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ABSTRACT

In the past a person with 12 years of work experience in an occupational skill to be taught was considered more desirable than a person with six years. The question of whether there is a correlation between the length of occupational experience as a valid indicator of the quality of the teacher is examined. There are two ways whereby a person with an occupational skill can become a vocational-industrial teacher: the traditional four-year baccalaureate program, and the certification program. Data were collected on the selected personal, professional, and academic characteristics of 63 students enrolled in the Penn State baccalaureate program, 129 students in the certificate program, 28 certificate holders, and 23 baccalaureate graduates. The procedures used in this study are described: the selection of population and sample, investigation of the characteristics, and data collection and computer analysis. Conclusions regarding the differences in the two programs are discussed. Research indicates that the number of years of occupational experience has little effect on the outcome of the trade competency examination and that the results of the trade competency examination cannot be used as a predictor for teaching or academic success. References and the format used are appended. (EC)

THE PENNSYLVANIA STATE UNIVERSITY

DEPARTMENT OF VOCATIONAL EDUCATION

VOCATIONAL–INDUSTRIAL TEACHER EDUCATION AT THE PENNSYLVANIA STATE UNIVERSITY: AN EXAMINATION OF PROGRAM AND STUDENT CHARACTERISTICS

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BUREAU OF VOCATIONAL, TECHNICAL AND CONTINUING EDUCATION

VOCATIONAL – TECHNICAL EDUCATION **Research Report**

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STUDY IMPLICATIONS

This study along with other studies reported herein have broad implications for vocational teacher preparation. From the beginning vocational educators gave great emphasis to work experience as that activity which develops the occupational skill to be taught. A minimum of two years of occupational experience past the learning period or equivalent to approximately six years of work experience is presently required prior to taking the trade competency examination and entering the teaching field. We have in the past considered a person with twelve years of experience more desirable than a person with six years, and a person with eighteen years as having even greater occupational competency.

Traditionally, new vocational teachers are placed on the teacher pay scale according to his years of occupational experience, usually one additional year on the pay scale for each two years of occupational experience. This in fact says a person with eighteen years experience is valued much more than a person with a minimum of six years. This study, along with others reported addressing this issue indicates that this may not be true. Research does not prove that the more occupational experience, the better the teacher.

Research also indicates that the number of years of occupational experience has little effect on the outcome of the trade competency examination. Several studies reported herein point out that after six to eight years of occupational experience the additional years had little positive effect, and if anything, they may have a negative factor. This study shows that the results of the trade

competency examination cannot be used as a predictor for teaching or academic success. This does not suggest that the test is valueless, but it is of little value except to determine occupational competency.

Traditionally, vocational teachers have been recruited from industry and provided in-service education to aid them in reaching a minimum of 60 credits for permanent certification. This study points out that the baccalaureate degree route (134 credits) takes less time than the certificate route. The baccalaureate route enables the Department of Vocational Education at The Pennsylvania State University to have vocational teachers prepared at an earlier age to enter the teaching field. This study indicates that these teachers have from 12 to 18 years longer professional life because of their earlier entrance age. When comparing fully certified teachers, the baccalaureate route provides twice the professional life. This study also concluded that the age and years of working experience past the minimum has little, if any, effect on academic achievement in vocational subjects as well as all university subjects.

To date there have been no studies which follow the graduates of the two programs into professional life to determine if one is more successful than the other. Yet the Kapes-Pawlowski study reported did definitely conclude that the teacher characteristic which was favorably tied with student success was the number of college credits of the teacher. The more college credits the better his or her student did on the Ohio Trade Achievement Test. Thus, it would follow logically that the B.S. degree teachers will prepare a higher skilled high school graduate.

One factor not brought out by this study but nevertheless a fact, the B.S. degree student is not subsidized by less expensive v-credits as the part-time certificate student. Thus, it costs the state less to prepare the full-time baccalaureate student than does the part-time certificate student. Coupled with the 12 or more years professional life the cost-benefit ratio swings strongly in favor of the B.S. degree graduate. The implications of this study strongly suggest that the baccalaureate approach be expanded and encouraged as the prime source of future vocational teachers, not only for the cost-benefit factor but to develop a younger better prepared teacher who will provide many more years of professional service to this state. The research reported herein strongly indicates that the B.S. degree graduate offers many advantages over the certification program. However, this should not rule out the certificate program, there will always be areas which we cannot prepare vocational teachers at the rate in which they are needed or in the areas in which there is an immediate need. This study indicates less emphasis in the future should be placed on the certificate approach and more concern given to the development of a strong baccalaureate program.

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I. FOUNDATION FOR THE INVESTIGATION

Historical Perspective

After winning its independence, our country established a free general education for all citizens. The primary purpose for this development was the feeling of the leadership that for the people to govern themselves, they must have a sound basic general education. According to Stiles, McCleary, and Turnbaugh (1962), this education was called for by George Washington, John Adams, and James Madison; however, there was no great support for it by the public. In the generation following the revolution, while support for a public education improved, it was felt that an elementary schooling was sufficient. Any education beyond the elementary level was considered a personal matter. In time the successful completion of a basic education became compulsory for all members of society, and a matter for the state and local governments to control.

As our young nation grew and society changed, so did the educational needs and aspirations of its citizens. Students planning to continue their education beyond the public schools required more than a basic elementary education, and as time progressed there developed a greater demand for education beyond the secondary level. At about the same time a gradual decline started in apprenticeship programs, on-the-job training, and the passing of skills from father-to-son. Evans (1971) maintained that vocational instruction was discontinued for most young people in the early nineteenth century due to the decline of apprenticeships. Thus, there was now a new void for

educational institutions to fill; namely, vocational training. Along with this new void a complementary need was created for the training of the teachers for these vocational skills.

Some entrepreneurs were able to identify this developing need for vocational training in its early stages and took steps to meet its demand. In 1824 the first distinct and separate post-secondary technical school, the Rennsselaer Polytechnic Institute, was founded for the preparation of teachers in the area of applied husbandry, manufacturing, and domestic affairs (Brubaker and Rudy, 1958). A few years later in 1827, according to Fulton (1969), the first business proprietary school was established by Benjamin Franklin Foster. Consequently, post-secondary vocational institutions were formally created.

In 1862 occupational education gained great momentum through the passing of the Morrill Act, which called for federal aid to support agricultural and mechanical, and land grant colleges. Shortly thereafter in 1865 the technical colleges experienced another milestone in the establishment of the Massachusetts Institute of Technology for the training of prospective engineers and technicians (Brubaker and Rudy, 1958). By the end of the century the technical schools had a foot hold in the educational structure. This was evidenced in a report by the Office of Education (1902) where it professed that by 1900 there were forty-two technological institutes in the United States. These new institutions gave education a much different definition as the nation started into the 1900's than it had in the early 1800's.

In response to these evidences of the need for the training of occupational skills, an evolution in the offerings of the public

schools began to appear. Support for this was observed in the passing of the 1917 Smith-Hughes Act, which allocated federal money specifically, for the promotion of educational programs in agriculture, home economics, trade and industrial education, and the preparation of teachers for these areas. With this act the federal government not only provided assistance to these occupational areas, but also allowed for self-perpetuation through support for the preparation of the teachers of these occupations.

As our country moved further into the 1900's; our society went into an accelerated period of industrial growth, a financial crisis and a war which led to a technical revolution. Probably in no other comparable short period of time, except possibly when the wheel was invented, has there been such an upheaval throughout man's way of life. An effect of this transformation was the more specific divergence of the public school curriculum into three areas: academic, vocational, and general. In the vocational area the skills to be taught for numerous occupations became more complex.

In more recent times our nation entered an era which may be termed the automation-computer revolution and space age. Needless to say our educational system is again feeling the vibrations from changes taking place in society. Today most jobs that are plentiful require a specialized training. Lessinger (1971) points out that, in the past, education produced only satisfied customers since jobs were plentiful and the dissatisfied students left school without complaint. Hence, in order not to have a society composed of dissatisfied former customers, vocational educators must be concerned about the occupational abilities of all of their students when they choose to terminate their educational

endeavors. On the other hand Byers (1973) discussed another matter deserving the educator's attention. This issue is the fulfillment of the full potential of our students. He feels that to be the major challenge for educators in the seventies.

Introduction to the Study

Vocational educators have a two-pronged responsibility. One is not more important than the other, but both must receive equal concern. On the one side of the fork is the requirement for vocational teachers who know their occupational skills well enough to insure that their students can learn the necessary skills for a job. The other prong on the fork requires vocational educators to be competent teachers, and to be able to assist with the overall development of the students.

Such a two-pronged outcome must be achieved through an educational program with a proper balance between these two areas. It follows therefore that requirements for admission to a teacher training program must expect an appropriate knowledge and background in the skill to be taught, and the teacher certification or baccalaureate program of study must include those courses needed to provide the necessary information on pedagogical matters and the processes of human development.

In order to determine whether a balance exists, it is necessary to study the structure of each prong and its relationships to the other. This assessment of the educational program, requirements, students, and graduates must be of a continuing nature in order for teacher training institutions to change with society and not after it.

Barlow (1967) advocated in a national seminar, that no matter how good of a pattern exists in any area of vocational teacher education, it "has to suffer some change" (p.13). Without a constant and consistent eye on vocational teacher education programs, they cannot be expected to perpetuate the fulfillment of needs in our society as was first established by the Smith-Hughes Act of 1917 or any later legislative enactments.

Statement of the Problem

Background

The Department of Vocational Education at The Pennsylvania State University offers two options whereby a person with an occupational skill may become a vocational-industrial teacher. The one alternative is the traditional four year baccalaureate program. Entrance into this degree program requires the meeting of established university admission standards plus appropriate occupational experience as set forth by the vocational education department. In addition, as a prerequisite for observation and practice teaching, a trade competency exam must be passed by the future teacher prior to his senior year.

The other route for one to become a vocational-industrial teacher is via a certification program. Experience in an occupational skill along with the passing of a trade competency exam is required for admission into what is termed as a Vocational Education I certificate program. This first certificate is earned upon the successful completion of 18 credits, and grants provisional teaching certification to the holder. The teacher with a Vocational Education I certificate must then continue his studies for a Vocational Education II certificate.

The second certificate requires a total of 60 credits, or 42 credits beyond the first certificate, and after three years of successful teaching provides the holder with permanent certification. A certificate holder may continue his or her studies for other specialized certificates or a baccalaureate degree.

The Problem

This study was concerned with the current and former vocational teacher education students in the Department of Vocational Education at The Pennsylvania State University. The current and former students were subdivided for the study into four groups, which were: 1) current students in the Vocational Education II program, 2) current baccalaureate students, 3) holders of the Vocational Education II certificate, and 4) graduates of the baccalaureate degree program.

The inquiries revolved around selected personal, professional, and academic characteristics of the students, certificate holders, and graduates. In looking at these characteristics from several perspectives, the study sought to establish any relevant information about them and their inter-relationships. The data involved in the study were analyzed and then reviewed to form recommendations for the improvement of the teacher training program of study or to support those aspects of the program already in effect. In this regard the study sought answers to the following:

1. What characteristics should a vocational education department look for in prospective students?
2. Do the two vocational teacher education programs and their students exhibit any significant difference?

3. Do the student performances in the required areas of study in the academic program exhibit any group or sub-group significant differences?
4. What are the implications of the years of occupational experience and the performances in the trade competency exam for vocational education students?

In conducting this study, the data was collected and recorded on computer format sheets. A computer process was used for the various analyses of the variables. Thus as a fulfillment of a secondary purpose of the study; the data tape, formats, and computer process was submitted to the Department of Vocational Education for future comparisons.

Description of Variables

The background and achievement variables collected on the students and graduates were as follows:

1. The program of study in which the student is currently enrolled or had completed (certificate students, certificate holders, baccalaureate students, and baccalaureate graduates).
2. Birth date.
3. The number of years of occupational experience in their area of specialization.
4. The present grade point average for current students.
5. The grade point average upon the completion of their program for baccalaureate or certificate graduates.
6. The predicted grade point average for current baccalaureate students and baccalaureate graduates.

7. The date of admission or initial enrollment in The Pennsylvania State University courses.
8. The date of program completion for graduates and certificate holders.
9. The percentage score received on the written and performance portions of the trade competency exam, and their average score.
10. The course number, grade, number of credits and academic area for each course completed either successfully or unsuccessfully.

Questions Posed

In addition to seeking descriptive information on the current and former students, the investigation consisted of the following specific questions:

1. Is there a significant difference in the academic performances in the two teacher preparation programs of study with regard to the certificate students, the holders of the Vocational Education II certificate, the baccalaureate students, and the baccalaureate graduates?
2. Are there any differences in the academic performances among the academic areas for the following groups:
   a. students in the Vocational Education II certificate program?
   b. students in the baccalaureate program?
   c. holders of the Vocational Education II certificate?

d. graduates of the baccalaureate program?

e. all students and former students in the study?

3. What is the relationship between academic performance and the number of years of trade experience?
4. What is the relationship between academic performance and the trade competency exam scores?
5. What is the relationship between the academic performances for the certificate and baccalaureate students and their age?
6. What is the relationship between the predicted grade point average utilized for the admission of students into the baccalaureate program and the actual grade point average of the four year students, and final all university average of the baccalaureate graduates?
7. What is the relationship between the years of occupational experience and the time taken to complete either the baccalaureate degree or certificate program?
8. What is the relationship between occupational experience and the average score of the two portions of the trade competency exam?
9. What is the relationship between the written and performance scores of the trade competency exam?

Definition of Terms

Some of the terms in this study have a specific connotation with regard to the data represented. A definition of these terms and their restrictions are given here to provide proper interpretation.

Academic Area: The academic areas in the study correspond to the course requirements of the Department of Vocational Education. All of the courses taken by the current and former students were given one of five possible classifications, which were: 1) industrial education, 2) liberal arts, 3) science and math, 4) professional education not including industrial education courses, and 5) miscellaneous courses not included in the above four categories.

Age: In this study only the ages of the current certificate and baccalaureate students were calculated. Thus age is the chronological years of age for the current students at the time of data collection.

Baccalaureate Graduate: A person who received a bachelors degree in vocational education since July 1, 1969 was included as a graduate of the baccalaureate program.

Baccalaureate Student: Only those students who had declared a vocational education major in the baccalaureate program were considered a baccalaureate student. The baccalaureate student group was limited to those students in their sophomore, junior or senior years; or with over 30 credits toward the four year degree.

Certificate Holder: A person was classified as a certificate holder if he received a Vocational Education II certificate or had successfully completed 60 credits in the certificate program since July 1, 1969. If a person received a Vocational Educational II certificate and either enrolled in the baccalaureate program or received a bachelors degree, he was accounted for as a baccalaureate student or graduate and not as a certificate student. If a certificate holder continued his studies for another certificate, only the 60

credits successfully completed for the Vocational Education II certificate were used in the data.

Certificate Student: The certificate students in this study were composed of students who had received a Vocational Education I certificate or who had successfully taken 18 credits or more in the vocational education certificate program, and were currently enrolled in the Vocational Education II program.

Current Student: Owing to the not uncommon interruptions in the programs of study for students in the vocational-industrial teacher education programs, a person was considered a current student if he had taken a course in the seven terms prior to the Spring Term 1974.

Date of Admission: The date that the student began taking courses toward his degree or certificate was considered as the date of admission. This allowed an accurate accounting of time in a program of study. The official date of admission, which is the date of program declaration, was in most cases not relevant for this study.

Grade Point Average: The grade point average, or all university average, concerned the most recent grade point average for current students. The grade point average for the baccalaureate graduates and certificate holders was computed at the time they completed their program of study.

Predicted Grade Point Average: The grade point average predicted by The Pennsylvania State University for a student is calculated only for those individuals admitted directly into the four year baccalaureate program. Thus students who were enrolled in extension courses and declared a baccalaureate degree after taking several courses did not have a predicted average. In a few cases involving students admitted

via an educational opportunity program into the four year degree program, no predicted average was calculated. The predicted grade point average used was the average predicted for the non-science area from the high school rank and the sum of the college boards.

Trade Competency Exam: The trade or occupational competency exam is a state wide exam which had to be taken and passed prior to completing the certificate program and by baccalaureate students before the student teaching practicum. Passage via an evaluation of credentials was made for those occupations for which no exam was available or for which a state license was issued. The exams consisted of a written portion and a performance test. The percentage score was recorded for each test as well as an average of the two percentage scores.

