyze SOCAT and re-evaluate the type and amount of industrial input that was used in the test development. Make any corrections that are necessary.

It is further recommended, after either of the above has been completed, that new correlations studies be conducted.

Another cause of low correlations obtained by this study is the reliability of the scoring procedures for the performance section of the SOCAT test.

The literature, (15), indicated it is possible to develop reliable scoring procedures. This study suggests that the scoring procedure used with SOCAT should be evaluated to determine any problem areas.

The Triad Relationship

It is the opinion of the author the correlation found in this study, between the Written/Performance test is due to the difference between the subject matter taught in the classroom and the performance portion of the training program. This difference could be due to the lack of current industrial input. This is a major problem with competency testing as it relates to vocational education. This addresses research question number one in Chapter III. Research question one states: What are some problems that may be encountered in performance testing? There should be a strong relationship between

the theory and performance part of the training program as each relates to the industry the program is attempting to serve, the premise being that each program must be developed by a joint effort between industry and the training program. It is the belief of the author if occupational educators would really develop training programs based on true industrial needs, a significant correlation would exist between the Written/Performance test and program improvement would be apparent. This cooperation forms what the author calls a Triad Relationship. The Triad Relationship is demonstrated pictorially by Figure I on the following page. Each arm of the Triad is held together by occupational education.

Job competencies required by actual jobs in industry can only be taught when the curriculum of the occupational education program is a joint product of the training institution and the industry it serves. Industry, the base of the triad, must communicate to occupational education planners specific competencies or skills and knowledge that graduates of programs must possess to be successful workers in industry. Curriculum restructuring, especially during today's high-tech explosion, should be complimentary to industrial changes.

Productivity in industry is a by-product of this triad relationship in that competent workers in industry will produce more goods and services. The circle, representing occupational education, is tangent to each side of the triangle forming the industrial triad. The point of tangency is significant in that a common relationship of dependency is established with each component of the triad, (industry, job competencies, and productivity).

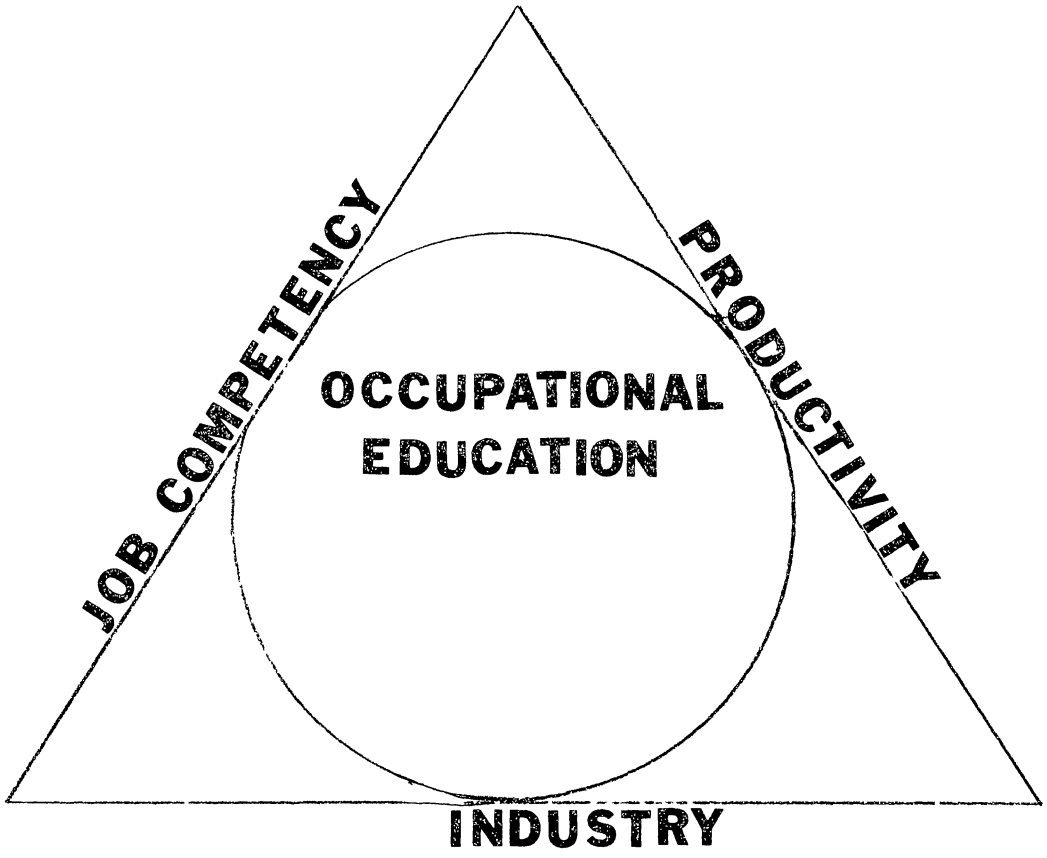

Figure 1. The Triad Relationship

Another problem encountered with competency testing is instructor update. In occupational education programs that are products of the training institution/industry, it is necessary for the instructors to maintain a constant update of technology change occuring in industry related to the trade area being served. Instructors update is complimentary to industry input needed in developing occupational education programs. Both have a direct relationship to competency testing and tend to bring about a correlation between theory and performance--Written/Performance test correlation.

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VITA 2

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Professional Organizations: American Vocational Association, Oklahoma Vocational Association, Oklahoma Council of Local Administrators, Association for Supervision and Curriculum Development.

United States Patents: Production of Dinonylnaphthalene Sulfonates, Number 3,075,005. Process for preparing Dialkylnaphthalene, Number 3,076,857. White oil stabilizing treatment, Number 3,110,664. Production of Dialkylnaphthalenes, Number 3,083,243.