AN ANALYSIS OF OKLAHOMA SCHOOL-INDUSTRY PRACTICES IN THE PLACEMENT AND EMPLOYMENT OF TECHNICIAN GRADUATES

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Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the degree of
DOCTOR OF EDUCATION
July, 1968

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ACKNOWLEDGEMENTS

The study was conducted with the assistance and cooperation of many people. The writer wishes to express his sincere appreciation to these persons who made this work possible.

Sincere gratitude is expressed to members of the author's graduate advisory committee: Dr. Maurice W. Roney, Chairman, and Dr. Paul V. Braden, who provided guidance and valuable assistance at all stages in the planning and development of the study; Dr. Robert T. Alciatore, whose assistance made this study possible and my ultimate goal attainable; and Dr. William W. Stevenson, who provided constant encouragement and valuable assistance.

Administrators and instructors in the several schools at which the field study was made and representatives attending the employer conferences contributed valuable assistance. These individuals gave of their time in a spirit of cooperation that was a source of inspiration to the investigator.

Special recognition is expressed to Connie Johnston for her patience and efforts in typing the rough drafts. Also, appreciation is expressed to Linda Johns for her typing assistance.

This acknowledgement would be incomplete without recognition of the sustaining patience and sacrifices by my wife, Geneva, who helped to make the study a reality. Neither can I overlook my parents whose support and encouragement never cease to be an inspiration.

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CHAPTER I

THE PROBLEM

Sweeping changes are taking place in American industry and post-high school educational institutions which supply an ever increasing proportion of industry's technical manpower needs. These changes, which have been brought about primarily by new developments in science and technology, are forcing attention to the relationships between education and economic development. A deliberate and systematic effort, therefore, must be made to keep pace and to anticipate changing technical manpower requirements which bring new demands to educational institutions. This may require a new level of school-industry dialogue.

The impact of these rapid scientific and technological changes and the importance of continuing economic development suggests that educational and industrial representatives must work closely together in order to understand and evaluate the developing needs and problems in the area of technical manpower training and utilization. Oklahoma educational institutions are not presently supplying the number of technicians needed in the state and the considerable out-of-state migration of technicians recently trained in the state indicates that Oklahoma educators and employers of technicians may not presently engage in sufficient dialog relevent to this problem. There is not sufficient data available on technician placement and employment practices of Oklahoma organizations and the relationship of these practices to the out-of-state

migration of graduating technicians for sound long-range educational planning. The lack of sufficient data is particularly acute at the two year post-high school level.

Purpose of the Study

The primary purpose of this study was to investigate Oklahoma school-industry placement and employment practices with emphasis on those practices which may be associated with out-of-state migration of recently graduated two year post-high school engineering and physical science related technicians.

The primary purpose of the study can be further delinated by the following specific objectives:

A. To identify placement/employment practices of Oklahoma schools and industries graduating and employing engineering and physical science technicians.

B. To determine the present and projected needs of Oklahoma employers for engineering and physical science technicians.

C. To identify technician manpower requirements not presently being supplied by educational institutions in Oklahoma.

D. To determine the placement/employment communication patterns between Oklahoma educational institutions and Oklahoma organizations employing technician graduates.

Need for the Study

A major goal of Oklahoma is to increase its rate of economic growth. The problem is to develop an overall plan which will efficiently accomplish this goal. A frequently mentioned policy to help

accomplish this goal is to make available the needed resources for the expansion of existing organizations and to attract new industry and business.

Oklahoma has many resources which are vital to the expansion of existing organizations and in attracting new industry to the state. Vital new and expanding resources available in the state include such things as: Developing river waterway transportation; coal, gas, oil, and water provide reserve power; however, foremost among Oklahoma's resources are the young people who must provide the technical skills and knowledge required for economic growth.

If Oklahoma is to grow and prosper in an age of technology, a better dialog must be established between educational institutions and employing organizations of technicians. There is evidence that Oklahoma organizations are not meeting competition from other states in bidding for the services of technical school graduates. While some Oklahoma organizations and the Governor's Commission were pleading for technical manpower needed for the expansion and development of industry, a majority of recently trained Oklahoma technicians left the state upon graduation. Efforts, therefore, must be made by Oklahoma to retain its trained technical manpower.

The problem of economic development in Oklahoma was described by John J. Klein in The Oklahoma Economy (1, pp. 121-122) as follows:

> Oklahoma as a State is behind the rest of the nation in its level of economic attainment, this possibly being attributable to Oklahoma's still recent agricultural origins. Yet, since 1939, the Oklahoma economy has acquired features more like those of the nation: increased industrialization, a rising urban population, declined in the rural economy, and growth of the service industries. A more efficient utilization of resources has occurred. As a result Oklahoma per capita personal income as a percentage of the United States

> averages has increased from 62.1 percent in 1939 to 83.1 percent in 1950.
>
> The task of development in Oklahoma is to accelerate these trends,...

The national need for technical manpower resources is indicated in the U.S. Department of Labor publication, Manpower Research: Mobility and Workers Adaptation to Economic Change in The United States (2, pp. 38-39), which stated:

> Technological changes have occurred with such rapidity in recent years that the supply of technical manpower has failed to meet the need for it. At the present, the number of technicians employed as supporting personnel is approximately three-fourths the number of engineers and scientists. It has been estimated that within a few years, an average of two to three technicians will be needed for each engineer...800,000 additional technicians will be needed by 1970, not including replacement requirements.

Grant Venn in Man, Education, and Work (3, p. 163) further emphasized the importance of this impact of technological change on education and with regard to the relationship between educational institutions and organizations employing technicians, he stated:

> There is a dangerous lack of understanding within the educational community and within business and industry of the impact of technological change on education for work. Few administrators in school systems and institutions of higher education have concerned themselves with vocational and technical education. There has been little exchange of information or discussion among the employers, government, experts, armed forces personnel, propriety school educators, and legislators, who are all concerned with the problem of vocational and technical education.

Maurice W. Roney and Paul V. Braden stated in the preliminary report of the statewide study Occupational Education Beyond The High School in Oklahoma (4, pp. 162-163) that an in-depth study of employment practices and trends is essential if Oklahoma is to attract and hold substantial industries. Regarding the employment practices in Oklahoma industry, the preliminary report related the following general

questions and remarks.

> An intensive study of industrial employment will be necessary before a sound long-range plan for occupational education can be developed. It is apparent that Oklahoma's industries are not meeting competition from other states in bidding for the services of technical school graduates. The unknown factors here are: Is this due to unusual job characteristics in Oklahoma industries? Are there salary differentials? Are Oklahoma firms recruiting and employing technicians from other states? Are their educational and experience requirements for technical jobs realistic? What are their relationships with Oklahoma technical schools? What are their quantitative and qualitative needs for new employees in the future? What kinds of in-plant and in-service training programs are needed for technical employees? These are some of the questions that must be answered before a realistic and efficient plan for occupational education can be developed and implemented.