Work Experience: The years of occupational experience was calculated for each student at the time he began his course work in his program of study. Fractions of years were rounded to whole numbers with one-half or more of a year of work experience rounded up to the next whole number. The basis for the calculation of the years of work experience was on the reported years by the student on a data card filled out at the time the first industrial education course was taken. In those cases where an industrial education course was not the first course taken or the student began his courses prior to the time when the data cards were utilized, the number of years of work experience was adjusted accordingly.

II. REVIEW OF RELATED LITERATURE

Introduction

The review of the literature was conducted from two separate points of reference. Since this study concerned only undergraduates in the Department of Vocational Education at The Pennsylvania State University; one aspect of the literature search investigated the related research or portions of related research conducted solely within the Department of Vocational Education at The Pennsylvania State University plus those studies which sampled vocational educators in the state of Pennsylvania. This section of the review also looked for singular studies in other departments of vocational education in the nation for comparisons on data, analysis, and study procedures.

The other aspect of the review focused on the heretofore described variables of the study. Specifically, this portion of the survey concentrated on written material concerning descriptive features of vocational teacher education students, occupational experience, occupational evaluation programs, and academic programs of study for vocational teachers.

In the following review, some studies were repeated in terms of the relevance of the information to the topic under discussion. This reporting procedure was followed to allow a full comparison of all of the material surveyed.

The review of the literature encompassed relevant written material found in books, journals, periodicals, dissertations, and

unpublished papers. Only the relevant information found in these writings was reported.

Previous Studies in the Department of Vocational Education at The Pennsylvania State University

While there had been studies conducted on the vocational education program in its early stages at The Pennsylvania State University, the literature search began with a self-evaluation study of the department in 1964. This self-study was considered the first contemporary study since it was conducted shortly after the department was established as it essentially exists today in the University structure. However, the data from this, and the second study to be reported in this section, began in 1944. Thus, some of the information reported in this survey has been considered a reference base for this investigation.

In the self-evaluation study Brandon (1964) reported a total of 268 enrollees in the trade and industrial courses in 1964. This enrollment was composed of seven students in the undergraduate baccalaureate program and 204 persons in certificate programs. Brandon also found that of the 268 enrollees in 1964, the students had a median age of 39 years with a median of 16 years trade experience. At the same time he determined that there were a total of 81 bachelor degrees awarded from 1944 to 1963.

Shortly after the self-evaluation was made, another study was conducted on the occupational competency evaluation program in the department. Then, as today, the question as to the relevance and the

method of the measurement of occupational competency was a crucial concern. This, of course, is also a major consideration in this study.

In the comprehensive study of the occupational competency evaluation program at The Pennsylvania State University, Impellitteri (1965) gathered data on the evaluations made at the University from May 26, 1944 to March 20, 1965. There were a total of 718 persons who had taken the trade competency exams over this period of time. The examinees had an average I.Q. (as per the Otis Self-Administering Test of Mental Ability) of 107, an average age of 37 years, and a mean of 12.5 years of industrial experience. In an analysis of the written and performance tests for 609 individuals, the scores for the performance exams had a mean of 81.62% with a standard deviation of 9.45 while the written exam had a mean of 79.41% with a standard deviation of 10.37.

The correlations found by Impellitteri on some of the variables in the study are presented in Table 1. As a result of the correlation between the two exams, he concluded that the performance and written tests were independent measures but with a sufficient common variance to contend that they were in the same achievement battery. Owing to the absence of a correlation between occupational experience and the performance test, he felt there was no support for the supposition that individuals with more years of industrial experience have a tendency to score higher on the performance test than those with fewer years of occupational experience. At the same time the negative correlation between work experience and the written test indicated that those with lesser years of work experience scored higher on the written portion than those with more years of experience. It is interesting also to note from Table 1 that all of the correlations

between the three background variables and the test scores were essentially not significantly different from zero except for the correlation of -0.15 between the written scores and the years of experience.

Table 1

CORRELATIONS BETWEEN RELATED VARIABLES
IN THE IMPELLITTERI STUDY (1965)

Variables (N=714)	2	3	4	5
1. Performance Score	0.46*	-0.05	0.04	-0.01
2. Written Score	---	-0.05	-0.05	-0.15*
3. Otis I.Q.		---	-0.16*	0.20*
4. Age			---	0.61*
5. Years of Experience				---

*Probability of a chance departure from zero is less than 0.01.

As a result of the above relationships regarding years of work experience and scores on the tests, Impellitteri divided the group into two parts. He placed those people with less than ten years of trade experience into sub-group I and those with over ten years experience into sub-group II. A correlation was then calculated for the two sub-groups with regard to their performances on the two parts of the occupational competency exam as shown in Table 2. He did not feel the results of these correlations indicated anything other than meager evidence that sub-group I performed better than sub-group II.

Table 2

CORRELATIONS BETWEEN OCCUPATION EVALUATION EXAMINATIONS AND YEARS OF OCCUPATIONAL EXPERIENCE IN THE IMPELLITTERI STUDY (1965)

Variables	Total (N=714)	Sub-Group I (N=333)	Sub-Group II (N=331)
Years of Experience and Performance	-0.01	0.05	-0.06
Years of Experience and Written	-0.15**	-0.02	-0.12*

*Probability of a chance departure from zero is less than 0.05.

**Probability of a chance departure from zero is less than 0.01.

In his final analysis Impellitteri concluded that the number of years of work experience for a person was not indicative of his or her success on the written or performance tests on the occupational competency examination. In addition he felt that "no positive statement could be made in determining the value of the current occupational competency evaluation program at Penn State" (p.1).

Another study with related information about the department was conducted a few years later by Detwiler (1967). In this investigation he surveyed all students enrolled in Industrial Education courses at The Pennsylvania State University in the Spring Term of 1967. There were a total of 320 students surveyed with 265 responding or 82.81%. There were 227 students in the adjunct certificate program, six in the baccalaureate degree program, and 32 in graduate studies. As a part of this study he found that the respondents had a median age of 38.3 years with a median of 12.37 years of occupational experience. In addition

it was determined that 101 of the students had taken the occupational competency exam while 164 had not.

A number of years later another study was conducted in the department with regard to occupational experience and the occupational competency exams. This investigation by McAlister (1973) was conducted in cooperation with the Bureau of Vocational-Technical and Continuing Education of the Commonwealth of Pennsylvania. The research centered around 27 different occupations in the vocational-technical area; however, those occupations with less than three people who successfully completed the occupational competency program were excluded. Hence, a total of 376 people who successfully completed the occupational competency program administered at The Pennsylvania State University from 1962 to 1972 were included in the data. McAlister found that the 376 persons had a mean of 15 and a median of 14 years of occupational experience. McAlister reported that she found no correlation between the successful completion of the exams and the number of years of occupational trade experience.

Related Studies Conducted in the State of Pennsylvania

Since the major portion of the subjects in this investigation were residents of the State of Pennsylvania, the literature search looked separately at any of the studies made solely on Pennsylvania vocational education personnel. This search focused on the variables, study procedures, and resulting conclusions of the literature review.

Of the two studies located in this review, one was conducted by Rumpf (1954) on the methods used in selecting vocational teachers

for employment in Pennsylvania. The data for this study were collected on shop teachers from 73% of the school districts in Pennsylvania that conducted vocational education programs. Of the total of 236 teachers surveyed; 20 had masters degrees, 24 had bachelors degrees, 174 held the standard certificate (Vocational Education II), one held a temporary standard certificate (Vocational Education I), and 17 were using an emergency certificate.

Rumpf reported the median age of the teachers to be 45.41 years. The average number of years of work experience in an occupational trade was found to be 12. With regard to college credits earned by the teachers, the median number was 50 with a mean number of 70.97 and a range of 8 to 236 credits. Seventy of the teachers never took the trade competency exam inasmuch as they were teaching prior to the time the exam was required.

One of the major features of Rumpf's study was the comparison of the years of trade experience to teaching effectiveness. The effectiveness of the teacher was determined via a sophisticated process performed by the local administrator. Essentially effectiveness was based on the teacher's performances, background characteristics, attitude, and professional preparation. In his conclusions Rumpf felt trade experience was of a negative value for a teacher after they obtained 12 years. In ranking the teachers according to their effectiveness from the best score to the lowest, he found the top fifth to have the least average number of years of teaching experience as shown in Table 3.

Table 3

RELATIONSHIP OF TEACHING EFFECTIVENESS AND YEARS OF TRADE EXPERIENCE (RUMPF, 1954)

Teaching Effectiveness by Fifths (N=236)	Average Years of Work Experience
1	12.17
2	13.77
3	14.31
4	12.69
5	15.02

In addition Rumpf found a slight positive correlation between a teacher's performance and the total number of college credits earned. Also a substantial correlation was reported between teaching performance and the age of the teacher at the time of entrance into the teaching field with those at a younger age tending to have a better performance. Finally, Rumpf felt that there was no evidence to show that industrial employment or non-teaching employment during the school year or summer vacation had any effect on teaching performance.

In a second study using variables similar to those in the Rumpf study, Kapes and Pawlowski (1974) were concerned with vocational-technical instructors from three area vocational-technical schools in non-metropolitan Pennsylvania. Essentially this study investigated three basic characteristics of vocational-technical teachers: years of industrial experience, years of teaching experience, and number of college credits. At the same time the student shop achievement of all junior and senior students taught by their teachers was measured via

the Ohio Trade and Industrial Education Achievement Test (OTAT). Hence the study examined the relationships of the three teacher characteristics to each other and to the achievement of the students.

There were a total of 31 teachers and 876 junior and senior students at the three area vocational-technical schools included in the sample. The data were collected in the Summer of 1973 as a part of a Longitudinal Vocational Development Study (VDS) project conducted in the Department of Vocational Education at The Pennsylvania State University. In a comparison of the teacher characteristics, student achievement and student ability; correlations were computed for the instructors of the junior and senior students. Table 4 has been composed to exhibit the basic results obtained in the analysis.

As a result of their research some of the conclusions reached by Kapes and Pawlowski were:

1. Industrial experience, teaching experience, and number of college credits of the vocational teachers are characteristics fairly independent of one another.
2. The number of college credits earned was the only teacher characteristic with a significant positive relationship to student shop achievement.
3. Industrial experience may possess a negative relationship to student shop achievement when many years of experience are involved.
4. There is a lower relationship between student ability and shop achievement than would be expected in more academic areas of study.

5. The students who were in their junior year scored higher than those in their senior year in all three schools.

Table 4

RELATIONSHIPS OF THE TEACHERS INDUSTRIAL EXPERIENCE, OCCUPATIONAL EXPERIENCE, CREDITS EARNED; AND STUDENT ACHIEVEMENT AND STUDENT ABILITY
(Kapes and Pawlowski, 1974)

Variables Correlated	Teachers of Junior Students	Teachers of Senior Students
Industrial Experience and Teaching Experience	-0.07	-0.09
College Credits Earned and Teaching Experience	0.29	0.24
Industrial Experience and College Credits Earned	0.00	-0.12
Student Ability and Student Achievement	0.19	0.23
College Credits Earned and Student Achievement	0.43	0.31
Industrial Experience and Student Achievement	0.00	-0.18
Teaching Experience and Student Achievement	0.07	0.21

Consequently Kapes and Pawlowski recommended that:

1. The minimum number of credits required for initial teacher certification should be increased.
2. Young men and women should be encouraged to pursue a full time college program for vocational teacher certification immediately after high school graduation.
3. Industrial experience should be minimized as a criteria for initial teacher certification.
4. Students for a high school vocational program should be selected using characteristics from the affective domain rather than on cognitive ability.
5. The students in the third or senior year in a vocational program may find it more profitable in a cooperative rather than traditional vocational program of instruction.
6. Caution should be exercised in the interpretation of the findings of their study due to variability from one school to another.

Self-Studies Conducted by Other Departments of Vocational Education

As a part of this portion of the literature search a survey was conducted of 28 other vocational education departments with programs similar to the Department of Vocational Education at The Pennsylvania State University. A request was made for any studies or data of a formal or informal nature on their undergraduates. The

purpose for the survey was explained in the letter and a stamped self-addressed envelope was enclosed for material to be returned.

Of the 28 departments contacted there were seven replies. Two of the seven responses contained data on their respective department, while the other five responses were courteous replies indicating no information was available. Of the two responses which contained information about their department, only one was applicable to this investigation.

The study, which contained some relevant data, was from The University of Minnesota. This unpublished study by Bjorkquist and Wisser (1973) concerned the characteristics and goals of their undergraduates via a program evaluation by their undergraduates. To obtain this information a questionnaire was mailed to 108 students enrolled during the Spring Quarter of 1973. Completed questionnaires were received from 84, or 78%, of these students.

In their survey Bjorkquist and Wisser found that the students had a mean age of 25.3 years. Nearly seven-eights of the respondents had some industrial wage earning experience yielding an average of 4.8 years. In addition nearly 25% of the students had already had some teaching experience. With regard to the program evaluation, the courses judged to be most "highly useful" or "useful," were: off campus laboratory courses (95%), industrial education courses (92%), on campus laboratory courses (85%), liberal arts courses (85%), and professional courses in the College of Education (79%).

Relevant Literature on Specific Characteristics

Descriptive Characteristics

In the studies conducted on vocational teacher education students, two conducted at The Pennsylvania State University offered similar descriptive background information while a department at another university reported quite dissimilar data. Brandon (1964) in his previously discussed self-evaluation of the vocational education department at The Pennsylvania State University gave the median age as 39 and the median number of years of occupational experience as 16 for 268 students enrolled in the trade and industrial education courses in 1964. In addition for the 1963-64 academic year there were seven students in the undergraduate baccalaureate program and 204 enrolled in the special teaching certificate programs.

Three years after the self-evaluation, Detwiler (1967) who was referred to earlier, conducted a study on the vocational-industrial education student at The Pennsylvania State University. A survey was sent to 320 students, of which 265 responded, in the Spring Term of 1967. Detwiler found the median age to be 38.3 years and the median years of occupational experience to be 12.37. At the same time the 265 respondents were reported to consist of 227 certificate students, six baccalaureate majors, and 32 graduate students.

In the aforementioned departmental study at The University of Minnesota, Bjorkquist and Wisser (1973) mailed a questionnaire during the Spring Term 1973 to 108 students, of which 84 or 78% replied. The final tally of the returned questionnaires reported the mean age of the students to be 25.3 years with a mean of 4.8 years of occupational

experience. The 108 students were all enrolled in the four year program.

The literature concerning research on vocational teachers also exhibited descriptive data of a like nature to each other and to the students at The Pennsylvania State University. In 1954 Rumpf (1954) conducted a study with regard to vocational teachers in Pennsylvania. Of the 236 shop teachers included in the study, the median age was 45.41 years; a range of 26 to 75 years with 5% under the age of 31. The average number of years of occupational experience was 12. The degrees or certificates held by the teachers were: masters 20, bachelors 24, standard certificate 174, temporary standard certificate 1, and emergency certificate 17. The teachers had a median number of 50 post-secondary credits.

Approximately 20 years later the Kapes and Pawlowski (1974) study tested students in Pennsylvania on shop achievement and related their scores to the characteristics of their instructors. The average age of the 31 teachers was 44.71 years and they had 14.55 years of occupational experience. The mean number of college credits held by the teachers was 66.13.

In Ohio, a study was conducted on the full time day teachers of vocational education by Reese and Orr (1971). The investigation was performed in 1967 on a total of 689 teachers in Ohio. The average age of the teachers was 42.5 years with an average of 12.1 years of occupational experience. The profile also showed that 56.7% had a degree or certificate below the baccalaureate level, 43% had a bachelors degree, and 16.6% held a masters degree.

Forgey (1972) reported a review made on selected vocational education personnel in the state of Illinois. The study was made on vocational personnel at six public high schools, six area vocational centers, and three junior colleges. There were a total of 359 vocational personnel contacted with 339 or 94.42% responses. While age was not a factor given, the teachers' occupational experiences were reported. Approximately 22% of the teachers had over ten years of experience while 42% had six or more years of experience. Nearly 50% of the 339 teachers, counselors and directors held a masters degree.

In the two separate studies mentioned earlier on individuals who took the occupational competency exams at The Pennsylvania State University, numerous descriptive characteristics were given. In the first study by Impellitteri (1965) the data accounted for 718 people. The average age of the 612 people who took the exams was reported to be 37 years with a standard deviation of 9.14 years. For 604 people an average of 12.5 years of occupational experience with a standard deviation of 8.49 years was found.

The people who successfully completed the occupational competency exam at The Pennsylvania State University from 1962 to 1972 were examined in the other study by McAlister (1973). From the 376 individual evaluations taken into account, the average age was not calculated but the mean number of years of occupational experience was 15, for an increase of 2.5 years over the average from 1944 to 1965.

Occupational Experience

In research projects involving the relevance of occupational experience to vocational teacher performances, the conclusions have significant meaning for the work experience requirements of vocational

teacher education programs. This is substantiated by Swanson (1967) who advocated at a national conference that he felt the work experience requirement of the Smith-Hughes Act should be re-examined and numerous alternatives should be explored.

In the previously reviewed study by Rumpf (1954) concerning vocational teachers in Pennsylvania, one of the factors considered in the teacher performance ratings was the number of years of occupational experience of the teacher. He found in the 236 teachers examined that the average number of years of occupational experience was 12. However, at the same time he found that in the relationship between work experience and teaching performance there was a negative value as far as teaching effectiveness was concerned for teachers with over 12 years of occupational experience. At the same time Rumpf concluded there was no evidence to support the contention that industrial employment or non-professional education positions held during the school year or summer vacation had any effect on teaching performance.

In a study by Cesta (1970) involving nine school teachers in six occupational areas, a teacher cooperative education program was evaluated. The program involved teachers who worked in business firms during the summer break. In his evaluation Cesta concluded that the participants benefited considerably from the work experience which in turn improved their teaching methods.

At the same time in the Kapes and Pawlowski (1974) study, one of the characteristics investigated was the number of years of industrial experience in the teacher's background. When the study related teaching experience to the number of college credits earned by a teacher, it was found that teachers with more years of industrial

experience had less teaching experience and fewer college credits. They found no relationship between occupational experience of teachers and student shop achievement scores. Thus, they recommended that industrial experience be minimized as a criteria for initial teacher certification.

Occupational Competency Evaluations

A topic of great controversy among vocational educators is the utilization of the occupational competency exam. While some vocational teacher certification institutions rely on the results of these exams to determine whether or not a person is competent in his trade, there are others that do not perform any occupational testing at all. While there are arguments pro and con with regard to a testing program, there is little conclusive research to substantiate one side or the other.

One aspect of the argument for requiring a skill is that in order for a person to teach a skill, he must understand and be able to perform the skill. Schaefer (1967) feels that occupational competency and subject matter mastery are essential ingredients in the composition of a vocational teacher. Nelson and Barlow (1973) are somewhat more pointed in their view whereby they claim experience has shown that the quality of instruction depends directly upon the occupational competency of the teacher.

If it is an acceptable fact that one must know his trade before he teaches it, then several questions must be answered. How well must a person know his occupation in order to teach it? How can one be tested to determine how well he can perform his occupational

specialty? Should a written or performance test be administered? Should a teacher be evaluated higher for the process or for the product in an occupational examination? Peterson (1973) felt that the technical competencies needed by vocational teachers is an area which is receiving the least amount of attention from researchers. The above questions plus many others are being asked of researchers in vocational education.

One proposal for occupational evaluation is a state testing program. Schaefer (1967) supported the use of a state exam which tested for the mastery of the content tc be taught. The state testing program has been taken one step further by the development of a national competency evaluation program.

In a survey of the state directors of vocational education in 50 states, Washington, D.C., Puerto Rico, Virgin Islands, and Guam; Larson and Crain (1969) found in 53 returns that 16 states used the competency exam, 31 states had never used an exam and five had discontinued the use of an exam. In addition they reported that seven states were planning to institute an exam program within two years. In another survey of the states Nelson and Barlow (1973) found 17 states used some form of occupational testing and four planned to use an exam in the near future. The exams were reportedly used for industrial teacher certification, admission to industrial teacher education programs, and advanced college credit.

With regard to specific research conducted on one aspect of the competency exam question, Boyd and Shimberg (1971) claimed the results of an evaluation may not be dependable owing to certain subjective factors. As a result they propose that an evaluation be

composed of a written and performance portion for a more dependable overall score. However, they advocate that if a choice must be made, greater attention should be given to the person's ability to do the job rather than their knowledge about the occupation. Boyd and Shimberg drew conclusions from Stuitt (1947) who conducted a study on naval personnel. Stuitt found that tryout performance tests for gunners mate school correlated from 0.14 to 0.35 with initial written tests and only slightly higher with final written tests. In torpedoman's school the shop tryout performance scores correlated 0.63 with the overall final grades but only 0.38 with the multiple choice final examination.

In the more recent research by Impellitteri (1965) on the occupational evaluation program at The Pennsylvania State University, the correlation between the written and performance scores was 0.46 while the years of occupational experience correlated -0.01 with their performance scores and -0.15 with the written exam. Impellitteri interpreted the moderate correlation between the written and performance exams to indicate the two tests were independent, but showed they were sufficiently related to justify their being in the same achievement battery. However, the low negative correlations with the number of years of occupational experience were felt to show there was absolutely no tendency for those with more years of trade experience to have higher scores on the exams. Owing to these interpretations, along with other comparisons, Impellitteri concluded that the value of the competency exams could not be determined.

The McAlister (1973) study mentioned earlier also utilized a sample who had taken the occupational competency exam at The Pennsylvania State University. No correlation was found to exist

between the exam scores and years of experience for the 376 people who took the exams between 1962 and 1972.

Academic Programs

One of the objectives in the literature review was to survey those writings on the vocational teacher education programs of study. In particular this portion of the search concentrated on studies concerning the composition of the academic program and the relationships of the programs to students' occupational experience, and trade competency evaluations.

With regard to teacher programs, Peterson (1973) posed some questions that he felt deserved the attention of researchers. Specifically he querried if prospective teachers are:

> simply required to complete a number of courses in the technical or pedagogical areas? Should students be required to complete certain courses or should they be free to choose their own program? . . . Is it important to provide personal advice regarding course work . . .? Should some device be used to determine who is best suited to become a vocational teacher? (p.23)

While research in this area may not answer the above questions specifically, it does give some insight into program composition and effectiveness. In the study by Bjorkquist and Wisser (1973), the effectiveness of the different areas of study in the academic program as determined by the students was sought. The courses judged most useful by the students were: off campus laboratory courses (95%), liberal arts courses (85%), on campus laboratory courses (85%), industrial education courses (92%), and other courses in the College of Education (79%).

In a study to test the importance of occupational experiences and formal teacher preparation, Popham (1968) established separate

classes to be taught by teachers of electronics and auto-mechanics; and by non-teachers with a background in electronics or auto-mechanics. Each teacher had two sections of a class with a nine hour unit to be taught to each class. The teachers and non-teachers were given the sets of instructional material, objectives, and resource materials two weeks before the classes began. The students were assigned randomly to the classes and were given a pre-test. At the end of the nine hours of instruction the students were given a post-test. The final test consisted of a performance test designed to establish the achievement of the student after nine hours of instruction. The results of the test scores were analyzed for the electronics and auto-mechanics classes separately.

In the comparison of the student achievement, Popham found no significant difference between the two groups in auto-mechanics. For the teachers of electronics, however, there was a small but significant difference in favor of the teacher group at the 0.05 level. Popham noted though that this difference was not confirmed in an additional analysis. In addition, in the promotion of pupil behavioral changes, there were no differences found in any of the groups. Popham concluded this absence of behavioral change for the students in the teacher group was due to the teacher being given inadequate preparation to produce such change.

The previously discussed study by Rumpf (1954) also has implications for the baccalaureate teacher preparation program. In this regard, he found a slight positive correlation between a person's teaching performance and the total number of college credits earned.

The effectiveness of three different teacher education programs in trade and industrial education was analyzed by Fagan (1970). A study of the relationships of a number of pedagogical factors to teaching effectiveness was made on beginning teachers. Among Fagan's conclusions was that a teacher's performance is increased with additional teacher preparation.

The results of the Rumpf (1954) and Fagan (1970) studies were substantiated by Kapes and Pawlowski (1974). Of the characteristics taken into consideration, the number of college credits earned by the teacher was the only one to exhibit a significant positive relationship to student shop achievement. The other factors taken into account were the teacher's occupational experience, the years of teaching experience, and the student's ability.

Summary

Departmental and State Research Studies

Formal studies of a published or an unpublished nature conducted by an academic department, university, or state on their students or teachers represent an effort to better understand one of the components in their universe. Such inquiries, of course, should offer information to enable improvements to be made in a program. Without such inquiry there is no resultant data for sound decision making. Consequently, according to Peterson (1973), an evaluation of a teacher education program should have a high priority in every institution preparing vocational teachers. However, in the fast pace of today's society, these self-evaluations cannot wait every five to ten years to be conducted.

In the review of the studies on the Department of Vocational Education at The Pennsylvania State University, a number of reports were found that were written over the past ten years. Only those which were relevant to this study were discussed, but these were not the only studies performed.

Corresponding inquiries about vocational teachers in the state of Pennsylvania were not as plentiful; although two very relevant studies by Rumpf (1954), and Kapes and Pawlowski (1974) were found. An interesting feature of these two reports, which were conducted 20 years apart, was that they both determined that the number of credits earned by a teacher was a basic factor in their teaching performance.

A survey of vocational education departments in the United States similar to the department at The Pennsylvania State University revealed only two departmental evaluations on undergraduate students. This may not be atypical of the academic departments found in our higher educational institutions today, but it limits the opportunity for the comparison of the results of the analyses from this study to like vocational education departments.

The Literature on Characteristics

The writings with variables particular to this study in many cases are broad investigations which include these variables or a part of a larger study. The descriptive statistics are summarized in Table 5. The information from earlier studies on the students in vocational education at The Pennsylvania State University reveal similar findings. The median age given for the students in 1964 (Brandon, 1964) was 39 and in 1967 (Detwiler, 1967) it was 38.3 years.

Table 5

PERSONAL CHARACTERISTICS ON VOCATIONAL TEACHER EDUCATION PERSONNEL CITED IN THE LITERATURE REVIEW

Investigator	Subjects	N	Date of Data Collection	Age		Work Experience		Location of Subjects
				$\bar{X}$=Mean M=Median	S.D.	$\bar{X}$=Mean M=Median	S.D.	
Impellitteri (1965)	Students	612	1944-65	$\bar{X}$=37	9.14	---	---	Penn State Univ.
		604	1944-65	---	---	$\bar{X}$=12.5	8.49	
Brandon (1964)	Students	268	1964	M=39	---	M=16	---	Penn State Univ.
Detwiler (1967)	Students	265	1967	M=38.3	---	M=12.37	---	Penn State Univ.
Bjorkquist and Wisser (1973)	Students	84	1973	$\bar{X}$=25.3	---	$\bar{X}$= 4.8	---	Univ. of Minnesota
McAlister (1973)	Students	376	1962-72	---	---	$\bar{X}$=15 M=14	---	Penn State Univ.
Rumpf (1954)	Teachers	236	1954	M=45.41	---	$\bar{X}$=12 M=12.67	---	Pennsylvania
Reese and Orr (1971)	Teachers	689	1967	$\bar{X}$=42.5	---	$\bar{X}$=12.1	---	Ohio
Kapes and Pawlowski (1974)	Teachers	31	1973	$\bar{X}$=44.71	8.96	$\bar{X}$=14.55	6.70	Pennsylvania
	(Students = 878)							

At the same time the occupational experience for the students in 1964 (Brandon, 1964) was found to be a median of 16 years, and in 1967 (Detwiler, 1967) a median of 12.37 years. Brandon (1964) reported there were 204 certificate students and seven baccalaureate majors while Detwiler (1967) found 227 certificate students and seven undergraduates. Thus from these two studies the only significant change was in a decrease of the median number of years of occupational experience.

In the departmental study conducted at The University of Minnesota in 1973 by Bjorkquist and Wisser (1973), the findings are quite dissimilar to those from The Pennsylvania State University. Bjorkquist and Wisser reported the mean age of 84 undergraduate majors to be 25.3 years with an average of 4.8 years of work experience. These averages are considerably different from the students at The Pennsylvania State University; although they concern only four year students in a vocational program and not any certification students.

In the studies on the Pennsylvania State University students by Impellitteri (1965) and McAlister (1973), the relationship between occupational experience and the results of the trade competency exams were compared. Their combined investigations covered the period from 1944 to 1973. In both cases a relationship between trade competency scores and occupational experience was not found.

While the value of occupational experience for vocational teachers cannot be disputed from an aesthetic point of view, the research on this variable fails to offer any conclusive results with regard to its specific academic or professional value. Neither Rumpf (1954) nor Kapes and Pawlowski (1974) found any evidence to indicate there was any relationship between occupational experience and teacher

performance. Impellitteri (1965) did find some evidence indicating a possible stratum with regard to occupational experience and competency exam performance; however, this information was not significant to the value of either occupational experience or competency examinations. In conclusion, the review of the literature indicated:

1. Vocational teacher education students at The Pennsylvania State University are older and have more industrial experience than the typical undergraduate student in Minnesota or Ohio.
2. The average occupational experience of a vocational teacher education student at The Pennsylvania State University is over 12 years and the average age is over 37 years.
3. There is no relationship between the number of years of occupational experience and trade competency exam performances.
4. The more years of occupational experience a teacher has does not insure better teacher performance.
5. The number of college credits taken is positively related to the performance of a vocational teacher.

III. PROCEDURE

Population and Sample

This study concerned those individuals who are or were in the vocational-industrial teacher education program at The Pennsylvania State University. The investigation included all of the current and former students in the program within certain established parameters. The findings of this study may be generalized to similar programs at other vocational teacher training institutions and to future students in the vocational teacher education program at The Pennsylvania State University. Thus, while the study included all relevant present and former students, it is considered a sample representation with reference for a larger population of students.

An important feature of this study is that it was conducted to provide a broad perspective of the students and the total vocational-industrial education program at The Pennsylvania State University, as well as an in-depth investigation of certain specific student characteristics. As such, the study not only considered all results for an overall view, but also looked at each characteristic separately. Consequently, in the broad perspective, descriptive statistics were reported in terms of their overall representation of the program and students; and for the individual characteristics inferential statistics were utilized in terms of the particular question under consideration.

The students who were included in the sample were individuals enrolled in the vocational-industrial teacher education baccalaureate program and the vocational-industrial teacher certification program.

The baccalaureate program consisted of approximately five years of post-secondary study. Only the baccalaureate students in their sophomore year or with 30 or more credits were included in the investigation.

The certificate program of study entailed the obtaining of 60 credits for the Vocational Education II certificate. This certificate, along with three years of successful teaching experience, qualified the holder for a permanent teaching certificate. The data for this part of the sample were limited to those students who had earned a Vocational Education I certificate or 18 college credits, and were continuing their studies for a Vocational Education II certificate.

The other part of the sample for the investigation were people who had earned either the Vocational Education II certificate or the bachelor's degree. The former students were limited to those who earned their degree or certificate after July 1, 1969. If a student earned a certificate and was continuing his studies for a four year degree, he was accounted for only as a baccalaureate student. Likewise, if an individual earned a Vocational Education II certificate and a baccalaureate degree, he was included only as a baccalaureate graduate. Thus, no person was included in more than one group for any analysis.

The information related to these students and graduates was obtained from their academic transcripts, the records in the Department of Vocational Education, and the files in the Division of Undergraduate Studies at The Pennsylvania State University. The data and the classification of the subjects were calculated at the end of the Winter Term 1974. Inasmuch as the students in both programs had a tendency to interrupt studies periodically to return to their occupations on a full

time basis, a student was considered to be current if he had taken any course within the previous seven terms, including the Winter Term 1974. This coincided with The Pennsylvania State University's definition of a current student.

Thus, this study consisted of all individuals in four distinct and separate groups in the vocational-industrial teacher education program at The Pennsylvania State University. These groups, as described previously, and their corresponding number of subjects were: certificate students (129), certificate holders (28), baccalaureate students (63), and baccalaureate graduates (23).

Investigation of the Characteristics

Only certain characteristics of the students and graduates were selected for investigation in this study. Some of the characteristics were applicable to all four groups in the study while others were relevant to only one or two of the groups. As a result some of the groups were combined or subdivided in terms of the characteristic being analyzed in order to permit a more appropriate investigation of a variable.

Since the study revolved around certain major characteristics, each are discussed independently. Inasmuch as a characteristic may have been considered a dependent variable in one analysis and an independent variable in others; the characteristics are not defined in terms of their research design utilization. As a result there will be a duplication in the discussion of some of the relationships in the sub-sections since all comparisons or findings for a characteristic are discussed in the section devoted to it. The discussions of the

characteristics are presented in the same order utilized in the literature review. The same titles and their order of presentation was also followed in Chapter IV. This arrangement of sub-sections was as follows: descriptive characteristics, occupational experience, occupational competency evaluations, and academic programs.

Descriptive Characteristics

A principle aspect of this study was an investigation of the students and graduates in terms of certain descriptive characteristics. This information was particularly important for laying a base for the statistical analyses performed in the other sub-sections on specific characteristics, and for data for comparison with the heretofore cited studies.