Investigations are demonstrating that availability of trained manpower is increasing in importance as a major factor in economic progress. For example, the National Manpower Council in A Policy For Skilled Manpower (5, pp. 15, 17, and 19) stated that:

> Only recently have we come to realize that the development and effective utilization of our human resources cannot be left to chance....
>
> We are sometimes likely to forget that the rate of our economic progress depends in considerable measure on the quantity and quality of our available skilled manpower....
>
> Our future progress and strength depend upon a conscious and deliberate concern with our manpower resources.

Oklahoma's need for technicians is illustrated in the following projections appearing in the Oklahoma Employment Security Commission's 1964 study, Manpower in Oklahoma (6, p. 26):

> Employment in technical occupations numbered 35,003 when this survey was made. Despite being the smallest in size, this group will increase at a rate exceeding other categories in the first two forecast years. More specifically, additional requirements for technicians will be 3,747; 11,662; and 18,830 in 1965, 1970, and 1975, respectively.

The Oklahoma Regents for Higher Education also acknowledges the need for technicians in their publication Higher Education Opportunities and Needs in Oklahoma (7, p. 67) in which they declared:

> The demands for technical and vocational education will sky rocket over the next decade, according to all available indexes; consequently, Oklahoma will need to expand its capabilities in these important areas at the post-high school level. The number of technical workers needed for Oklahoma in 1975 is projected to be approximately 50 to 60 percent greater than the 35,000 workers in the technical category who were counted in a 1963 manpower survey...

Despite the importance and need for recently educated technician in Oklahoma, Wilfred M. Bates in "An Examination of the Relationship of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate Degree Programs in Oklahoma" (8, p. 51) found that over one-half (56.8%) of the post-high school graduate technicians who secured employment go out of state for that initial employment.

Dale Yoder stated in Labor Mobility and Economic Opportunity (9, p. 80) that since human resources are scarce and valued above all others, their mobility thus becomes a matter of primary concern to all modern societies.

The urgency of this specific problem is indicated by Roney and Braden in the preliminary report of the statewide study, Occupational Education Beyond The High School in Oklahoma (4, p. 162). Regarding the employment practices in Oklahoma industry, the preliminary study stated that:

> It is apparent that Oklahoma's industries are not meeting competition from other states in bidding for the services of technical school graduates.

Information about placement practices of post-high school institutions offering two year engineering and physical science related

technician programs does not appear in literature on a statewide level. Therefore, it appeared clear that an excellent opportunity existed to relate a study of industry's employment practices of two year post-high school engineering and physical science related technicians with a study of placement practices of Oklahoma educational institutions graduating this kind and level of technicians.

Research Questions

An attempt was made in this study to answer the primary question of the study--What are the Oklahoma school-industry placement and employment practices relating to graduating technicians? Furthermore, what are the implications from an analysis of these placement and employment practices for reducing the out-of-state migration of Oklahoma's graduating technicians? The following research questions were posed in order to identify the specific factors involved in the placement and employment of two year post-high school engineering and physical science technicians.

A. How is the number of graduating technicians of an educational institution associated with the placement practices of its graduating technicians?

B. How is the total enrollment of an educational institution associated with the placement practices of its graduating technicians?

C. How is the type of educational institution associated with the placement practices of its graduating technicians?

D. How is the geographic location of an educational institution associated with the placement practices of its

graduating technicians?

E. How is the number of technicians employed by an organization associated with its technician employment practices?

F. How is the number of total employees of an organization associated with its technician employment practices?

G. How is the major activity of an organization associated with its technician employment practices?

H. How is the geographic location of an organization associated with its technician employment practices?

Scope of the Study

This study included all Oklahoma educational institutions graduating two year post-high school engineering and physical science related technicians and selected Oklahoma organizations believed to employ engineering and physical science related technicians. The placement practices of the technician education programs studied are of the two year associate degree type, although all of them do not include the associate degree as a completion credential.

The number and kinds of educational institutions included in the study were: Seven (7) junior colleges, two (2) technical institutes, one (1) university, and one (1) trade-technical school. All of the programs studied are college credit programs with the exception of those offered by Oklahoma State Tech at Okmulgee, Oklahoma. The placement practices of only four of the 35 programs offered at Oklahoma State Tech were studied. The four programs are: Drafting, refrigeration, industrial electronics, and data processing.

The number and kinds of Oklahoma organizations given an invitation

to participate in the study were: All organizations with an employment of 300 or more; all organizations with a total employment of 200 to 299 which would normally be thought to hire technicians; 50 percent of all organizations with an employment of 100 to 199 and 25 percent of all organizations with an employment of 50 to 99 which were thought to employ engineering and physical science related technicians. The 50 and 25 percent samples were selected by the use of a table of random numbers. The placement and employment practices followed by schools and employers in the sample were based on the 1967 spring graduation period. Restricting the study to this time period was important in order to keep significant economic conditions as constant as possible.

Definition of Terms

Employment Practices.--Employment practices are those procedures followed by employing organizations which materially affect the quantity and quality of job opportunities for technician graduates.

Engineering Technician.--An engineering technician is one whose education and experience qualify him to work in those areas of engineering which require the application of established scientific and engineering knowledge and methods, combined with technical skills, in the support of engineering or scientific activities toward the accomplishment of engineering objectives (10, p. 13).

Follow-up Study.--A study of the experiences or status of former pupils (11, p. 671).

Geographic Mobility.--A movement from place to place (9, p. 86).

Interstate Migration.--A movement from one state to another.

Junior College.--An institution of higher education which offers

the first two years of college instruction, frequently grants an associate degree, and does not grant a bachelor's degree. Offerings include transfer and/or terminal programs (with an immediate employment objective) at the post-secondary instructional level and also may include adult education programs. It is an independently organized institution (public or non-public) or an institution which is a part of the public school system or an independently organized system of junior colleges. The term does not refer to the lower division of a four-year institution, even if this lower division is located on a campus entirely different from the campus of the parent institution (12, pp. 12-13).

Migration.--The voluntary movement of individuals beyond and outside their interaction systems in the community of residence (13, p. 75).

Mobility.--A quality of flexibility, adjustability, and freedom of movement among labor markets (9, p. 82).

Out-of-State Migration.--The voluntary movement of individuals beyond or outside their state of residence.

Physical Science Technician.--Physical science technicians assist physical scientists and engineers in theoretical and applied research, and in solving practical problems. Generally, they work directly with physical scientists. Physical science technicians usually specialize in one branch of these sciences, usually chemistry, physics, or mathematics (14, p. 16).

Placement Practices.--Placement practices are those procedures followed by an educational institution in helping student-learners or graduates to locate work, either part-time or full-time in the field for which they are trained, which is consistent with their abilities, experiences, and backgrounds (12, p. 14).

Post-High School Education.--All education of any kind beyond or in addition to the twelfth grade or its equivalent as that grade is now generally understood and accepted in the public schools of the state of Oklahoma (15).