The first information sought in this sub-section was the identity of those students considered as certificate students and baccalaureate students as previously defined, and those individuals who either earned a Vocational Education II certificate or bachelor's degree since July 1, 1969. Upon the collection of the names of the individuals for each group, a comparison was made to locate duplicates. A list of names and a total sample was then established for the certificate students, certificate holders, baccalaureate students, and baccalaureate graduates.

Following the identification of the students and graduates, their transcripts were obtained from which data were taken for each person. This information included the date of birth; date of degree or program completion for certificate holders and baccalaureate graduates; the all university average; the date of admission or date of the first

course taken; and the courses, number of credits for each course, and grade obtained. This information was recorded on a computer data sheet which is described in the concluding section.

The departmental information cards, which were obtained by the Department of Vocational Education for each student at the time he or she took an industrial education course, were located for each individual in the sample. From these cards, shown in Appendix A, the years of work experience were recorded. This number was the number of years reported by the student at the time they took their first vocational education course. In those instances where the first course was prior to the date of the card on file, the number of years was adjusted to coincide with the first course on the transcript.

The trade competency exam files were then searched for the students and graduates who had taken the trade competency examination. The scores for the written and performance exams were located for each person. The points earned were divided by the total points on the exam in order to arrive at a percentage score. An average percentage score for the two tests was then computed.

From the above information the following was obtained:

1. The number of subjects in each group.
2. The average age of the enrolled students.
3. The mean number of years for certificate holders and baccalaureate graduates to complete their program of study.
4. The mean number of years of occupational experience for all groups; for certificate students;

for certificate holders; for baccalaureate students; and for baccalaureate graduates.

5. The all university average for all groups; for certificate students; for certificate holders; for baccalaureate students; and for baccalaureate graduates.
6. The number of subjects who had taken the trade competency exams and the average percentage scores on the written and performance exams for certificate students and holders, and for baccalaureate students and graduates.

Occupational Experience

The years of occupational experience, as previously described, were the number of years declared by the student at the time of enrollment in the first industrial education course. Adjustments were made for the number of years to coincide with the time the student took his or her first college course; or, in other words, when the student began his studies.

This portion of the study first reviewed the average number of work years for all of the individuals in the study and for each group: certificate students, certificate holders, baccalaureate students, and baccalaureate graduates. The information attained from these averages assisted in the construction of other sub-groups based on the number of years of work experience. They were grouped as: 1-5 years, 6-13 years, and 14 years and over. These sub-groups were then used in additional investigations since it was suspected that

non-linear relationships may exist between years of work experience and several other characteristics under investigation.

In the study of work experience for the enrolled and former students, several comparisons were made between the work experience variable and other characteristics. Correlations were calculated to determine what these relationships were. These correlations or sets of correlations originated from the questions posed in Chapter I, and are discussed further in the last section of this chapter.

One of the questions in the first chapter concerned the relationship between trade experience and academic performance. In this regard the student's all university average and/or former student's final all university average was correlated with work experience in the following manner:

1. All certificate students, certificate holders, baccalaureate students, and baccalaureate graduates:
   a. and their years of work experience.
   b. with 1-5 years of work experience.
   c. with 6-13 years of work experience.
   d. with 14 and above years of work experience.
2. The certificate students and certificate holders:
   a. and their years of work experience.
   b. with 1-5 years of work experience.
   c. with 6-13 years of work experience.
   d. with 14 and above years of work experience.
3. The baccalaureate students and baccalaureate graduates:
   a. and their years of work experience.
   b. with 1-5 years of work experience.

c. with 6-13 years of work experience.

d. with 14 and above years of work experience.

Another question posed for this study concerned the relationship between the trade competency exams and occupational experience. Thus, correlations were calculated for the following:

1. The years of work experience of all students and graduates with:
   a. their score on the written part of the trade competency exam.
   b. their score on the performance part of the trade competency exam.
   c. their average score of the written and performance scores or the trade competency exam.
2. The average score of the written and performance portions of the trade competency exam with the work experience of all students and graduates in the following sub-groups:
   a. 1-5 years of work experience.
   b. 6-13 years of work experience.
   c. 14 and above years of work experience.

A third question regarding occupational experience concerned the number of years it took for a person to complete a certificate program or baccalaureate degree. Hence, two correlations were calculated between:

1. The number of years of work experience and the number of years for certificate holders to earn their certificate.
2. The number of years of work experience and the number of years for baccalaureate graduates to earn their degree.

Occupation Competency Examinations

In the analyses involving the performances on the occupational competency exam for the enrolled students and graduates; the percentages for the scores on the written section, the performance section, and the average of the two were recorded for investigation. The scores on these tests were obtained from the trade competency examination files located in the Department of Vocational Education at The Pennsylvania State University. Occupational competency exam scores were not available for all enrolled students and graduates in the study. This was due to two situations. One case involved those occupational specialities for which an exam is not administered in lieu of an evaluation of credentials or possession of a state license. The second exception involved those students in the baccalaureate program who had not taken the exam as it does not have to be successfully completed until the beginning of the student teaching practicum.

In addition to the descriptive data obtained for this portion of the study, the investigation of the trade competency program was conducted with regard to its relationships to the other characteristics in the study. The comparisons of the trade exam scores with other variables were made in accordance with the initial questions proposed

for investigation. The method used to test these relationships in all cases was via a correlational analysis to be discussed further in the last section of this chapter.

One of the questions posed for the occupational competency exam scores concerned how they compared to the academic performances of the students. To study this relationship, the all university average of the students and final average of the graduates were compared to:

1. The written exam percentage scores.
2. The performance exam percentage scores.
3. The average percentage score for the written and performance tests.

Another test for the degree of relationship between competency exam scores and students years of work experience was conducted. In this regard correlations were calculated for the following:

1. The work experience of all students and graduates with:
   a. their percentage score on the written part of the trade competency exam.
   b. their score on the performance part of the trade competency exam.
   c. their average percentage score of the written and performance percentage scores on the trade competency exam.
2. The average percentage score from the written and performance portions of the trade competency exam for all students and graduates with work experience in the following sub-groups:

a. 1-5 years of work experience.

b. 6-13 years of work experience.

c. 14 and above years of work experience.

The final analysis conducted utilizing the scores on the trade competency exam involved the percentage scores themselves. In this analysis a correlation was calculated on the student percentage scores for the written part of the exam against their percentage scores on the performance test.

Academic Program

Along with the descriptive information related to academic performances, the investigation of the academic program involved comparisons of the academic performances of the enrolled students and graduates with the other previously described characteristics, and a comparison of different components of the academic performances with each other. The information gathered for this portion of the study was obtained from the academic transcript with the exception of the occupational experience, trade competency exam scores, and predicted grade point averages as previously discussed.

The comparisons were made using the correlational analysis and one factor analysis of variance as described in the last section of this chapter. All of the relationships studied were as heretofore mentioned in the questions posed in Chapter I.

A primary indicator of academic performance is a student's all university grade point average. In part of this section an attempt was made to determine what characteristics might be highly related to academic performance. Thus the all university grade point average was

correlated with:

1. Age:
   a. of the enrolled certificate students.
   b. of the enrolled baccalaureate students.
2. The trade competency examination:
   a. the percentage scores on the written test.
   b. the percentage scores on the performance test.
   c. the average percentage scores of the written and performance tests.
3. Years of work experience:
   a. of all individuals in the study.
   b. of the enrolled certificate students and certificate holders.
   c. of the enrolled baccalaureate students and baccalaureate graduates.
4. The years of work experience of the enrolled certificate students and the certificate holders with:
   a. 1-5 years of occupational experience.
   b. 6-13 years of occupational experience.
   c. 14 and above years of occupational experience.
5. The years of work experience of the enrolled baccalaureate students and baccalaureate graduates with:
   a. 1-5 years of occupational experience.
   b. 6-13 years of occupational experience.
   c. 14 and above years of occupational experience.

Another measure related to performance in an academic program is the time taken to complete a certificate or degree. In this regard a correlation was calculated between the number of years taken to complete the program and the years of occupational experience for:

1. Certificate holders.
2. Baccalaureate graduates.

One of the other concerns for an academic department involves the predicted grade point average utilized by the university for the admission of students to their program. At The Pennsylvania State University a predicted grade point average is only used for admission into the baccalaureate degree program. If a certificate student or holder decided to continue his studies for a baccalaureate degree, he was not admitted through the use of grade point predictors but upon an evaluation of his past college level performances. Thus, it was planned to calculate a correlation between the predicted grade point average for the baccalaureate students and graduates with their current or final average. Since there were an insufficient number of students and graduates who had a predicted grade point average used as a criterion for admission, this correlation could not be completed. The information obtained for this analysis, however, was relevant and the findings are reported.

The other investigation of the academic performances of the students and graduates involved an entirely different set of data. The courses taken by each student along with the corresponding number of credits and grades earned were recorded. The courses were then classified into one of five categories which were: 1) industrial education courses, 2) liberal arts courses, 3) math and science

courses, 4) professional education courses excluding industrial education, and 5) other miscellaneous courses. The names of the courses included under each category, except miscellaneous, are shown in Appendix B.

Upon the categorization of courses and the grouping of students into the appropriate program of study, the investigator was able to make comparisons of the academic performances among and between the groups. The first set of computations involved a one factor analysis of variance whereby the independent variable was the subjects' program status comprised of the following four groups: certificate students, certificate holders, baccalaureate students, and baccalaureate graduates. The dependent variables for which each analysis was conducted were:

1. The average all university grade point average.
2. The average grade point averages earned in the industrial education courses.
3. The average grade point averages earned in the liberal arts courses.
4. The average grade point averages earned in the math and science courses.
5. The average grade point averages earned in the professional education courses.

For each analysis of variance performed, a Bartlett's Test was conducted to assess the equality of variances.

For the second set of computations, it was anticipated that the dependent and independent variables in the previous analysis of variance could be alternated for another series of one factor analysis

of variance. In other words, the independent variable was the academic area of industrial education, liberal arts, science and math, and other professional education; and the dependent variable was again the student grade point average for each of these areas. However, for the certificate students and certificate holders, there were not sufficient data for an analysis of variance with repeated measures since the certificate students and the certificate holders did not have courses taken in all four of the described academic areas. As a result the analyses could only be performed for the baccalaureate students and the baccalaureate graduates. In addition for each analysis of variance conducted, correlations were calculated among the average grade point averages in each course area. In those analyses where the means were significantly different at the 0.05 level, further appropriate tests were conducted to identify which of the groups were significantly different from one another.

Data Collection and Computer Analysis

The first step in the study was to obtain the names of the certificate and baccalaureate students, certificate II holders, and baccalaureate graduates. These were obtained from the files in the Department of Vocational Education along with a copy, if available, of the most recent transcripts from the Summer Term 1972 to the Winter Term 1974. For the baccalaureate graduates the university commencement programs from Summer Term 1969 to and including Winter Term 1974 were searched for names.

The transcripts collected for the students were reviewed and a list was compiled for those students for whom a transcript or Winter

Term 1974 courses were not available. The transcripts on hand for the students who completed the certificate II program or baccalaureate degree were reviewed to ascertain that their transcripts included all courses to the date the degree or certificate was received. The names and student numbers of the individuals for whom an academic record was not available or in question, were checked against the micro-film transcript record of the College of Education. After acquiring additional records, the remaining names and student numbers were taken to the University's Records Office for the final search.

After the receipt of all available transcripts, they were sorted into four groups: certificate students, certificate holders, baccalaureate students, and baccalaureate graduates. The names were reviewed to eliminate any duplicates in the four groups. If a student earned a certificate and was continuing his studies for a bachelor's degree, he was considered only in the baccalaureate group. If a student earned a certificate and a bachelor's degree, he was accounted for in the baccalaureate graduate group.

After the groups were considered complete, the transcripts were checked to insure that individuals were within the established parameters of their group. The certificate students had to have received a Vocational Education I certificate or taken a minimum of 18 credits. A baccalaureate student had to have a fourth term standing as of Winter Term 1974 or a total of 30 credits. The courses counted for a Vocational Education II certificate holder were the first 60 credits successfully taken; and the credits recorded for the baccalaureate students were only those taken up to the time their degree was earned. In the certificate holder and baccalaureate groups, there were

individuals who were continuing their studies, but the additional courses beyond the degree or certificate were not recorded. For the certificate holder who was continuing his studies, he was considered as a certificate holder unless a declaration for a baccalaureate degree was made. This was necessary since the certificate holder may have been taking credits for an additional certificate rather than a baccalaureate degree.

Whereupon an accurate list was completed for all of the students to be included in the study, the number of years of occupational experience for each person was sought. This information was taken from data cards, shown in Appendix A, filled out by all students who take an industrial education course. Hence the years of work experience secured were the number of years declared by the student on the first card filed by him. In those cases where the date of this card coincided with the first course taken by the student, the number of years was copied as found. In other situations where the first card in the file for a student did not coincide with the first course on the transcript, the number of years of occupational experience was adjusted by subtracting the years of difference between the time the card was filed and the time of the first course from the years of experience declared. This situation was found particularly for those students who began their course work prior to when the data cards were instituted.

The final characteristic to be collected for the enrolled and former students were the performances on the occupational competency examination. The examination files were searched for all of the individuals concerned. In many cases the scores were found recorded in a percentage form, while for others the percentages had to be

calculated. After the percentages for the written and performance portions of the exam were procured, an average percentage of the two scores was calculated for each person.

The names of the baccalaureate students and graduates were taken to the Division of Undergraduates Studies of the University for their predicted grade point average. The personal folders for the students were located and the predicted averages sought. Owing to the small number of students for whom a predicted grade point average was utilized for admission to the program, this information was not included in the analysis. The findings in this search, however, were relevant and were reported.

The predicted grade point averages for the baccalaureate graduates were also sought. Since the available folders on file only went back to 1969 admissions, the predicted averages were obtained for only two graduates. The storage medium and system of the records for the graduates admitted prior to 1969 were such as to make further searches not feasible.

All of the above information, except the predicted grade point averages, were then recorded on computer layout forms. There were two card formats utilized for the presentation of the data to the computer. For both formats the subjects were identified by social security number rather than by name to insure confidentiality of the compiled information.

The first format, labeled the "student card," concerned the descriptive data. These cards were distinguished from the second card by an "s" in column 80. The format used for the student cards is shown in Appendix C.

A second format was used to record the courses taken by each person along with the corresponding number of credits, grade, term taken, and academic area. Even though all of the data recorded on this card was not needed for this study, it was included for possible further studies. The format for the course cards, which allowed for three courses per card, is exhibited in Appendix D.

After the data were recorded on the formats, cards were key-punched and verified. A computer listing of the cards was run and the data again verified. A sort was then run on the cards for a match of the social security numbers on the student and course cards for each person. The data were then placed on a magnetic tape for the analysis.

The sums, averages, and differences between dates were calculated through the use of simple program instructions via the Remote Job Entry (RJE) Facility. The remainder of the analyses were made through the use of Statistical Package Programs on file in the Computation Center at The Pennsylvania State University. The source language for the programs was Fortran IV.

The correlations were computed via the Statistical Package Program for the Pearson Product Moment Correlation Coefficient-PPMCR-(Verity and Kuntz, 1972). For the variables utilized in these correlations, their means and standard deviations were produced as a part of the output of the program using the non-random missing data option.

The one factor analysis of variance on the mean grade point averages for the four subject groups in each of the four academic areas and their all university average was performed through the use of the ANOVES/ANOVUM Statistical Package Computer Program (Verity and Smith, 1972). The program utilized for this set of analyses was the ANOVES

for unequal cell frequencies. Along with each ANOVES a Bartlett's Test was conducted to determine the equality of the variances in the four cells.

For the investigation of the equality of the mean grade point averages in the four academic areas for the baccalaureate students and graduates, a computer package program by Games, Gray, Herron, and Pitz (1974) for an analysis of variance for repeated measures (ANOVR) was used. For the ANOVR, the ANOVES, and the Bartlett's Test for the homogeniety of variances, the level of significance was set at 0.05. For the comparisons showing a significant difference the FOLUP program by Yancey, Howell, Games, and Serapiglia (1973) utilizing Fisher's Least Significant Difference (LSD) Test was selected to investigate differences between all possible pairs of means.

IV. FINDINGS

Introduction

The statement of the problem for this study posed four broad questions toward which the efforts of this investigation were directed. In order to permit greater specificity of the charge presented, the initial four questions were expanded to the nine sub-questions presented in Chapter I. The information in answer to the nine sub-questions provided the knowledge upon which the conclusions were founded for the four basic questions. These conclusions are presented in the final chapter whereas the results of the inquiries on the nine sub-questions are discussed in this chapter.

Inasmuch as the computations for the nine sub-questions involved over 60 separate analyses, the findings for these questions were grouped into four categories. The titles for these four categories utilized the same headings as those used in the previous two chapters. The captions for these categories were descriptive characteristics, occupational experience, occupational competency evaluations, and academic programs. While each of the nine sub-questions are discussed under the appropriate heading, they are not presented in the numerical order assigned to them in Chapter I. In those cases in which a question concerned variables associated with two of the above sub-headings, the findings were duplicated; however, the background information and corresponding discussions differed.

Descriptive Characteristics

While the descriptive information gathered for this section did not pertain directly to any of the nine sub-questions, it served to establish a base for the investigation. This offered an opportunity to compare the various descriptive characteristics to each other as well as to the data found in the related literature.

The descriptive data, shown in Table 6, indicated that as of Winter Term 1974 there were 129 certificate students and 63 baccalaureate students. In addition, a total of 28 Vocational Education II certificates were earned and 23 baccalaureate degrees were awarded from July 1, 1969 through the Winter Term 1974. The study conducted ten years previously in 1964 by Brandon (1964) reported there were 268 enrollees in the vocational education courses of which seven were in the baccalaureate program and 204 students were in the various certificate programs. At the same time Brandon found there were a total of 81 bachelor degrees awarded from 1944 to 1963. In other words, in the past ten years in the Department of Vocational Education, growth occurred mainly in the four year program.

The average or median age of the students in the vocational-industrial education program at The Pennsylvania State University in the previous studies, as shown in Table 5, ranged from 37 to 39 years. The average age for all of the subjects in this study was 36.65 years; however, the average age for the certificate students was 42.93 years and the baccalaureate students was 24.84. Thus, the average age for the total sample and for the certificate students was comparable to the ages reported in the previous studies. The average age, however, for

the baccalaureate students in vocational-industrial education at The Pennsylvania State University, as per this study, was very similar to the average of 25.3 years found for the students in the four year program at The University of Minnesota, as reported by Bjorkquist and Wisser (1973).

The average number of years of work experience at the time the students began their studies can be seen in Table 6 to range from 3.95 to 14.56 years with an overall average of 10.65 years for all four sub-groups. Again the certificate students were found to have an average number of years of occupational experience comparable to these reported in the previous studies on the students at The Pennsylvania State University. The average of 3.95 years of work experience for the baccalaureate students were also comparable to the 4.8 years of work experience reported for the baccalaureate students at The University of Minnesota (Bjorkquist and Wisser, 1973).

The average all university average for the baccalaureate students, as shown in Table 6, was found to be considerably lower than the other three groups. However since the baccalaureate students at The Pennsylvania State University typically take the work competency exam or have their credentials evaluated in lieu of an exam late in their academic program; their averages were correspondingly affected in that the successful completion of the exam traditionally earned for a student 15 credits at an "A" level grade. Also noted in the descriptive data was that on the average a greater number of years was taken to complete the Vocational Education II certificate than the four year degree.

Table 6

DESCRIPTIVE CHARACTERISTICS OF THE CERTIFICATE STUDENTS, CERTIFICATE HOLDERS, BACCALAUREATE STUDENTS, AND BACCALAUREATE GRADUATES OF THE DEPARTMENT OF VOCATIONAL EDUCATION AT THE PENNSYLVANIA STATE UNIVERSITY AS OF THE END OF THE WINTER TERM 1974

Subject Groups	N	Average Years Work Experience	Average All University Grade Point Average	Age	Years to Complete Program	Written Trade Competency Scores	Performance Trade Competency Scores	Average Total Trade Competency Scores
Certificate Students	129	14.56*	3.14	42.93*	-	-	-	-
Certificate Holders	28	13.44	2.94	-	9.25	-	-	-
Baccalaureate Students	63	3.95	2.71	24.84*	-	-	-	-
Baccalaureate Graduates	23	7.87	3.12	-	7.74	-	-	-
All Groups	243	10.92	3.01	-	-	72.00*	79.39*	75.89*
Certificate Students & Certificate Holders	157	14.35*	3.05	-	-	71.17*	80.32*	75.87*
Baccalaureate Students & Baccalaureate Graduates	86	5.00	2.82	-	-	74.18*	77.33*	75.93*
Certificate Students & Baccalaureate Students	192	10.42*	-	36.65*	-	-	-	-

NOTE: The above averages with an asterisk (*) were calculated using N's smaller than reported in this table. For the exact N in the above noted averages see the pertinate following table.

The average percentage scores for the occupational competency exams were found by Impellitteri (1965) to be 81.62% for the performance tests and 79.41% for the written exam. While the average percentage score for the performance test (79.39) found in this study was similar to that found by Impellitteri, the average written percentage score (72.00) differs considerably. From the data in Table 6 it was noted that the average scores for the written and performance exams for the certificate students and certificate holders were very similar to the average scores for the baccalaureate students and graduates. However, the certificate students and certificate holders had a higher average percentage (80.32) on the performance test than the baccalaureate students and graduates (77.33). Likewise the baccalaureate students' and graduates' average of 74.18 for the written exams was greater than the 71.17 average for the certificate students and holders. The range between the written and performance average scores was somewhat greater for the certificate students and holders than for the baccalaureate students and graduates.

In conclusion, the descriptive information indicated that a difference existed not only between the four groups, but also between the two programs. The students and holders of the Vocational Education II certificate as compared to the baccalaureate students and graduates were found to be older, to have more years of occupational experience, to do better on the performance test of the occupational competency exam, but not as well in the written portion, and to take more years to complete their program of study. The certificate students were found to have a higher grade point average than the baccalaureate students, but the baccalaureate graduates were found to have a higher average

than those who completed the certificate program. Finally, the characteristics for the certificate students and holders were much more similar to the findings of earlier studies on the Pennsylvania State University students and vocational teachers than their contemporaries in the baccalaureate program.

Occupational Experience

As previously noted the average number of years of occupational experience for the 243 subjects of this study was 10.92 years. The standard deviation for the 10.92 years was found to be 8.40 years which indicated a positively skewed distribution. In the breakdown of the years of work experience, it was found that the certificate students and holders had an average of 14.35 years while the baccalaureate students and graduates had an average number of 5.00 years. Consequently, further sub-division of 1-5 years, 6-13 years, and 14 and above years of work experience was made as shown in Table 7. These sub-divisions were utilized for numerous investigations inasmuch as it was suspected that a non-linear relationship may exist when years of work experience were compared to other variables.

A nearly equal distribution among the three sub-groups was found when all of the subjects in the study were grouped together. However, as shown in Table 7, when the individuals were divided into those associated with the certificate program and those in the baccalaureate program, the number of persons found in the occupational sub-groups were inverse for the two programs. Thus, the further analyses concerning the number of years of work experience were made not only for all of the individuals in the study; but also, where

appropriate, for those involved with the certificate program and the baccalaureate program with further sub-divisions of 1-5, 6-13, and 14 and greater years of work experience.

Table 7

STUDENTS AND GRADUATES BASED ON YEARS OF OCCUPATIONAL EXPERIENCE AND PROGRAM OF STUDY

Years of Work Experience	All Groups	Certificate Students and Holders	Baccalaureate Students and Graduates
1-5	74	17	57
6-13	82	60	22
14 and greater	85	78	7

Question #3: What is the relationship between academic performance and the number of years of trade experience? In the investigation of this question correlations were calculated between the two variables, work experience and academic performance. In Table 8 the results of these correlations are reported along with the corresponding means and standard deviations for the occupational experience of the sub-groups being investigated.

From Table 8 it can be observed that there is a relationship with a $p < 0.01$ between occupational experience and academic performance. This seemed to indicate that the students with more work experience perform better academically than those with less years of occupational experience. However, in the sub-grouping for all subjects, for those

in the certificate program, and for those in the baccalaureate program; the only consistent positive relationship between the two variables was for those individuals with 1-5 years of occupational experience. In addition, the correlation for all individuals with 1-5 years of work experience was found to have a probability of a chance departure from zero of less than 0.01 ($p < 0.01$) while those with 6-13 years and over 14 years were found to have a slight negative correlation. Thus, for those individuals who entered the program with six or more years of work experience, their academic performances were not found to improve as their number of years of work experience became greater.

Another revealing feature of the set of correlations concerned those calculated for the certificate groups and the baccalaureate groups. The significant positive correlation ($p < 0.05$) for the baccalaureate groups and the slight negative correlation for the certificate groups exhibited a distinct difference for the two programs. The baccalaureate group, of which over one half had 1-5 years of work experience, had a major influence on the significant correlation found for all groups combined.

From the information presented in Table 8, the large standard deviation for the mean number of years of work experience for the baccalaureate group indicated that the baccalaureate group had a very positively skewed distribution. In addition another interesting statistical relationship was found with respect to the correlations obtained for the groups with 1-5 years of occupational experience. When all of the individuals with 1-5 years of work experience were combined, the resultant correlation was larger than either the certificate or baccalaureate group with 1-5 years of experience. This larger

Table 8

CORRELATIONS BETWEEN OCCUPATIONAL EXPERIENCE AND ACADEMIC PERFORMANCE WITH MEANS AND STANDARD DEVIATIONS FOR YEARS OF TRADE EXPERIENCE

Subject Groups	N[1]	Correlation Coefficient	$\overline{X}$ Work Years	Standard Deviation
All Subjects	241	0.189**	10.92	8.40
1-5 years work	74	0.340**	2.09	1.62
6-13 years work	82	-0.067	8.92	2.11
14 and greater work	85	-0.064	20.80	4.70
Certificate Students & Certificate Holders	155	-0.043	14.35	7.66
1-5 years work	17	0.127	2.82	1.63
6-13 years work	60	-0.322*	9.27	2.07
14 and greater work	78	-0.079	20.78	4.70
Baccalaureate Students & Baccalaureate Graduates	86	0.256*	5.00	5.86
1-5 years work	57	0.337**	1.88	1.57
6-13 years work	22	0.314	8.00	1.98
14 and greater work	7	0.196	21.00	5.03

*Probability of a chance departure from zero at less than 0.05.

** Probability of a chance departure from zero at less than 0.01.

[1]The N=241 was not equal to the total N=243 since the years of occupational experience was not available for two certificate students.

correlation was due to the distributions for the two groups complementing each other whereby their combined correlation was greater than for either group separately. This, in turn, influenced the correlation found between all groups and work experience.

Question #7: What is the relationship between the years of occupational experience and the time taken to complete either the baccalaureate or certificate program? In investigating this question, correlations (not shown in any table form) were calculated between the number of years of trade experience and the time taken for the certificate holders and baccalaureate graduates to complete their program. As recorded in Table 6 an average of 9.25 years was needed to earn a Vocational Education II certificate and 7.74 years for a bachelor's degree.

A correlation of -0.416 ($p < 0.05$) was found between the years of work experience and the number of years to earn a certificate for the 27 certificate holders. The correlation between the years of trade experience and the number of years to complete the baccalaureate program was found to be -0.201 for the 23 graduates, which did not have a probability of a departure from zero at even the 0.10 level.

Even though there was no relationship found between the years of work experience and the time to earn a bachelor's degree, (possibly owing to small sample size), the relationship was negative. This, along with the negative correlation ($p < 0.05$) for the certificate holders, indicated that students with fewer years of occupational experience required more years to complete a program of study. This relationship may be attributed to the previously mentioned practice whereby a student may discontinue his studies to return to his trade full time

periodically in order to earn funds to continue his education. Such a practice seemed to be true more so for the younger student with fewer years of trade experience. However, when age is compared between programs, certificate holders took more years to complete their program than the baccalaureate graduates.

Question #8: What is the relationship between occupational experience and the average score of the two portions of the trade competency exam? In the investigation of this question, a correlation was calculated between the average percentage scores of the two tests in the exam and the number of years of occupational experience. In addition those in the sub-divisions based on 1-5, 6-13, and 14 and greater years of work experience, were examined separately. Also, the individual scores for the written exams and performance tests were related to trade experience for further definitive information. The results of these correlations and the mean number of years and corresponding standard deviations for each sub-group are reported in Table 9.

From the results of these comparisons it was noted that the average number of years of occupational experience (11.43) for those who took the exam was greater than the 10.42 years for all of the individuals in the study. Also, with a standard deviation of 7.558, the distribution was positively skewed. Thus, the individuals who took the exam had more years of trade experience than the average subject in this study.

From the results of the correlations, as shown in Table 9, the only relationships with a $p < 0.10$ were found between the scores on the performance test and the years of work experience, and for the average scores for those individuals with over 14 years of occupational

Table 9

CORRELATIONS BETWEEN OCCUPATIONAL EXPERIENCE AND THE TRADE COMPETENCY EXAMINATION WITH MEANS AND STANDARD DEVIATIONS FOR YEARS OF TRADE EXPERIENCE

Trade Competency Exam Variable	N	Correlation Coefficient	$\bar{X}$ Work Years	Standard Deviation
Written Exam	97	0.055	11.42	7.56
Performance Exam	97	0.206*	11.42	7.56
Average of Written & Performance Scores	97	0.175	11.42	7.56
Trade Competency Average Score &:				
1-5 years work experience	22	0.161	2.86	1.46
6-13 years work experience	40	0.015	8.60	2.00
14 & greater years work experience	35	0.285*	20.03	4.87

*Probability of a chance departure from zero at less than 0.10.

experience. Thus, as in the Impellitteri (1965) and McAlister (1973) studies, a strong relationship between two seemingly naturally related variables was not found.

Occupational Competency Evaluations

Several of the initial questions concerned the occupational competency evaluations. In order to assess the impact of the occupational testing program in relation to the vocational education program, all analyses conducted on this variable are reported in this section.

Question #4: What is the relationship between academic performance and the trade competency exam scores? The comparisons between the competency exam scores and the all university grade point averages were undertaken via correlational analysis. The results of these correlations are reported in Table 10.

Table 10

CORRELATIONS BETWEEN THE PERCENTAGE SCORES ON THE TRADE COMPETENCY TESTS AND THEIR AVERAGE SCORES, AND ALL UNIVERSITY GRADE POINT AVERAGES

	N	Correlation Coefficient
Written Test	97	0.120
Performance Test	97	-0.023
Average Scores of the Written & Performance Tests	97	0.063

NOTE: No correlations had a probability of a chance departure from zero at less than 0.10.

A total of 97 individuals in the study had taken the competency exam. A break down of these 97 individuals showed that 46% of the certificate holders and 60% of the baccalaureate graduates had taken the exam. The scores for the exam were found not to correlate with the academic all university average at even the 0.10 probability level. Thus, performance on either test or their averages was not an indication of a person's ability to do academic work.

Question #8: What is the relationship between occupational experience and the average score of the two portions of the trade competency exam? As shown in Table 9 and discussed in the last section on occupational experience, a strong relationship between the two variables was not found. In fact, the only non-chance correlations ($p < 0.10$) were found between the scores on the performance exam and years of occupational experience, and for those individuals with over 14 years of work experience.

A reasonable assumption might be made that as the number of years of occupational experience increased, the scores on the competency exam would do likewise. As exhibited in Table 9, the people who had taken the exam were placed into one of three categories; which were 1-5, 6-13, and 14 and greater years of work experience. Those with 6-13 years of experience had a lower correlation than those with 1-5 years of experience. Although these correlations were not significant, at least they were not negative as found by Impellitteri (1965) in three of the four correlations on his sub-groups (Table 2). However, for this study there was no evidence that additional years of work experience result in a higher trade competency score, except perhaps for those with over 14 years of experience.

Question #9: What is the relationship between the written and performance scores of the trade competency exam? In regard to this question a correlation was calculated for the two portions of the trade competency exam. The correlations (not shown in any tables) for the 97 observations was 0.143, which did not have a probability of a chance departure from zero at even the 0.10 level.

The correlation between the two exams was quite different than the 0.46 found by Impellitteri (1965). He felt the 0.46 correlation exhibited sufficient commonality to contend they were in the same achievement battery. With the 0.143 correlation found in this study and the purpose of the two tests, it was questionable whether the same conclusion could be reached. Inasmuch as the two exams were both testing for occupational competency in a specific trade, it would seem reasonable to assume with an N as large as 97 that at least a beyond chance relationship ($p < 0.05$) would be found.

Academic Programs

The sub-questions for this study regarding the academic program sought to investigate the relationships between academic performances and the other variables in the study. Comparisons between course performances for the different academic areas were also performed to seek answers to the questions.