Post-High School Level.--See Post-Secondary Instructional Level.

Post-Secondary Instructional Level.--The general level of instruction provided for pupils in college programs, usually beginning with grade 13, and any instruction of a comparable nature and difficulty provided for adults and out-of-school youth (11, p. 679).

Standard Metropolitan Statistical Area.--An SMSA is a county or group of contiguous counties which contains at least one city of 50,000 inhabitants or more, or "twin cities" with a combined population of at least 50,000. In addition to the county, or counties, containing such a city or cities, contiguous counties are included in an SMSA if they are essentially metropolitan in character and are socially and economically integrated with the central city (16, p. XI).

Technical Institute.--A school at the post-high school level which offers technical education in one or more fields to prepare people for employment in positions which lie between the skilled workers and professional scientists or engineers (12, p. 20).

Technician Education.--Education to earn a living in an occupation in which success is dependent largely upon technical information and understanding of the laws of science and principles of technology as applied to modern design, production, distribution, and service (12, p. 20). Technician education is considered to be that education related to a technology program, two years in length of the associate degree level (4, p. 94).

Technology.--The application of scientific principles in research, design, development, production, distribution, or service. It often is used to denote a segment of the applied sciences, i.e., electronic technology (12, p. 20).

Trade-Technical School.--The trade-technical school is an educational institution that offers training programs at both the trade and technician level. The primary objective of this type of school is the preparation of individuals for employment. While this type of institution serves post-high school students, it does not give college credit or award an associate degree.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study was to investigate Oklahoma school-industry placement and employment practices with emphasis on those practices which may be associated with out-of-state migration of recently graduated two year post-high school engineering and physical science related technicians. To effectively accomplish this objective, it became necessary to study the placement and employment practices in two phases: (1) Placement practices of Oklahoma educational institutions graduating two year post-high school engineering and physical science technicians, and (2) employment practices of Oklahoma organizations employing two year post-high school engineering and physical science technicians.

The review of literature revealed that a study was conducted recently which investigated the out-of-state migration among recent technician graduates in Oklahoma. This geographic mobility study of graduating technicians, however, did not investigate the placement-employment practices of the Oklahoma organizations graduating and employing these technicians. Actually, no studies were found pertaining specifically to placement-employment practices of schools and organizations graduating and employing engineering and physical science technicians.

An effort was made to keep the several important factors grouped

in the review of literature. The review of literature pertinent to this study is, therefore, divided into the following five sections: (1) The technician; (2) out-of-state migration; (3) placement practices; (4) employment practices; and (5) interrelationships of placement and employment practices.

The Technician

The Technician Identified

The literature indicates there is no universally accepted definition of a technician. The investigator has included selected references on the identification of technicians which appear most representative. The references to the technician which follow, consistently view technician occupations as lying somewhere between the skilled occupations and the professions. In addition, the technician is found across the range of occupational fields and employing organizations.

Attempts at identifying the technician have been made by various means. Some individuals have tried to define the technician while others have tried to provide an understanding of the technician by describing the technical abilities common to technical occupations.

One definition of the technician was provided by the U. S. Bureau of Labor Statistics in Scientists, Engineers, and Technicians in the 1960's (17, p. 39) which stated:

> (Technicians) All persons engaged in work requiring knowledge of physical, life, engineering, and mathematical sciences comparable to knowledge acquired through technical institute, junior college, or other formal post-high school training, or through equivalent on-the-job training or experience. Some typical job titles are: laboratory assistants, physical science aids, and electronic technicians.

The publication Employment Outlook For Technicians by the U. S. Bureau of Labor Statistics (18, p. 1) provided a descriptive statement of the technician by stating the term "technician" is used to describe a large and loosely defined group of occupations at many levels of skill and with a wide variety of training requirements. In general, the publication states, technician jobs fall between those of the skilled craftsman and the professional engineer or scientists.

Maurice W. Roney, in the U. S. Office of Education publication, Occupational Criteria and Preparatory Curriculum Patterns In Technical Education Programs (19, p. 5) stated five general abilities of the technician. They were given as follows:

1. Facility with mathematics; ability to use algebra and trigonometry as tools in the development of ideas that make use of scientific and engineering principles; an understanding of, though not necessarily facility with, higher mathematics through analytical geometry, calculus, and differential equations, according to the requirements of the technology.

2. Proficiency in the application of physical science principles, including the basic concepts and laws of physics and chemistry that are pertinent to the individual's field of technology.

3. An understanding of the materials and processes commonly used in the technology.

4. An extensive knowledge of a field of specialization with an understanding of the engineering and scientific activities that distinguish the technology of the field. The degree of competency and the depth of understanding should be sufficient to enable the individual to do such work as detail design using established design procedures.

5. Communication skills that include the ability to interpret, analyze, and transmit facts and ideas graphically, orally, and in writing.

Roney (19, pp. 6-8) further identified twelve criteria for identifying occupations that require a technician education. He emphasized

these twelve criteria are not necessarily to be given equal weight in identifying technician occupations, and that no single occupation may require all of them. The twelve criteria state that the individual in the occupation:

1. Applies knowledge of science and mathematics extensively in rendering direct technical assistance to scientists or engineers engaged in scientific research and experimentation.

2. Designs, develops, or plans modifications of new products and processes under the supervision of engineering personnel in applied engineering research, design, and development.

3. Plans and inspects the installation of complex equipment and control systems.

4. Advises regarding the maintenance and repair of complex equipment with extensive control systems.

5. Plans production as a member of the management unit responsible for efficient use of manpower, materials, and machines in mass production.

6. Advises, plans, and estimates costs as a field representative of a manufacturer or distributor of technical equipment and/or products.

7. Is responsible for performance or environmental tests of mechanical, hydraulic, pneumatic, electrical, or electronic components or systems and the preparation of appropriate technical reports covering the tests.

8. Prepares or interprets engineering drawings and sketches.

9. Selects, compiles, and uses technical information from references such as engineering standards, handbooks, and technical digests of research findings.

10. Analyzes and interprets information obtained from precision measuring and recording instruments and makes evaluations upon which technical decisions are based.

11. Analyzes and diagnoses technical problems that involve independent decisions.

12. Deals with a variety of technical problems involving many factors and variables which require an understanding of several technical fields.

The literature further identifies the engineering and physical science technicians as those technical personnel who work with engineers and physical scientists in theoretical and applied research, and in solving practical problems. The following statements by the Bureau of Labor Statistics and the Engineering Manpower Commission may further help to identify these particular kinds of technicians to which this study is limited.

Engineering Technicians.--The U. S. Bureau of Labor Statistics in "Employment Outlook for Technicians Who Work with Engineers and Physical Scientists" (20, p. 159) stated that technicians work with engineers and scientists in virtually every respect of engineering and scientific work. Many of them are in research, development, and design work. The document stated that technicians in this type of activity generally serve as direct supporting personnel to engineers or scientists. In the laboratory, it stated they may conduct experiments or tests; set up, calibrate, and operate instruments; and make calculations. They may also assist scientists and engineers in developing experimental equipment and models, and frequently assume responsibility for certain aspects of design work under the engineer's direction.