Question #3: What is the relationship between academic performance and the number of years of trade experience? This question was discussed in the sub-section devoted to occupational experience with occupational experience as the criterion. For this sub-section the question was considered with the academic performances foremost in

mind. The all university grade point average was the academic program's reference point for this question. Consequently, Table 11 was composed to exhibit the correlations between the two variables, also shown in Table 8, but with the means and standard deviation for the all university grade point averages (GPA).

The sub-groups, as shown in Table 11, with 1-5 years of work experience were the only sub-groups to show a consistent positive correlation with the all university GPA, two of which are statistically significant ($p < 0.01$). For those with fewer years of work experience (1-5 years), a lower grade point average than the other work experience groups was found. In fact, with the exception of the correlation for all subjects and the significant negative correlations, all of the significant correlations had a mean grade point average below a 3.00 with standard deviations to indicate near normal distribution for each. From the table it appears that those individuals with 1-5 years of experience was a major contributor for the overall significant correlation of 0.189 ($p < 0.01$).

Since there would seem to be a strong relationship between the number of years of trade experience and age or maturity, a higher grade point average would be expected to a point at which educational psychologists would determine that learning ability declines. This seemed to be indicated whereby those individuals with 6-13 years of experience exhibited a higher average in each sub-group.

Question #5: What is the relationship between the academic performances of certificate and baccalaureate students and their age? The answer to this question was investigated with regard to the enrolled students in the Winter Term 1974. The correlations between the all

Table 11

CORRELATIONS BETWEEN ACADEMIC PERFORMANCE AND OCCUPATIONAL EXPERIENCE WITH MEANS AND STANDARD DEVIATIONS FOR THE ALL UNIVERSITY GRADE POINT AVERAGES

Subject Groups	N	Correlation Coefficient	$\overline{X}$ Grade Point Average	Standard Deviation
All Subjects	241	0.189**	3.01	0.49
1-5 years work	74	0.340**	2.82	0.54
6-13 years work	82	-0.067	3.10	0.42
14 & greater work	85	-0.064	3.09	0.46
Certificate Students & Certificate Holders	155[a]	-0.043	3.11	0.43
1-5 years work	17	0.127	3.07	0.45
6-13 years work	60	-0.322*	3.12	0.36
14 & greater work	78	-0.079	3.10	0.47
Baccalaureate Students & Baccalaureate Graduates	86	0.256*	2.82	0.55
1-5 years work	57	0.337**	2.73	0.55
6-13 years work	22	0.314	3.02	0.55
14 & greater work	7	0.196	2.96	0.34

*Probability of a chance departure from zero at less than 0.05.

**Probability of a chance departure from zero at less than 0.01.

[a]The N=241 was not equal to the total N=243 since the years of occupational experience was not available for two certificate students, thus the grade point average for the certificate students and holders in Table 11 will not agree with Table 6.

university average and age for the student groups along with their mean ages, academic performances, and corresponding standard deviations are given in Table 12.

Table 12

CORRELATION BETWEEN STUDENT AGE AND ALL UNIVERSITY GRADE POINT AVERAGES WITH CORRESPONDING MEANS AND STANDARD DEVIATIONS

Group	N	Correlation Coefficient	$\bar{X}$ Age	S.D.	$\bar{X}$ Grade Average	S.D.
Certificate Students	114	0.006	42.97	8.58	3.12	0.45
Baccalaureate Students	61	0.310*	24.84	7.33	2.69	0.54

*Probability of a chance departure from zero at less than 0.02.

NOTE: The N for the two groups is less than the N given previously inasmuch as the ages were not available for all students.

As shown in Table 12 a large difference was found in the mean ages and academic averages for the two groups. The correlation ($p < 0.02$) found for the baccalaureate students indicates a positive relationship between age and academic performance for the younger group of students. The virtually zero correlation for the certificate, or older, students indicated no relationship between the two variables. Possibly for the certificate group a positive correlation would be found up to a certain age which would include the age group of the baccalaureate students. However, regardless of the age level at which

a relationship between age and academic performance no longer exists, when the average age progressed to 42.97 years, the older students did not perform better academically than the younger students.

Question #4: What is the relationship between academic performance and the trade competency exam scores? As discussed under the sub-section on the occupational competency evaluations and shown in Table 10, a correlation between the all university average and the competency exam scores were calculated in response to this question.

A total of 97 individuals took the exam and, as previously shown in Table 6, the average percentage scores on the tests were: written 72.00, performance 79.39, and total average 75.89. The mean all university grade point average for those who took the exam was 3.10 with a standard deviation of 0.37. The correlation coefficients, as shown in Table 10, were not found to be significant at even the 0.10 level of probability. Thus, the occupational competency exam scores and the academic performances were not found to be related.

Question #1: Is there a significant difference in the academic performances in the two teacher preparation programs of study with regard to the certificate students, the holders of the Vocational Education II certificate, the baccalaureate students, and the baccalaureate graduates? For the investigation of this question a series of one factor analysis of variances were performed whereby the independent variable was divided into the following categories: certificate students, certificate holders, baccalaureate students, and baccalaureate graduates. The dependent variable for the analyses was the average all university grade point average and the average grade point averages earned in the four previously defined academic areas which were

industrial education, liberal arts, math and science, and professional education. For each analysis of variance a Bartlett's Test for homogeneity of variance was conducted. The results of these analyses are shown in Table 13.

In the set of the one factor analysis of variance, a significant difference was found for the mean all university averages and the industrial education course grades. However, owing to the large differences found in the variances on the all university averages and the industrial education course averages, the resultant probability for these two analysis of variances, as well as the one for the liberal arts courses, should be interpreted with caution.

Inasmuch as it was determined that for the four groups the mean all university averages and the mean grade point averages for the industrial education courses were found significantly different at the 0.05 level, a follow-up study was conducted for both comparisons. The Fisher Least Significant Difference Test (LSD) was utilized to test for significant differences between the mean averages at the 0.05 level.

In the test of the all university grade point averages, the Fisher LSD Tests identified the following means as having a significant difference at the 0.05 level.

1. Certificate students (3.14) and baccalaureate students (2.71).
2. Certificate students (3.14) and certificate holders (2.94).
3. Baccalaureate students (2.71) and baccalaureate graduates (3.12).
4. Baccalaureate students (2.71) and certificate holders (2.94).

Table 13

FIVE ONE FACTOR ANALYSIS OF VARIANCE AND BARTLETT'S TEST FOR HOMOGENIETY OF VARIANCE ON THE PERFORMANCES IN THE ACADEMIC AREAS OF STUDY AND ALL UNIVERSITY AVERAGE FOR THE CERTIFICATE STUDENTS, CERTIFICATE HOLDERS, BACCALAUREATE STUDENTS, AND BACCALAUREATE GRADUATES

Academic Area	Certificate Students Mean GPA N=129	Certificate Holders Mean GPA N=28	Baccalaureate Students Mean GPA N=63	Baccalaureate Graduates Mean GPA N=23	Probability Bartlett's Test on Variance	ANOV Probability
All University	3.14 (0.44)[b]	2.94 (0.31)	2.71 (0.55)	3.12 (0.42)	0.011[a]	0.001[c]
Industrial Education Courses	3.34 (0.55)	3.17 (0.38)	3.47 (0.37)	3.64 (0.36)	0.001[a]	0.002[c]
Liberal Arts Courses	2.32 (1.16)	2.47 (0.74)	2.09 (0.75)	2.57 (0.61)	0.001[a]	0.143
Math & Science Courses	2.74 (0.78)	2.57 (0.79)	2.33 (0.85)	2.50 (0.94)	0.741	0.061
Professional Education Courses	2.96 (0.67)	3.25 (0.48)	3.02 (0.79)	3.06 (0.68)	0.112	0.438

[a]The chi square for the Bartlett's Test on variances was significant at the 0.05 level and did not support the hypothesis of equal variances. Thus the ANOV should be interpreted with caution.

[b]The standard deviations appear in parenthesis.

[c]Significant at the 0.05 level.

In the test of the means for the average industrial education course grades, the following were identified as having a significant difference at the 0.05 level.

1. Certificate students (3.34) and baccalaureate graduates (3.64).
2. Certificate holders (3.17) and baccalaureate graduates (3.64).
3. Certificate holders (3.17) and baccalaureate students (3.47).

In looking at the two initial analysis showing a significant difference, one might conclude that the means for the same groups of students would be found significantly different in both analyses. This would seem logical in that the differences for the industrial education course averages would be the cause for the significant difference in the all university averages. As noted above, the groups found significantly different were nearly exactly opposite for the two analysis of variances. In other words the groups which had significantly different means in the industrial education courses had similar all university averages.

In looking at the means in Table 13, the superior averages in the industrial education courses were studied. It was noted that while the certificate students and holders had a much superior number of years of occupational experience (14.35 years), they had lower grade point averages in the industrial education courses than the baccalaureate groups who had lesser years of experience (5.00 years). As mentioned previously this may be the result of awarding academic credit and a course grade to the students in the baccalaureate program for the passing of the trade competency exam or the evaluation of their

credentials for trade competency certification. Since these grades were typically at the upper limit of the grade spectrum, the industrial education course averages as well as the all university averages tended to be enhanced for those who received trade competency credits.

In addition, the set of ANOV's in Table 13 found no differences in the liberal arts courses, math and science courses, and professional education courses. The probability for the liberal arts courses must be interpreted with caution owing to the significant difference found in the variances via the Bartlett's Test. The highest probability for equal academic averages was found for the professional education courses.

Question #2: Is there any difference in the academic performances among the academic areas for the following groups:

a. students in the Vocational Education II certificate program?

b. students in the baccalaureate program?

c. holders of the Vocational Education II certificate?

d. graduates of the baccalaureate program?

e. all students and former students in the study?

For the investigation of this question a one factor analysis of variance for repeated measures was utilized for each of the groups and all of the subjects combined. However, since there were an insufficient number of individuals in the certificate student and certificate holder groups with courses in both the math and science area and professional education area, the analyses for these groups as well as for all groups combined was not possible. Hence, the above question was answered only for the baccalaureate students with an N of 43 and for all of the

baccalaureate graduates (N=23). The results of the two analyses are shown in Table 14.

Table 14

TWO ONE FACTOR ANALYSIS OF VARIANCE ON REPEATED MEASURES FOR THE BACCALAUREATE STUDENTS AND BACCALAUREATE GRADUATES AND THEIR ACADEMIC PERFORMANCES IN THE FOUR ACADEMIC AREAS

	Baccalaureate Students N=43	Baccalaureate Graduates N=23
Mean GPA for Industrial Education Courses	3.49 (0.38)[a]	3.64 (0.36)
Mean GPA for Liberal Arts Courses	2.27 (0.63)	2.57 (0.61)
Mean GPA for Math & Science Courses	2.56 (0.70)	2.50 (0.94)
Mean GPA for Professional Education Courses	3.05 (0.79)	3.06 (0.68)
ANOV Probability of Equal Means	0.001	0.001

[a]The standard deviations appear in parentheses.

Owing to the significant results found in the two analyses, as exhibited in Table 14, a follow-up study was conducted for each. The test utilized for the follow-up studies was the Fisher's Least Significant Test (LSD) with a confidence level set at 0.05. In the test of the means found for the baccalaureate students, all of the means were found to be significantly different from one another. In the LSD test for the baccalaureate graduates a significant difference was found between the grade point average for the industrial education courses and the grade point averages for the other three academic areas. The differences between the mean grade point averages for the other three academic areas were found to be non-significant at the 0.05 level. Thus, while the academic performances in the different academic areas for the baccalaureate students bear no resemblance to each other, the academic performances in the industrial education courses of the baccalaureate graduates bear no resemblance to the performances in the other academic areas.

In addition to the analysis of variance computed for the baccalaureate students and baccalaureate graduates and their performances in the academic areas, correlations were conducted on the academic performances for the two groups. The correlations computed between the grade point averages in the academic areas for the baccalaureate students is given in Table 15.

The set of correlations shown in Table 15 indicated there was no relationship between the academic performances in the industrial education courses and the course performances in the other academic areas. At the same time the correlations showed positive relationships with performances in the other three academic areas ($p < 0.01$ or 0.02).

Table 15

CORRELATION BETWEEN THE GRADE POINT AVERAGES FOR THE ACADEMIC AREAS OF STUDY FOR THE BACCALAUREATE STUDENTS (N=43)

Variables	2	3	4
1. Industrial Education Courses	-0.070	-0.014	0.188
2. Liberal Arts Courses		0.724**	0.400**
3. Math & Science Courses			0.379*
4. Professional Education Courses			

*Probability of a chance departure from zero at less than 0.02.

**Probability of a chance departure from zero at less than 0.01.

In other words a student who performed well in one of the academic areas, other than industrial education, performed well academically in the other academic areas, but not necessarily in the industrial education courses. This may have been a result of a different criteria utilized for academic evaluation in the industrial education academic area or indiscriminant grading procedures.

The set of correlations found in the comparison of the grade point averages for the academic areas of the baccalaureate graduates are presented in Table 16. The correlations in Table 16 showed a significant relationship ($p < 0.05$) between the industrial education courses and the liberal arts courses whereby Table 15 exhibited a small negative correlation between the two areas. In fact with the exception of two correlations (the liberal arts and math and science courses, and

Table 16

CORRELATION BETWEEN THE GRADE POINT AVERAGES FOR THE ACADEMIC AREAS OF STUDY FOR THE BACCALAUREATE GRADUATES (N=23)

Variables	2	3	4
1. Industrial Education Courses	0.422*	0.330	0.094
2. Liberal Arts Courses		0.620**	0.157
3. Math & Science Courses			0.039
5. Professional Education Courses			

*Probability of a chance departure from zero at less than 0.05.
**Probability of a chance departure from zero at less than 0.01.

the industrial and professional education courses performances), the set of comparisons shown in Table 15 appear to be quite different from those in Table 16. This apparent difference may be due to either a change in the composition of the undergraduate student body in the vocational education baccalaureate program, or a change in the evaluation process for assigning course grades.

Question #6: What is the relationship between the predicted grade point average utilized for the admission of students into the baccalaureate program and the actual grade point average of the four year students, and final all university average of the baccalaureate graduates? The investigation for this question involved the collection of the predicted grade point averages for the baccalaureate students and graduates. However, as mentioned previously, an insufficient

number of students were admitted on the basis of their predicted grade point average for an analysis to be conducted. In addition, owing to the storage system, it was not feasible to obtain the predicted grade point averages for a sufficient number of baccalaureate graduates in order to calculate any correlations.

In the investigation for a response to this question, it was found that of the 63 baccalaureate students in the study, 13 were admitted with a predicted grade point average which was used as criteria for admission. A total of 26 students, including the above 13 students, had a predicted average calculated, although those for the other 13 were not utilized. Hence 37 of the four year students did not have a predicted grade point average calculation, and 50 were admitted to the program through other than the traditional admission procedure. For the 26 students with a predicted grade point average, the range was from a 1.57 to a 3.05 predicted average. In a breakdown of the predicted grade point averages and the corresponding number of students in that range, it was found that nine students were in the 1.50-2.00 average, eleven were in the 2.00-2.50 average, six were in the 2.50-3.00 average, and one had over a 3.00 predicted average. In the case of one student with a predicted average below a 2.00, his record showed that he had to seek professional counseling as a result of anxiety attacks owing to his inadequate performances in the classroom.

For the students admitted on the basis of their predicted average, the number of students which fall into the sub-ranges were: one student in the 1.50-2.00 range; six students in the 2.00-2.50 range; five students in the 2.50-3.00 range; and one student with above a 3.00. Thus, the predicted grade point averages obtained indicated

that the 13 students admitted on the basis of their predicted average were essentially predicted to be successful. For the predicted grade point averages found on the other 13 students, eight were in the 1.50-2.00 range in which essentially academic difficulties are predicted.

V. SUMMARY, CONCLUSIONS, DISCUSSION, AND RECOMMENDATIONS

Summary

Introduction

Owing to changes in technology, advances in science, and the expanded knowledge about human behavior; our society has been in a state of flux. This consistent growth pattern has required corresponding adjustments in our mode of existence. These adjustments may be made in the form of an autonomic response or a cognizant reaction. In a planned, knowledgeable reaction to change; an awareness of the existing environment as well as the alteration in operation is necessary.

Academic departments, being of a professional nature, are quite apt to be informed of the changes taking place in their field of expertise. However, in order to cope with societal changes, the academic department must be knowledgeable of the existing conditions and corresponding components being affected by the changes taking place. This study's concern was an investigation of several aspects of the teacher preparation programs in the Department of Vocational Education at The Pennsylvania State University. The information found in this investigation was intended to enable the department to react to past, present and future changes which may affect these programs of study and personnel.

Statement of the Problem

This study was concerned with the students enrolled in the certificate and baccalaureate teacher preparation programs of study, and those former students who earned a teaching certificate or baccalaureate degree. The inquiries revolved around selected personal, professional, and academic variables on the students, certificate holders, and graduates. The investigation sought to establish relevant information about these variables and their relationships to each other.

In this regard the study sought answers to the following questions:

1. What characteristics should a vocational education department look for in prospective students?
2. Do the two vocational teacher education programs and their students exhibit any significant differences?
3. Do the student performances in the required areas of study in the academic programs exhibit any group or sub-group significant differences?
4. What are the implications of the years of occupational experience and the performances in the trade competency exam for vocational education students?

In addition this study sought to establish a data base and corresponding computer related system for the analyses. The data and procedures were submitted to the Department of Vocational Education for future comparisons.

Procedure

The individuals utilized for the study were enrolled in the vocational-industrial program in the Department of Vocational Education at The Pennsylvania State University. They were composed of 129 students enrolled in the certificate program and 63 students enrolled in the baccalaureate program as of the Winter Term 1974; and 28 students who earned a Vocational Education II certificate and 23 students who earned a baccalaureate degree from July 1, 1969 through the Winter Term 1974. The data obtained on these individuals came from the University's academic transcripts, records in the Department of Vocational Education, and the Division of Undergraduate Studies at The Pennsylvania State University.

The background and achievement variables collected on the students, certificate holders, and graduates were:

1. The program of study in which the student was enrolled or had completed.
2. Birth date.
3. The number of years of occupational experience.
4. The grade point average for the enrolled students.
5. The grade point average for the baccalaureate graduates and certificate holders at the time of the completion of their program of study.
6. The predicted grade point average for baccalaureate students and graduates.
7. The date of admission or initial enrollment in The Pennsylvania State University courses.

8. The date of program completion for graduates and certificate holders.
9. The percentage score received on the written and performance portions of the trade competency exam, and their average score.
10. The course number, grade, number of credits, and academic area for each course completed either successfully or unsuccessfully.

In order to obtain information to answer the four broad questions posed for this study, nine sub-questions were presented for investigation. These questions were as follows:

1. Is there a significant difference in the academic performances in the two teacher preparation programs of study with regard to the certificate students, the holders of the Vocational Education II certificate, the baccalaureate students, and the baccalaureate graduates?
2. Is there any difference in the academic performances among the academic areas for the following groups:
   a. students in the Vocational Education II certificate program?
   b. students in the baccalaureate program?
   c. holders of the Vocational Education II certificate?
   d. graduates of the baccalaureate program?
   e. all students and former students in the study?
3. What is the relationship between academic performance and the number of years of trade experience?

4. What is the relationship between academic performance and the trade competency exam scores?
5. What is the relationship between the academic performances for the certificate and baccalaureate students and their age?
6. What is the relationship between the predicted grade point average utilized for the admission of students into the baccalaureate program and the actual grade point average of the four year students, and the final all university average of the baccalaureate graduates?
7. What is the relationship between the years of occupational experience and the time taken to complete either the baccalaureate degree or certificate program?
8. What is the relationship between occupational experience and the average score of the two portions of the trade competency exam?
9. What is the relationship between the written and performance scores of the trade competency exam?

In response to these questions, the analyses utilized essentially two statistical methods along with the appropriate follow-up investigations. Question #1 was answered through the use of a set of one factor analyses of variance (ANOV) along with a Bartlett's Test for homogeniety of variances. Follow-up investigations for those ANOV's exhibiting a significant difference were made through the use of the Fisher Least Significant Difference (LSD) Test.

Question #2 was responded to through the use of a set of one factor analyses of variances for repeated measures (ANOVR). For the ANOVR's exhibiting significant differences the Fisher's Least Significant Difference (LSD) Test was also conducted.

The Pearson Product Moment Correlation (PPMCR) was used to answer questions #3, 4, 5, 7, 8, and 9. Owing to insufficient information question #6 was not answered although the available findings were reported.

The procedure followed for the investigation concerned the collection of the data and recording them on one of two computer format layout forms (shown in Appendix C and D). The data were punched on computer cards and entered into the computer. The analyses were conducted through the use of the Remote Job Entry (RJE) Facility. The data were then removed from the computer and placed on a magnetic tape for storage and further use by the Department of Vocational Education.

Findings

Owing to the number of sub-questions asked, four categories were established to report the findings. The first sub-heading was entitled descriptive characteristics and while no question was answered specifically in this section, the information presented offered a base for reference. Thus, the nine sub-questions were then answered in the remaining three sub-headings, which were occupational experience, occupational competency evaluations, and academic programs. The findings reported under the four sub-headings provided the information to respond to the four major questions.

Descriptive Characteristics: The study, as shown in Table 6, found that as of the Winter Term 1974 there were 129 certificate students, 28 certificate holders, 63 baccalaureate students, and 23 baccalaureate graduates. The average age for the enrolled students was 36.65 years with an average age of 42.93 years for the certificate students and 24.84 years for the baccalaureate students. The baccalaureate graduates took an average of 7.74 years to complete their program of study while the certificate holders required an average of 9.25 years to earn their necessary 60 credits.

The average number of years of work experience at the time a program of study was begun or first course was taken was found to be 10.92 years. The certificate groups, meaning the certificate students and holders, had an average of 14.35 years of work experience while the baccalaureate groups had an average of 5.00 years of work experience. With regard to the trade competency exam the average percentage score for the 97 individuals who took the exam was 75.89. The average score for the written exam was 72.00 with those in the certificate group having an average score of 71.17 and the baccalaureate group a 74.18. The average score for the performance exam was 79.39 with an average score for the certificate group of 80.32 and the baccalaureate group of 77.33.

Also as shown in Table 6, the all university grade point average for everyone included in the study was 3.01. The grade point averages for the individual groups were: certificate students 3.14, certificate holders 2.94, baccalaureate students 2.71, and baccalaureate graduates 3.12.

Occupational Experience: For the comparisons between the years of occupational experience and the other variables, the individuals in the study were further identified as to those with 1-5 years, 6-13 years, and 14 and greater years of trade experience. While the distribution for all of the groups was found to be slightly skewed toward the 14 and greater years of work experience, the certificate groups had 17 with 1-5 years, 60 with 6-13 years and 78 with 14 and greater years of experience. At the same time the baccalaureate groups were found to have 57 with 1-5 years, 22 with 6-13 years, and 7 with 14 and greater years of experience.

In looking at the relationship between work experience and academic performance, a correlation of 0.189 was found. While this correlation was statistically different from zero ($p < 0.01$) for 241 observations, only those with 1-5 years were found to have a significant relationship (at $p < 0.01$). The other sub-groups of 6-13, and 14 and greater years had a slight negative correlation. In addition the baccalaureate groups were found to have significant correlation between the two variables ($p < 0.05$) while the certificate groups had a slight negative correlation.

For the relationship between the years of work experience and the number of years to complete the programs of study, the certificate holders showed a negative correlation of -0.416, which was significant at a $p < 0.05$ level. The baccalaureate graduates were found to have a -0.201 correlation between work years and years to complete their degree. This correlation was not statistically significant at even a $p < 0.10$ level. However, in looking at the relationship using the averages for both programs in terms of age and years to complete

the programs, certificate graduates were older and took more years.

The years of work experience was compared to the occupational competency evaluation and only the performance exam was found to be related at $p < 0.10$. In the division of the people who took the exam into the work years sub-groups, only those with 14 and greater work years had a significant correlation with a $p < 0.10$ with the average of the written and performance scores of the competency exam.

Occupational Competency Evaluations: In the investigation of the performances on the written and performance tests and their average scores, three relationships were studied. The one comparison concerned the relationship between the trade competency exam scores and academic performance. The three correlations found for the written, performance, and average scores were not significantly different from zero at $p < 0.10$.

The second comparison concerned the trade competency scores and the years of occupational experience. As discussed in the last sub-section, the only significant correlations ($p < 0.10$) were found between the scores on the performance exam and the number of years of occupational experience, and the average scores for those individuals with over 14 years of work experience.

The final relationship concerned the question regarding the relationship between the written and performance scores on the occupational competency evaluation. The correlation for the 97 observations was 0.143 which was not different from zero at even a $p < 0.10$.

Academic Programs: The sub-questions for this portion of the study sought to investigate the relationships between the academic

performances themselves, the other variables in the study, and the different subject groups. The one comparison involved the all university GPA and the number of years of trade experience. As mentioned in the sub-section on occupational experience, a correlation of 0.189 ($p < 0.01$) was found in that comparison. For the sub-groups on work years, a significant correlation was found for those with 1-5 years of work experience, while a slight negative correlation was found for the other two sub-groups. In addition, the baccalaureate groups were found to yield a significant relationship ($p < 0.05$) between the two variables. The individuals with 6-13 years of occupational experience exhibited a higher grade point average for both the certificate and baccalaureate groups than the other sub-groups based on work experience.

In the correlations found for the relationships between the age of the certificate students (42.97 mean years) and of the baccalaureate students (24.84 mean years), and the all university GPA; only the correlation between the baccalaureate students and age was found to be statistically significant ($p < 0.02$). For the relationship between the occupational competency exam and academic performance, the correlation for the two competency tests and their average score were not found to be related to the students all university GPA at even a $p < 0.10$ level.

The first of the nine sub-questions inquired as to whether or not there were differences between the academic performances of the certificate students, certificate holders, baccalaureate students, and baccalaureate graduates. Thus, a comparison was made for each of the mean grade point averages in the industrial education, liberal arts, math and science, and professional education courses as well as the

all university grade point average for each of the four groups. The analysis of variance revealed significant differences for the four groups at the 0.05 level between the all university GPA as well as for the mean GPA for the industrial education courses. The mean GPA's for the liberal arts, math and science, and professional education courses were not found to be significantly different for the four groups. The Bartlett's Test for homogeniety of variances did not support the hypothesis of equal variances at the 0.05 level for the mean all university GPA, and the mean GPA for the industrial education and liberal arts courses.

In a follow-up test on the mean all university GPA, the Fisher LSD Test identified the following groups as being significantly different at the 0.05 level.

1. Certificate students and baccalaureate students.
2. Certificate students and certificate holders.
3. Baccalaureate students and baccalaureate graduates.
4. Baccalaureate students and certificate holders.

In the follow-up test on the mean GPA's for the industrial education courses, the following groups were identified as being significantly different at the 0.05 level.

1. Certificate students and baccalaureate students.
2. Certificate holders and baccalaureate graduates.
3. Certificate holders and baccalaureate students.

A second comparison involving the mean GPA's for the academic areas concerned whether or not the mean academic performances were significantly different within each group of subjects. The analysis of

variance with repeated measures utilized for this investigation was only possible for the baccalaureate students and the baccalaureate graduates. The two analyses found significant differences at the 0.05 level for both groups. In the Fisher LSD Test performed for the follow-up analyses, the mean GPA's in the academic areas of the baccalaureate students were all found to be significantly different. For the baccalaureate graduates significant difference was found between the GPA for the industrial education courses and the other academic areas.

In the attempt to investigate the relationship between the baccalaureate students' and graduates' predicted GPA and their actual all university GPA, insufficient data was found in order to conduct any analyses. For the 63 baccalaureate students, 13 were admitted with the predicted GPA utilized as a criteria for admission. A total of 13 other undergraduates had a predicted GPA calculated for them but not used as admission criteria. Of these 13 students, eight had a predicted GPA between 1.50-2.00.

Conclusions

Question #1:

What characteristics should a vocational education department look for in prospective students? While a characteristic may be required to provide the necessary background to teach an occupational skill, this question was concerned as to whether there was a level at which the student's academic success was enhanced by these requirements or those indirectly related to them.

One of the characteristics which is required to teach an occupational skill is trade experience. Kapes and Pawlowski (1974) concluded that industrial experience may possess a negative relationship to student shop achievement when many years of experience are involved. In the analyses of these data a significant relationship was found between the number of years of occupational experience and academic performance. However, when the subjects used in this study were divided into sub-groups with 1-5, 6-13, and 14 and greater years of work experience; the only significant correlation ($p < 0.01$) between the years of work experience and the all university GPA was found for those individuals with 1-5 years of work experience.

Also in terms of work years, the baccalaureate students and graduates had an average of 5.00 years while the certificate students and holders had an average of 14.35 years. The correlation between the years of work experience and academic performances were statistically different ($p < 0.05$) for the baccalaureate students and graduates but slightly negative for the certificate students and holders. Thus, academic success as measured by the all university GPA was found to increase as an individual's years of work experience increased up to at least five years.

The time to complete either the baccalaureate or certificate program of study was another measure of academic success. In this regard the number of years of work experience was compared to the time taken to complete either the baccalaureate degree or certificate program. As noted in Table 5 the number of years to complete the certificate program was 9.25 years for the Vocational Education II certificate and 7.74 years for the baccalaureate degree.

When each type of program was analyzed separately the correlation between the years of trade experience and the number of years taken to complete the certificate program was -0.416 ($p < 0.05$). The correlation between the years of trade experience and the years to complete the baccalaureate degree was not found to be significant, but was negative at -0.201. Thus, those with more years of work experience, typically required less years to complete the certificate program of study. However, fewer work years did not indicate a delay in the earning of a baccalaureate degree.

Another characteristic of interest to an academic department is the age of their students. In this regard, as shown in Table 12, the relationship between a student's age and his all university GPA was investigated. No relationship was found between the all university GPA and the age of the certificate students, which was 42.97 years. For the baccalaureate students, who had an average age of 24.84 years, the correlation between the two variables was 0.310 which was statistically different from zero ($p < 0.02$). While the younger baccalaureate student performed better academically in relation to his age, the older certificate student was found to have a much higher GPA.

Finally, a requirement for certification to teach vocational education subjects is the passing of the trade competency exam. A comparison of the scores on the trade competency exam and the student's all university GPA was conducted. The correlations between the academic performances and the written test, performance test, and their average scores were not statistically greater than zero ($p < 0.10$). As a result the performances on either test or their average score was not an indication of ability to do academic work.

Conclusions concerning the favorable characteristics for prospective students in vocational education as found in this study were:

1. As students progressed up to five years of occupational experience, the all university GPA tended to be greater. As the number of years of occupational experience went beyond five years, the academic performances did not increase correspondingly.
2. Vocational-industrial students in the certificate program with fewer years of occupational experience tended to complete their program of study in more years than those students with a greater number of years of work experience. However, students in the baccalaureate program with fewer years of trade experience did not require more years to complete their degree. Overall, certificate students took more years than baccalaureate students to complete their program.
3. Performances on the trade competency exam exhibited no relationship to academic performances.

Therefore, in the final analysis from an academic point of view, a vocational-industrial teacher preparation program should encourage the enrollment of individuals at around 25 years of age with approximately 5 years of occupational experience. Since the scores on the trade competency exam bear no relationship to academic success, they should not be considered as a criteria from an academic standpoint.

Question #2:

Do the two vocational teacher education programs and their students have any significant differences? The descriptive characteristics for the individuals in this study exhibited a number of differences between the students and holders of the Vocational Education II certificate program, and the students and graduates of the baccalaureate program, as shown in Table 6. The students and holders of the Vocational Education II certificate were found on the average to be older, to have more years of occupational experience, to have a higher all university GPA, to score higher on the performance test of the occupational competency exam, but lower on the written test, to take more years to complete their program of study, and to have more students enrolled in their program.

In the investigation of the occupational characteristics for the two groups, the baccalaureate group had more individuals with a lower number of years of work experience, and the correlation between their years of work experience and the all university GPA had a $p < 0.05$. At the same time the certificate group had more individuals with a larger number of years work experience than the baccalaureate group and the correlation between their years of work experience and the all university GPA showed no relationship. In looking at the time taken to complete the certificate program and baccalaureate degree, the study found the certificate program to take more years to complete. In the inquiry as to whether or not the number of years of occupational experience influenced the time to complete either program of study, a negative relationship was found for both groups. The correlation of -0.416 for the certificate group was different from zero ($p < 0.05$)

while the -0.201 for the baccalaureate graduates did not differ from zero ($p < 0.10$) possibly due to the low N of 23. Thus, for the individual groups it appeared that the students with more years of work experience tended to complete their program of study in less years. However, in comparing the averages of work experience and years to complete a program of study for the total groups studied, a positive relationship between the two variables was found.

Another comparison of the two programs involved the age of the enrolled students and their all university GPA. The certificate, or older students, exhibited no relationship between age and academic performance, as shown in Table 12. For the baccalaureate, or younger student group, significant correlation ($p < 0.02$) was found between age and the all university GPA. As a result for the younger student group, age made a positive difference in a student's academic performance; however, for the older certificate group, age was of no consequence.