Physical Science Technicians.--The Engineering Manpower Commission defined physical science technicians in Trends In Engineering Technician Enrollments and Graduates (21, p. 15) as being:

> Students in physical science and mathematics oriented organized occupational curriculums of at least two (2) but less than four (4) years, leading to Associate degree or similar designation. (Do not include Medical or Dental Technicians or others not directly related to the physical sciences.)

The Technician's Education

The technician's education has been defined by the U. S. Office of Education in Standard Terminology for Instruction in Local and State School Systems (11, p. 573) as being a planned sequence of school experiences usually at the post-secondary level designed to prepare persons for a cluster of jobs in a specialized field of technology. The technician's education is further described as including major emphasis in mathematics and science as well as in the area of specialization. The technical education experiences are designed to prepare the individual for the occupational area between the skilled craftsman and the professional person. The technology curriculum is structured to prepare the graduate to: (1) Enter a job, (2) advance with the developments in the technology, and (3) continue his education through the various programs.

In the study Occupational Education Beyond the High School in Oklahoma (4, p. 9), Roney and Braden submitted a similar definition of technician education adopted by the Oklahoma Technical Education Council. The definition adopted by the council was stated as follows:

> Technical Education is a planned sequence of classroom and laboratory experiences, usually at the post-secondary level, designed to prepare men and women for a range of job opportunities in well-identified fields of technology. The program of instruction normally includes study in mathematics, the sciences inherent in a technology, and selected skills, materials, and processes commonly used in the technology. Complete technical education programs provide intensive training in a field of specialization, and include basic communication skills as well as general education studies. Instruction in technical programs gives major emphasis to principles rather than to specific techniques or skills. Industrial applications of these principles are used wherever possible in the instructional program.
>
> The technical curriculum should prepare the graduate to: (1) obtain a job, (2) be a productive employee with a

> minimum of additional on-the-job training, (3) advance with the developments in the technology, and (4) continue his education through extension or other supplementary training programs.
>
> In terms of a continuum of technological occupations, technical education prepares for the area between the operator or special skill jobs and the established professions such as medicine, engineering, and science.
>
> The technician is frequently employed in industrial activities in direct support of the professional employee, performing such duties as designing, developing, testing, or modifying products and processes; planning production; writing reports; preparing estimates; analyzing, diagnosing, and solving technical problems.
>
> Technical personnel also are employed in the agricultural sciences, life sciences, and biological sciences in occupations which require preemployment technical education.

Within the same study (4, p. 8), Roney and Braden described certain specifics which relate to a formal program of occupational studies at the associate degree level. The specifics described were given as follows:

1. The program is usually two years in length.
2. The content is derived from technical skills and knowledge requirements of technical occupations.
3. Mathematics and the physical or biological sciences are integral parts of the program; technical study is mathematics and science-based at all levels of the program.
4. The technical specialization is within an occupational field; but is not confined to, or limited by, the requirements of any single occupation or industry. The emphasis in instruction is placed on technical skills and knowledge that have broad applications.
5. Instruction is laboratory-oriented and makes use of many applications of the technical principles being studied. The emphasis is placed on analytical, rational thought processes rather than on the development of specific procedural techniques or skills.

H. P. Hammond stated in the "Report of Subcommittee of Technical Institutes" (22, p. 6) that the technician may receive his training in

any of a number of types of institutions, such as: (1) Technical institutes, (2) junior colleges, (3) extension divisions of colleges and universities, (4) proprietary schools, (5) industry operated schools or training divisions, (6) government operated schools, or (7) by correspondence schools. Oklahoma provides technician training in universities and the first three kinds of institutions named by Hammond.

The literature identifies the technical institute as being a school which offers technical education to prepare persons for semi-professional jobs. In addition, the junior college is identified as an educational institution which usually grants an associate degree, but not a bachelor's degree, in transfer and/or technology programs. Selected references are given to further identify these types of educational institutions offering technician programs which may be the least understood.

Technical Institute.--A technical institute is defined by Maurice W. Roney in "An Analysis of the Interrelationship of Mathematics, Science, and Technical Subject Matter in Selected Technical Institute Curricula" (23, p. 9) as being:

> A post-high school institution offering training for occupations in which emphasis is placed on the application of the functional aspects of mathematics, and science, or an officially designated, separately organized technical institute division of a four-year institution. The primary purpose of the technical institute is training for an objective other than the baccalaureate degree.

Junior College.--A junior college is defined by the U. S. Office of Education in Standard Terminology for Instruction in Local and State School Systems (11, pp. 92-93) as being:

> An institution of higher education which offers usually the first two years of college instruction, frequently which grants an associate degree, and does not grant a bachelor's degree. It is an independently organized institution (public or non-public) or an institution which is a part of a

> public school system or an independently organized system of junior colleges. Offerings include college transfer courses and programs; and/or technical and semi-professional occupational programs or general education programs at the post-secondary instructional level; and may also include continuing education for adults as well as other community services.

Out-of-State Migration

The literature reveals that since human resources are scarce and valued above all others, their mobility thus becomes a matter of primary concern to all modern societies. Oklahoma has technical trained manpower but a statewide study shows that over half of the recently graduated technicians in Oklahoma migrate out-of-state for their first job.

A study designed to place emphasis on school-industry placement and employment practices associated with the out-of-state mobility of graduating technicians must not over-look the identification of migration, economic and societal importance of mobility, and the relationship of selected variables to out-of-state migration of technicians. The literature reveals the terms migration and geographic mobility are used interchangeably; therefore, they have been treated as the same throughout this study.

Migration Identified.--This study utilizes the definition of geographic mobility provided by Yoder in Labor Mobility and Economic Opportunity (9, p. 86) as follows:

> Mobility--the term as here applied to manpower is used as approximately synonymous with adaptability and implies qualities of flexibility, adaptability, and freedom of movement among labor markets--is thus a major consideration in the process of equating demands for and supplies of manpower.

Yoder (9, p. 86) actually provided a ranking of mobility classification when he stated that even though the most popular recognized

mobility is that generally described as geographic or residential, it may also refer to occupational mobility, involving change from one job to another or to industrial mobility which is a shift from one industry to another.

Bates in, "An Examination of the Relationship of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate Degree Programs in Oklahoma," (8, p. 20) further stated that migrants are usually classified as to those who move within the same county, those who move to a different county, and those who move to a different county within the same state, and those who move to a different state.

Relationship of Migration to Manpower Policy.--Gladys L. Palmer in Labor Mobility and Economic Opportunity (24, p. 111) stated that mobility provides the necessary flexibility in a labor force to meet changes in labor requirements in a labor market, an industry, or a plant.

Yoder (9, p. 80) in establishing the relationship of mobility to efficient use of manpower resources provided a better understanding of this relationship when he said that mobility is a quality of manpower that is of special significance in modern economics. He stated that too little mobility can retard or prevent the effective allocation or distribution of manpower resources and thus occasion its under-utilization or waste and that too much mobility can have almost exactly the same detrimental influence on the application of manpower resources. Since human resources are scarce and valued above all others, Yoder further stated their mobility thus becomes a matter of primary concern to all modern societies.

The Relationship of Migration to Societal Gains and Costs.--Gerald

G. Sommers in The Journal of Human Resources (25, p. 427) declared policy-makers have a special interest in knowing the gains and costs, the return to personal and social investment in manpower relocation. Returns to the investment in mobility he indicated are crucially influenced by other investments in human beings. And Sommers summarized that investments in training, education, and labor-market information are likely to further geographic mobility and to enhance the economic benefits derived from mobility.

Paul Webbink in Labor Mobility and Economic Opportunity (26, pp. 6-7) expressed a concern for the relationship of migration to societal gains when he said:

> In the interest of both long-range and immediate economic, political, and social effectiveness and growth, we turn with deepened concern to this question: Can we gather the facts about why, when, and how people move jobwise, under the circumstances of life in our society in our time, that will enable us to organize our human resources by persuasion rather than by compulsion, and to strengthen our economy without destroying the chief distinctive contribution that we have to make to a developing industrial and business civilization.

In The Journal of Human Resources (25, pp. 428-429) Sommers alluded to the costs to an area due to mobility when he stated:

> The area from which workers migrate is likely to suffer losses in potential production, consumption, and infrastructure...On the other hand, receiving areas may benefit greatly from geographic mobility, in increased production and in the demand for goods, services, and facilities. Although some costs are also transferred from depressed areas along with the migrants, there are indications that an area's benefits from immigration greatly outweigh its costs.
>
> Thus, there is a complex relationship between costs and benefits of geographic mobility, as they pertain to the individual, to area redevelopment policy, and to national economic welfare. Whereas, most analysis settle for returns to the individual. Equally important results are the effects on the productive efficiency of particular regions and on the nation's gross national product.

Sommers (25, p. 428) also commented on the costs to the individual when he expressed the gains of mobility are found to be primarily economic, namely improved employment and income, and the costs are essentially noneconomic. According to Sommers, numerous studies have disclosed that mobility workers stress their loss of friends, relatives, and familiar surroundings, that the actual monetary costs of their move are of secondary importance.

Relationship of Selected Variables to Migration.--The publication Manpower Research: Mobility and Worker Adaptation to Economic Change in the United States (2, p. 23) states:

> There are many factors which impede or facilitate the movement of workers...The willingness and ability to move are affected by such personal characteristics as age, sex, race; by social factors such as level of education, marital status, or income level; by institutional and environmental factors such as employment practices, and home ownership; and individual needs such as the desire for security and for advancement opportunities.

Donald J. Bogue in A Methodological Study of Migration and Labor Mobility (27, p. 149) stated that imigration may be a response to a great variety of economic and social factors such as: (1) work preferences and interests, (2) values which attach to particular operations, (3) differences in human abilities, (4) differences in amount of training and education acquired, and (5) differences in rates of pay among areas for the same type of work.

In regard to geographic mobility of professional and technical manpower, Jack Ladinsky in The Journal of Human Resources (28, p. 475) summarized that professional, technical, and kindred workers are the fastest growing segment of the labor force. Evidence from the 1960 Census reveals that they are close to twice as migrating as any other occupation stratum.

F. Theodore Malm in Industrial and Labor Relations Review (29, p. 479) supported Ladinsky's findings when he said, "...professional and technical workers are the most mobile segment of the labor force."

The literature reveals that education tends to affect geographic mobility. The studies Manpower Research and Training (30), Manpower Report of the President (31), and "The Geographic Mobility of Professional and Technical Manpower" (28), confirm the belief that well educated people are the most mobile, geographic mobility drops off sharply with decreasing education, and low income and high education stimulate geographic mobility.

In Manpower Research: Mobility and Worker Adaptation to Economic Change in the United States (2, p. 21), it was stated the practice of the American worker to change his residence apparently is strongly influenced and limited by the character of his income and employment status. The same study (2, p. 21) also reported that states with the greatest expansion in employment during recent years attracted the greatest number of migrants from other States.

Bates (8, p. 33) summarized the literature on interstate migration when he stated:

> ...there are several variables which tend to affect geographic mobility. These variables appear to be: (1) age, (2) sex, (3) race, (4) level of education, (5) marital status, (6) income level, (7) institutional and environmental factors, (8) home ownership, (9) distance of move, (10) desire for security, (11) advancement opportunities, (12) work preferences and interests, (13) personal values, (14) human abilities, (15) rates of pay, (16) family size, (17) type of education, (18) employment status, (19) employment opportunities, and (20) employment practices.

Out-of-state Migration of Recent Oklahoma Technician Graduates.--Bates in "An Examination of the Relationship of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate

Degree Programs in Oklahoma" (8, p. 84) surveyed 175 (1967) technician graduates from nine junior colleges and technical institutes. Data were received from 95 percent of the 175 technician graduates and the conclusion reached by Wilfred M. Bates in his study was that the differences in employment practices which were demonstrated by the employers from Oklahoma and out of state did tend to affect interstate migration among the technician graduates of the associate degree programs in Oklahoma's junior colleges and technical institutes. Bates summarized his study (8, pp. 83-84) as follows:

> There appears to be a direct relationship between several variables related to employment practices and where the technician graduates secured their first job. For instance, nearly 76 percent of the technician graduates who remained within Oklahoma had received recruitment literature from in-state employers, whereas only 55 percent of them had received similar literature from out-of-state employers. Likewise, almost 84 percent of the technician graduates who migrated out of state had received recruitment literature from out-of-state employers as compared to 53 percent of them who had received similar literature from employers in Oklahoma. Employers in Oklahoma secured the services of the technician graduates who stayed within the state through at least eight sources. On the other hand, primarily only three sources were needed by out-of-state employers to secure the services of the technician graduates who migrated out of state. It appears that out-of-state employers utilized the services of the institutional placement office more than did the in-state employers. The findings indicate that in-state employers had interviewed at least 67 percent of the technician graduates who left the state, whereas the out-of-state employers had interviewed only 49 percent of the technician graduates who stayed within Oklahoma. This tends to indicate less effective recruitment on the part of the employers from Oklahoma. Again, the employers from out of state made use of "on campus" interviews much more than did the in-state employers. Nearly 94 percent of the technician graduates who moved out of Oklahoma were interviewed by out-of-state employers on their respective campuses. The employers from Oklahoma interviewed only 60 percent of the technician graduates who remained within the state on their respective campuses. Also, the employers from in state interviewed on campus 54 percent of the technician graduates who left the state, whereas only 32 percent of the technician graduates who stayed within Oklahoma were interviewed

on campus by out-of-state employers. This also tends to support the previous conclusion pertaining to effective recruitment by in-state employers. The number of job offers actually made to technician graduates who remained within Oklahoma by out-of-state employers and the number of job offers actually made to technician graduates who migrated out of state by employers from Oklahoma were equal. Certainly, there was a direct relationship of the number of job offers by in-state and out-of-state employers to where the technician graduates finally chose to live. The findings showed that out-of-state employers paid, on the average, approximately 13 percent more for the services of the technician graduates than did the employers from Oklahoma. Likewise, the employers from Oklahoma were able to secure the services of only thirty-eight technician graduates, whereas the employers from out-of-state were able to employ fifty of the technician graduates.