Finally, the study investigated whether or not there were any differences in the academic performances between the two groups in terms of their all university GPA, and their academic averages in the industrial education, liberal arts, science and math, and professional education courses. Differences in academic averages were found only for the all university GPA, and for the industrial education courses. For the all university GPA a significant difference at the 0.05 level was found between the enrolled students of both groups. For the performances in the industrial education courses, a difference at the 0.05 level was found between the mean averages of the baccalaureate graduates and the certificate students and holders; and between the certificate holders and the baccalaureate students and graduates. In

other words the enrolled students demonstrated a significant difference between each other in their all university average, while in the industrial education courses the former students were found to differ with each other as well as with the enrolled students in the other program.

Conclusions regarding the differences in the two programs of study and their students were as follows:

1. The certificate students were found to be older and to take more years to complete their program of study than the baccalaureate students. However, age was not related to the academic performances for the certificate students whereas the older baccalaureate students tended to have a higher academic GPA.
2. The certificate students had nearly three times as many years of occupational experience as the baccalaureate students. The more years of occupational experience the baccalaureate students and graduates had, the higher GPA tended to be earned. The number of years of occupational experience of the certificate students and holders had no relationship to the all university GPA.
3. The certificate holders with more years of work experience tended to complete their program of study in less years than those with less years of experience. While a negative relationship was also found for baccalaureate graduates between the years of work experience and the number of years to

complete their degree, the relationship was not significant.

4. The certificate students were found to have a higher all university GPA than the baccalaureate students. This difference in their averages was found to be of a significant nature rather than a chance difference at the 0.05 level.
5. No differences were found between the academic averages in the liberal arts, math and science, and professional education courses for the two programs of study. A difference in the grade averages in the industrial education courses was found between the baccalaureate graduates and the certificate students and holders, and between the certificate holders and the baccalaureate students and graduates.

Question #3:

Do the student performances in the required areas of study in the academic program exhibit any group or sub-group significant differences? In the one set of calculations concerning the performances in the required areas of study; the mean all university GPA and the mean GPA for the industrial education, liberal arts, math and science and professional education courses were compared among the certificate students, certificate holders, baccalaureate students, and baccalaureate graduates. A significant difference was found for the mean all university GPA's and the mean GPA's for the industrial education courses between the four groups.

The further analysis of the mean all university GPA's for the four groups revealed significant differences between the certificate students and baccalaureate students, between the certificate students and certificate holders, and between the baccalaureate students and graduates. For the industrial education course averages, a significant difference was found between the certificate holders and baccalaureate graduates, the certificate students and baccalaureate graduates, and the baccalaureate students and certificate holders.

The other comparison of the performances in the academic areas involved a comparison between the mean GPA's in the industrial education, liberal arts, math and science, and professional education courses for the baccalaureate students and for the baccalaureate graduates. For the baccalaureate students the mean GPA's for all of the academic areas were found to be significantly different from each other. In the comparisons for the baccalaureate graduates the GPA for the industrial education courses were found to be significantly different from the means of the other three academic area.

In the correlation between the grade point averages of the academic areas for the baccalaureate students, the industrial education courses did not show any relationship to the performances in the other academic areas. At the same time the academic performances in the other three academic areas yielded significant correlations with each other ($p < 0.02$). For the baccalaureate graduates, the only correlations found significant were between the industrial education courses and the liberal arts courses ($p < 0.05$), and between the liberal arts, and science and math courses ($p < 0.01$).

In conclusion, the differences in the performances in relation to the academic areas of study were as follows:

1. There were no differences found in the performance in the liberal arts, math and science, and professional education courses between the certificate students, certificate holders, baccalaureate students, and baccalaureate graduates.
2. For the all university GPA, significant differences were found between the enrolled students in the certificate and baccalaureate programs, and between the enrolled and former students in the certificate program as well as between the enrolled and former students in the baccalaureate program of study. In the differences between the enrolled and former students in the two programs of study, the certificate students' GPA was higher than the certificate holders while the baccalaureate students' GPA was less than the GPA for the graduates.
3. The performances in the different academic areas for the baccalaureate students were not found to be similar in nature. In the correlation of the course performances for the baccalaureate students, the achievement in the industrial education courses were not found to be related to the other three academic areas, which were found to be highly related to each other.

4. The mean GPA's in the industrial education courses were found to be significantly different from the mean GPA's in the other three academic areas for the baccalaureate graduates. The set of correlations conducted with regard to the course performances of the academic areas for the baccalaureate graduates showed no apparent similarity to the set for the baccalaureate students.

Question #4:

What are the implications of the years of occupational experience and the performances in the trade competency exam for vocational education students? In the investigation of the relationship between work experience and academic performance, a significant correlation was found ($p < 0.01$) between the two variables. However, in the classification of the individuals into sub-divisions based on years of occupational experience, those with 1-5 years were found to have a significant correlation ($p < 0.01$) with their academic performances while those with 6-13, and 14 and greater years exhibited a slight negative relationship.

In another comparison utilizing the number of years of work experience, the years for the certificate holders and baccalaureate graduates were compared to the number of years taken to complete their program of study. For the certificate holders a significant negative correlation was found, while for the baccalaureate graduates a non-significant negative correlation was obtained. However, overall certificate students were older and took more years to complete their

program than did baccalaureate students.

For the trade competency percentage scores, a correlation was calculated between the written, performance, and average total scores and the all university grade point averages. The resultant products of the correlations showed no relationship between any one of the three scores and a student's academic performance.

In the analysis between the occupational competency scores and work experience, a correlation was conducted between the written, performance, and total average scores and the number of years of work experience, as well as for the sub-groups of 1-5, 6-13, and 14 and greater years of experience. A significant correlation ($p < 0.10$) was found between the performance scores and years of work experience, and between the average total score and those with over 14 years of work experience.

Finally, a comparison was made between the written and performance scores for the 97 individuals who passed the exam. The correlation found was not significant at even a $p < 0.10$ level.

Conclusions regarding the occupational experience and the trade competency performances in relation to the programs of study were as follows:

1. the all university GPA was higher for individuals with more work experience within a range of 1-5 years. The all university average was not affected by additional years of work experience beyond the five years.

2. Individuals with more years of work experience completed the certificate program in less years than those with more years of occupational experience. No relationship between the two variables was found for the baccalaureate groups.
3. No relationship existed between the trade competency exams and academic performances as measured by GPA.
4. The number of years of work experience was related only to the performance scores of the trade competency exam at the $p < 0.10$ level. Individuals tended to have a higher total average trade competency score as their number of years of work experience progressed beyond 14 years.
5. There was no relationship found between the written and performance scores of the occupational competency exam.

Recommendations

Academic Related Changes

In reviewing the sums, averages, differences, comparisons, and relationships of the variables for the individuals in this study; numerous implications could be drawn. However, in this section only those aspects of the study which were felt to be more prominent were selected for discussion. As such, six implications are presented along with corresponding recommendations.

1. The two teacher preparation programs of study were found to be very dissimilar in terms of the

individuals associated with the programs. Therefore, different criteria should be emphasized for the admission or recruiting of students into each of the programs. The expectations or requirements for the students in the two programs of study should be related to the type of individuals in the programs rather than being of an identical nature.

2. The study found the younger students and those with fewer years of work experience to perform better academically. The ideal number of years of work experience in this regard seemed to have a peak at approximately five years. Thus, younger students with an interest in teaching should be recruited for both programs even with the understanding that additional work practicum experience would be needed for certification. This then endorses a continuation of the work experience or co-op type of programs.

3. Owing to the lack of relationship between the test scores themselves in the trade competency evaluation and between the trade exam performances and the other variables, the exams and the examination procedures need to be examined carefully. For those individuals who do not do well in an exam or fail one of them, they should have their results analyzed and corresponding rehabilitating course work in their skill area recommended. The

successful completion of a program of courses or practicum should then be required to overcome a deficiency rather than elimination from a program.

4. The course grade procedure in the industrial education courses should be evaluated. Particularly, the practice of giving 15 credits and a course grade of "A" to those who completed the trade competency evaluation successfully should be re-evaluated. This should be reconsidered in view of the misleading grade point averages presented. A pass and credits could be earned without a corresponding grade and resultant grade points.
5. In view of no admission criteria utilized by the University for the majority of the students enrolled in the vocational education baccalaureate program, the department should determine whether or not they should institute their own admission criteria. The establishment of the admission criteria would have to be determined through additional study on pertinent variables; such as previous academic performances, letters of reference, etc.
6. One of the purposes of the Vocational Education II certificate program of study is to allow students to attain a permanent certificate in fewer years. This objective has not been met. An average of 9.25 years was taken to earn the 60 credits required. It is

recommended that a maximum number of years be required to complete the certificate program of study.

For Further Study

In view of the findings from this study, several complementary areas where further study could be profitable have been noted. These were:

1. One of the areas of inquiry in this study was the occupational competency evaluations. However, the scores in this study were only for those individuals who passed the examination. Consequently, the performances for those who did not pass the exam should be investigated. Such a study could include the age and years of work experience for those who did not pass the evaluation as well as personal interviews. The results of such a study could be compared to identical findings in this study for those who passed the exam.
2. A difference in the academic performances for the students enrolled in the two programs was found in this study. It was noted that the two groups either took their courses either at the main campus or primarily at an extension center. Whether or not this observation is true could be investigated as well as whether or not there is a significant

difference between the grades earned on the main campus and those earned at the extension centers.

3. As mentioned earlier, there were a number of individuals who went from the certificate program to the baccalaureate program. Further investigation of these individuals as compared to the findings of this study may offer some insight into the departmental program and products.

4. Finally an extension of this study should be conducted for those individuals who completed the certificate and baccalaureate programs. Such a study could look into their occupational records after graduation from the certificate and baccalaureate programs. For those who are teaching, a teacher effectiveness study should be conducted and related to the data found in this study.

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A P P E N D I C E S

APPENDIX A

DEPARTMENTAL INFORMATION CARDS

As the title may indicate, these cards were used by the Department of Vocational Education to obtain information regarding their students at the time their first industrial education course was taken. As described on page 43, these cards provided this study with data on work experience.

Department of Vocational Education
The Pennsylvania State University
PS_____ IS_____

_____ Term 19_____
Course I Ed_____
Credits_____

Name_____
last first middle initial

Mailing Address_____
street city state zip

Employed by_____
street city state zip

Home Phone_____Business Phone_____Social Security #____

Occupational Experience: Specify kind, e.g., machinist, electrical, carpenter, etc., but don't include teaching time in "number of years."

Kind_____Number of Years_____

College Classification: Undergraduate____Master's____Doctor's_____
Adjunct_____

(OVER)

A P P E N D I C E S

APPENDIX A

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Department of Vocational Education
The Pennsylvania State University
PS_____ IS_____

_____ Term 19_____
Course I Ed_____
Credits_____

Name_____
last first middle initial

Mailing Address_____
street city state zip

Employed by_____
street city state zip

Home Phone_____Business Phone_____Social Security #____

Occupational Experience: Specify kind, e.g., machinist, electrical, carpenter, etc., but don't include teaching time in "number of years."

Kind_____Number of Years_____

College Classification: Undergraduate____Master's____Doctor's_____
Adjunct_____

(OVER)

Indicate with an "X" the teaching certificate which you now hold.

___None	___Voc. Instr. I	___Instructional I	___Voc. Ed. Coord.
___Emergency	___Voc. Instr. II	___Instructional II	___Supv. Voc. Ed.
___Perm. Stnd.	___Voc. Instr. III	___Instructional III	___Direct Voc. Ed.
___Voc. Interim	___Master's Equiv.	___Coop. Ed. Coord.	___Other

Indicate below the subject(s) which you are certified to teach

(1)_____ (2)_____ (3)_____

Are you now employed, indicate your present position-type with an "X"

_____Teacher	_____Director Voc. Ed.
_____Coop. Ed. Coord.	_____Principal
_____Voc. Ed. Coord.	_____Other (indicate below)
_____Supv. Voc. Ed.	_____

(OVER)

APPENDIX B

COURSE NAMES AS INCLUDED IN EACH CATEGORY

As mentioned in Chapter III, one investigation of the academic performances of the students involved a set of data concerning courses taken by each student. These courses were classified into one of five categories as listed below. The names of the courses are included under each category, except miscellaneous.

INDUSTRIAL EDUCATION

Industrial Education and Vocational Industrial Education.

LIBERAL ARTS

American Studies, English Composition, Anthropology, Art History, Chinese, Classics, Composition Literature, Critical Languages Program, Economics, English, French, German, Greek, Hebrew, History, Humanities, International Understanding, Italian, Journalism, Labor Studies, Latin, Liberal Arts, Linguistics, Medieval Studies, Philosophy, Polish, Political Science, Portuguese, Psychology, Religious Studies, Rural Sociology, Russian, Serbo-Croatian, Slavic Languages, Social Science, Sociology, Spanish, and Speech.

MATH AND SCIENCE

Applied Math, Botony, Biochemistry, Biological Science, Biology, Biophysics, Chemistry, Computer Science, Entomology, Math, Microbiology, Physical Science, Physics, Statistics, Astronomy, Ceramic Science, Earth Science, Geochemistry, Geography, Geological Sciences, Geology, Geophysics, Horticulture, Materials Science, Meteorology, Wood Science, and Zoology.

PROFESSIONAL EDUCATION

Art Education, Business Education, Counselor Education, Cultural Foundations of Education, Curriculum and Supervision, Developmental and Remedial Reading, Education, Education of Exceptional Children, Educational Administration, Educational Services, Educational Psychology, Elementary Education, Industrial Arts Education, Instructional Media, Language Education, Math Education, Music Education, Safety Education, Science Education, Secondary Education, Shorthand, Social Studies Education, Speech Pathology and Audiology, and Typing.

APPENDIX C

FORMAT USED FOR STUDENT CARDS

This first format, labeled the "student card," concerned descriptive data and was distinguished from the second format card by an "s" in column 80.

COLUMN	ITEM (b INDICATES BLANK)
1 thru 11	Social Security Number (NN b NN b NNNN)
13	Status Code Number: 1=certificate student 2=vocational education certificate holder 3=baccalaureate student 4=baccalaureate graduate
15 thru 22	Birth Date (NN b NN b NN) (-1=unknown)
24 thru 31	Date of Matriculation or Date of First Course Taken (NN b NN b NN) Note: Month for Winter Term=1, Spring Term=3, Summer Term=6, Fall Term=9; days then = -1.
33 thru 35	All University Average
37 and 38	Years of Occupational Experience
40 and 41	Occupational Competency Exam: Performance Score in Percentage Form (-1=not available)
43 and 44	Occupational Competency Exam: Written Score in Percentage Form (-1=not available)
46 and 47	Occupational Competency Exam: Average of Two Scores in Percentage Form (-1=not available)

49 thru 56	Date of Program Completion for Certificate Holders and Baccalaureate Graduates (NN b NN b NN) Note: Month for Winter Term=3, Spring Term=6, Summer Term=9, Fall Term=12; days then =-1.
58 thru 60	Predicted GPA
80	"s"=Student Card

APPENDIX D

FORMAT USED TO RECORD COURSES

This second format recorded each student's courses, course credit, grade, term taken, and academic area, and allowed for three courses per card. Not all of the data on this card was utilized in this study, however, it was included for possible further studies.

COLUMN	ITEM (b INDICATES BLANK)
1 thru 11	Social Security Number (NNN b NN b NNNN)
13	Status Code Number: 1=certificate student 2=vocational education II certificate holder 3=baccalaureate student 4=baccalaureate graduate
15 thru 19	Course Name (left justified)
21 thru 23	Course Number (used leading zeros)
25 and 26	Course Credits (used leading zeros)
28	Course Grade: A=4, B=3, C=2, D=1, F=0, Pass or S=*, Fail or U=0
30 thru 33	Term Course Taken: FA=Fall Term, WI=Winter Term, SP=Spring Term, SU=Summer Term, OC=Off Campus when term not specified. Year=column 32 and 33. (Example: Fa71=Fall Term 1971)
35	Code Number of Academic Area of Course 1=Industrial Education 2=Liberal Arts 3=Science and Math 4=Professional Education 5=Miscellaneous

37 thru 41	Course Name for Second Course
43 thru 45	Course Number
47 and 48	Course Credits
50	Course Grade
52 thru 55	Term Course Taken
57	Code Number for Academic Area of Course
59 thru 63	Course Name for Third Course
65 thru 67	Course Number
69 thru 70	Course Credits
72	Course Grade
74 thru 77	Term Course Taken
79	Code Number for Academic Area of Course