The purpose of this study was to investigate the placement and employment practices of Oklahoma schools and industrial organizations graduating and employing these 1967 spring graduating technicians studied by Bates with emphasis on those practices which may be associated with out-of-state migration of these graduating technicians.

Placement Practices

The literature reveals there is general agreement that placement is a vital function of schools graduating technicians. In addition, placement is considered too important to be trusted to another agency or to a part-time faculty assignment.

A study designed to investigate the placement practices of schools educating technicians must not over-look the identification of post-high school placement, the function, and need for technician placement. Actually a dearth of information was found relating to school placement practices. The literature refers to only two studies of placement practices in junior colleges and one study of placement practices of high school vocational (trade and industry) graduates. No information

was found relating to the placement practices of technology programs graduating technicians. The following discussion on school placement, however, is given to provide a basis for the identification and function of school placement.

Post-High School Placement Identified.--Milton C. Mohs defined college placement in Service Through Placement in the Junior College (32, p. 3) when he stated:

> ...placement may be defined as a service which assists its student clients in relating their personal qualities, education and experience to occupational requirements, assists them in their search for employment and cooperates with employers in the successful induction of the student into part-time and career positions. It also assists employers by screening and referring qualified applicants for jobs and acts as a liaison agent in acquainting college personnel with the needs of business and industry...An analysis of this definition shows that the act of placement is not limited to the pooling and distribution of workers; rather, in its activity, it cuts across the fields of counseling, training and evaluation through follow-up; providing a service alike to both clients--applicant and employer.

Placement practices as used in this study not only utilizes the definition suggested by Mohs, but also the one suggested by the American Vocational Association (12, p. 14) which referred to placement as being those procedures followed by an educational institution in helping technician student-learners or graduates to locate work, either part-time or full-time in the field for which they are trained.

The Function and Need for Technician Placement.--Concerning the function and need for technician placement, Norman C. Harris and William R. Yencso in Technical Education in Michigan Community Colleges (33, p. 68) stated the placement function is not only a vital service, which also boosts the quality and recognition of technical programs, but the placement personnel themselves can establish the rapport with employers

so necessary to the operation of effective technical programs.

Venn also emphasized the function and need for technician placement when he stated in Man, Education, and Work (3, p. 149) that:

> Colleges and universities attempt to place their graduates, especially those on the graduate level, in appropriate positions anywhere in the nation, or even in the world. Graduates are urged to return to the institution for short courses, seminars, and professional meetings. Their credentials are kept on file and updated for future use. But nothing like this occurs between the high school or junior college and its students, even though guidance and placement needs at these levels are more acute and complex than at the professional level.

The American Society for Engineering Education further stated in "Characteristics of Excellence in Engineering Technology Education" (34, pp. 20-21) that since engineering technology curricula are occupationally oriented, the student normally expects that some effort will be made to aid him in contacting prospective employers. A question was designed and later directed to each of the eleven school representatives in order to determine the involvement of Oklahoma schools in the placement of their graduating technicians. The American Society for Engineering Education propounded the placement function is extremely valuable to the student, the institution, and industry.

Walter Brooking emphasized the same need for technician placement service as did the American Society for Engineering Education when he stated in the U. S. Office of Education publication "Criteria for Technician Education--A Suggested Guide" (35, p. 94) that graduates of technical programs should be aided in every way possible in finding suitable employment. He again stated the placement function is an extremely valuable service to the student, the institution, and to employers.

Placement, A Service to Students.--In the successful placement

office, the emphasis is first--and foremost--on the counseling and assistance to the student. Editors Everett A. Teal and Robert F. Herrick in The Fundamentals of College Placement (36, p. 3) posed this point and have stated the placement office can help students:

1. By providing counsel and guidance to help them with their career decisions as well as with the less important questions that arise along the way;

2. By furnishing materials which will carry on employer contacts;

3. By maintaining an ample supply of reading materials on careers and employing organizations;

4. By stimulating and encouraging each one to obtain his own individual goals;

5. By having a full and complete knowledge of any supplementary or other advisory services on the campus which could complement the placement program; and

6. By creating a warm and friendly atmosphere that will stimulate them to continue their relationships with the placement office after they have become alumni.

Placement, A Service to Employers.--It is also stated in The Fundamentals of College Placement (36, p. 5) the placement office can aid employers. Teal and Herrick indicate school placement can benefit employers:

1. By making their needs and operations known to the students and alumni;

2. By enabling them to visit and interview qualified applicants and to make contact with the professors and other college personnel;

3. By serving as a channel for considerations of a special nature, such as scholarships, equipment needs, speaker services, consultant and research contacts, etc.

4. By keeping them informed of changes in educational programs or in student preparation for degrees; and

5. By helping them to gain a deeper insight into the areas of mutual professional organization that draw the employer and the placement organization together.

Placement, A Service to the Institution.--It has long been said that to be truly fulfilled, and to achieve his sense of purpose, man must work. The college placement officer, therefore, according to Teal and Herrick, is dedicated to helping each individual meet this need. This, as stated by Teal and Herrick, is a purpose founded on a sense of obligation and on the very highest principle of service to others. Editors Teal and Herrick further stated in The Fundamentals of College Placement (36, pp. 6-7) that the placement officer can serve the institution:

1. By establishing himself as a source of accurate and timely information on economic and industrial market trends;

2. By having an intimate knowledge of campus personnel and services for obtaining and distributing important and helpful information;

3. By encouraging and expanding contracts that contribute to the advancement or enlightenment of the staff;

4. By making certain that the employers are acquainted with all of the several areas of academic specialization;

5. By keeping alert to any additional areas of service that might be helpful to the school; and

6. By participating actively in on- or off-campus activities that will further the recognition of the service.

Technician Placement, School Function.--In determining what agency or agencies should be responsible for technician placement Harris and Yencso (33, p. 69) stated that education and training youth for jobs is only a part of the community college function. The other part of the college's function is placing them in jobs for which they are suited, and assisting them to grow in those jobs to positions of increasing responsibility. Harris and Yencso stated:

> Placement is much too important to be trusted to another agency, or to a part-time faculty-assignment, or to the

haphazard job-hunting efforts of students themselves.

College Placement Services versus Other Public Placement Agencies.--Mohs (32, p. 9) with regard to the agency or agencies to handle college student-graduate job placement, propounded independent placement by the state service, should be used only when the college is unable to provide its own service. Mohs said:

> No office could function adequately in the placement of youth without access to school personnel data, without its staff being on the campus for consultation with teachers and counselors, and without the staff having a thorough knowledge of the school program including the kind and quality of its various courses.

When an employer is considering the hiring of a young worker for a trainee level job, according to Mohs, he instructively thinks of the college. Usually he has some kind of contact--a teacher, a counselor, or an administrater. Mohs indicates the employer would prefer to work directly with one of these people rather than through other outside agencies.

Questions were asked in each of the interviews of the eleven Oklahoma schools to determine if the placement was (1) considered a primary function of the school's total guidance program, (2) the primary responsibility of the students and/or other organizations, or (3) the total responsibility of the students and/or other organizations. In his study of seventy-six junior colleges, Leland Medsker in The Junior College (37, p. 145) reports that in more than 90% of the two-year colleges studied, placement of students on jobs was reported as part of the program of personnel services and in 70% of colleges with an enrollment of 1,000 or more students, specialized officers were designated for the job.

Yet in the face of a widespread acceptance of the need for

placement service Mohs (32, p. 7) stated the majority of colleges provide their placement director with meager facilities, and a minimum of personnel. In regard to placement resources, each of the eleven school representatives were asked if they considered their school's placement resources to be adequate or inadequate and if inadequate, the major resources needed.

Norman C. Harris in Technical Education in the Junior College/New Programs for New Jobs (38, p. 89) seemed to be in full agreement with Mohs on the importance of placement and stated that placement is the keystone in the occupational education structure. He said placement should not be left to chance, nor should it be entrusted entirely to some agency outside the college. The assistance of other placement agencies (public and private) as stated by Harris may be welcomed, but the major directive effort should be centralized in one person or office at the college. Harris propounded:

> Coordinators, department chairmen, counselors, and faculty members may (and should) assist in placement, but the overall effort must not be incidental and uncoordinated. Industrialists and businessmen seeking employees should be able to deal with one office at the college. Placement records (student personnel files and job listings) should be centralized where they may be kept up to date, and this office, under the direction of a trained placement official, should provide students, graduates, and potential employers with efficient and courteous service.

In regard to the possible need for a trained school placement official, a question was raised in each interview asking the school representative to state the title of the person primarily responsible for technician placement. Harris then emphasized:

> It is especially important that the junior college which operates semi-professional and technical education programs have an effective placement bureau. Graduates of these programs move into relatively new occupational streams where channels for job placement are not yet well established.

> The professional occupations on the one hand, and the trade and craft occupations on the other, are served by public and private agencies accustomed to dealing in these well established job categories. In general these same agencies are not accustomed to serving the semi-professional worker, and by the same token, employers with "middle level" job openings do not normally seek these employees through existing agencies. Junior college graduates and local employers, too, will be best served if the college operates its own placement bureau.

Suggested Guidelines for Placement and Follow-Up.--James W. Altman in "School and Community Factors in Placement of Vocational* Graduates," Research In Vocational and Technical Education (39, p. 115) stated the following school activities were found to be associated with superior graduate placement and employment performances:

1. The development of an organized placement program with a designated coordinator and with responsibility assigned to a number of staff members.

2. A policy of actively seeking and using community support to help place graduates.

3. A systematic accumulation of knowledge concerning individuals to be contacted within revelent community sources of assistance.

4. Frequent use of personal contact, advisory services and "open house" events to communicate with the community.

5. Development of community awareness of the areas in which students receive training and the formation of favorable attitudes concerning the quality of this training.

In regard to the suggested school activity "Development of Community awareness of the areas in which students receive training" (see No. 5 above) the following question was directed to each of the eleven school representatives interviewed in this study: How did your school disseminate technician placement employment information to Oklahoma employing organizations?

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*Trade and Industrial Graduates

Altman (39, pp. 119-120) summarized some of the general findings about placement of trade and industry graduates to which his study "School and Community Factors In Placement of Vocational Graduates" has led. The general findings were:

1. School activity is central to effective placement.

2. An effective school effort is focused in a coherent program which accepts responsibility for placing students.

3. A placement mechanism in the school does not suffice; the school must take the initiative in contacting organizations throughout the community.

4. A base of good will and communication with all elements of the community is desirable, but the major effort should be aimed where the jobs are--at potential employers.

5. The school cannot abrogate its responsibility for placement through recourse to some other organization--not even to one as sympathetic and knowledgeable about placement as the Employment Security Office. To do so is to invite graduate placement which is less than optimum.

Harris (38, pp. 89-90) suggested the following guidelines for the operation of a placement bureau in a community junior college where occupational education is a recognized function:

1. Centralize placement activities in a placement office under the direction of a trained placement official.

2. Encourage placement efforts by faculty and staff in a planned and orderly manner, but with coordination of the total effort in the placement office.

3. Dedicate the efforts of the placement office to the real job--career placement. If budget and staff permit, the service of casual placement may be rendered to students, but avoid letting "the tail wag the dog."

4. Conduct an energetic (and continuous) campaign of information about the placement office until every business, industry, and agency in the region knows of its existence and purpose.

5. Cooperate with and enlist the assistance of local employment agencies, both public and private.

6. Keep records on students and job openings current--if not day by day, at least week by week.

7. Match students to jobs so that mutual satisfaction (employer-employee) will result. The reputation of the placement office, and indeed, the reputation of the college's occupational education program depends on the integrity and skill of placement personnel in this regard.

8. Prepare the student for his job interview. Get him ready to face his prospective employer by "training" him in the placement office.

9. Appoint a director of placement who will get out into the community and locate job openings like a trained reporter sniffs a news story. An "office recluse" waiting for the telephone to ring will not be very effective.

10. Make use of all the citizens' advisory committees in the placement effort. An annual "advisory committee night" in the spring (dinner, program, visits to regular classes and laboratories which have been moved to an evening hour for "advisory committee night") is often extremely productive.

11. Make placement important on campus. Use bulletin boards, display racks, photographs of former students at work on their jobs, feature articles in the campus newspaper. Bring last year's graduates back occasionally to talk to freshmen orientation sections about their education at the college and their work on the job. Get the local city and county newspaper to run articles on graduates working at interesting jobs.

Venn summarized Occupational Guidance, Placement, and Follow-up in Man, Education, and Work (3, p. 150) by stating that guidance, placement, and follow-up must become a recognized responsibility of all schools and colleges if education is to achieve its purposes in a technological society.

In summary, the literature on placement practices offers a definition of placement and attempts to establish not only the importance of placement to the student and employer, but also to the school. Placement was defined by the literature as being those procedures which

assist students in the search for employment and is the cooperation with employers in the induction of students into part-time and career positions. Placement can provide counsel and guidance to help students make career decisions; make employer needs and operations known to the students and others; and help school representatives establish a rapport with employers so necessary to the operation of effective technical programs. Mohs (32), Harris, (38) and Yencso (33) are in agreement that placement is a vital function of the schools graduating technicians, and that placement is too important to be trusted to another agency, or a part-time faculty-assignment.

One major objective of this study was to investigate the technician placement practices of the eleven Oklahoma educational institutions graduating two year post-high school engineering and physical science technicians. An interview schedule was designed, pre-tested and implemented to obtain the desired school placement information in areas such as degree of involvement in placement, placement resources, person primarily responsible for placement, sources of information on technician job opportunities, how placement/employment information was disseminated to students and employers, and the in-state/out-of-state differences in school-industry relationships.

Employment Practices

Employment practices as used in this study encompass those procedures followed by employing organizations which materially affect the quantity and quality of job opportunities for technician students and graduates. These employment practices include such areas as (1) ratio of technicians to engineers and physical scientists, (2) sources of

technicians, (3) vertical mobility, (4) communication patterns with institutions graduating technicians, and (5) projected technician manpower needs.

The literature seems to indicate the key to successful employment practices is to keep the schools informed of technician job opportunities and to be actively involved in part-time technician student employment. In addition, the employer must follow the interview immediately with a job-offer-letter and keep the placement officer informed of their negotiation with students.

A dearth of information is available on the employment practices of organizations employing technicians, especially with respect to sources of technicians, vertical mobility, and communication patterns with institutions graduating technicians. A number of selected references, however, are referred to in this review which provide insight into not only the demand for technicians in general, but the selected references provide information as to the importance of recruitment, part-time student employment, and offer suggestions with regard to employment policies and recruitment practices.

Present and Projected Technician Manpower Needs.--There seems to be little question that the nation's need for technical manpower is increasing at a much faster rate than the supply. In the publication, Manpower Research: Mobility and Workers Adaptation to Economic Change in the United States (2, pp. 38-39), it was stated technological changes have occurred with such rapidity in recent years that the supply of technical manpower has failed to meet the need for it. The publication further stated that at the present the:

...number of technicians employed as supporting personnel is

> approximately three-fourths the number of engineers and scientists. It has been estimated that within a few years, an average of two to three technicians will be needed for each engineer...800,000 additional technicians will be needed by 1970, not including replacement requirements.

Nationally, according to the U. S. Bureau of Labor Statistics (14, p. 21), about 50 percent of all technician employment is in engineering and physical science related occupations. While in Oklahoma the engineering and physical science technicians in 1963 constituted only 32.5 percent of all technical occupations reported by the Employment Security Commission (6, pp. 64-70).

The projected technician employment needs in the engineering and physical science related areas for Oklahoma are well below national projections. The expected growth of technician employment in Oklahoma for this group according to the Employment Security Commission (6, pp. 18-23), is 36.5 percent. According to the Bureau of Labor Statistics estimates (14, pp. 53-54), technician employment will increase nationally 75 percent during the same time period (1963-75). A question was directed to each of the industrial representatives representing the 77 organizations studied asking for the number and kind of additional technicians their organization will need by 1972.

Implications for Campus Recruiting.--George S. Odiorne and Arthur S. Hann reported in Effective College Recruiting (40, p. 10) that a number of "important" implications for college recruiting grow out of manpower projections in our economy. One stated by the authors was that the company which does not recruit effectively stands a small chance of meeting its staffing needs for qualified high level manpower. To determine in this study the extent Oklahoma employers recruit technicians, the following question was directed to the industrial representatives:

Do you actively recruit graduates of 2-year specialized post-high school technical programs?

According to P. W. Maloney in Management's Talent Research: Recruiting Professional Personnel (41, pp. 22-23), it is the disadvantage of non-campus hiring that drives employers to the schools where there is a big pool of qualified people actively seeking jobs. Maloney believed the over-all advantages of campus recruitment are:

1. The marketplace is well structured. Under employer pressure, placement operations have come a long way in most schools. It is relatively easy for employer and applicant to get to know each other.

2. At one swoop the employer can look over a cafeteria of skills. He can construct the "ideal" training background for his vacancies and, at least in the larger universities, find candidates who come reasonably close to it.

3. The campus hire is normally young, with a 40-year career ahead of him.

4. The employer can gain in other ways from the contacts he establishes at these centers of knowledge.

The main disadvantages of campus recruitment given by Maloney are:

1. Though the graduate's youth allows full career development, it also means that he may not have gained complete emotional maturity. This calls for better (i.e., more time-consuming) supervision once he is on the rolls.

2. He is mobile, and there's a high statistical probability that he will be working for someone else in a few years.

3. He is unproven in the real world; even though the data he has collected on the graduate show good academic performance, the employer will often find himself encumbered with a dud.

4. The employer gets entangled in long-range recruitment commitments that may prove embarrassing. Visit dates must be set far in advance of the trip, invitations for plant visits and offers of employment will often have to be extended several months before the man can come on the rolls, and back-up efforts like summer employment, faculty visits, and seminar participation must be scheduled long before the event. So long as the

program stays on an even keel, this is fine; when the hiring target disappears or is filled, someone may ask what it's all about.

5. The last disadvantage we might mention is probably another aspect of the long-range commitment problem: the fact that many or most of the male hirees have an Armed Services obligation. If the employer courageously decides to ignore this problem, he commits himself to taking on military-leave returnees two or even three years hence.

Benefits of Work Experiences to Educational Institution, Student Employer, and Local Community.--The American Association of Junior Colleges in "Occupational Education Bulletin" (42, pp. 1-2) proposed the following benefits on advantages of work experience education to the college, the student, the local employer, and the community:

Benefits to the College and Student:

1. Provides an opportunity for the college to relate academic training to job requirements.

2. Utilizes many community facilities and resources for training purposes, thus making it possible for the school to provide training in fields that the school program could otherwise not serve.

3. Increases the school's ability to hold students in school for a longer period of time.

4. Provides assistance in occupational guidance.

5. Enables the school to keep abreast of developments in the business and industrial world.

6. Provides a direct avenue through which the school can meet community needs.

7. Develops good school-community relations.

8. Acquaints employers with the work that young people trained in junior college can perform.

9. Provides a way to meet student occupational training needs.

Benefits to the Employer:

1. Provides the employer with carefully selected, part-time help who may become permanent at a later date.

2. Provides an opportunity for the employer to train possible future employees by use of the methods that he has found to be most satisfactory for his operation.

3. Provides the employer with employees who are receiving additional training through related instruction at school.

4. Serves as a training program for prospective employees of small businesses or industries that are unable to conduct extensive training programs within their own establishments.

5. Reduces turnover because the employees have become adjusted to the job before they accept full-time employment.

Benefits to the Community:

1. Provides the community with an increased source of well-trained workers.

2. Provides the community with a labor force that is more thoroughly and efficiently trained and hence works more efficiently.

3. Increases cooperation between the community and the college.

4. Increases the possibility that young people will remain in the community after graduation, since they will already have found a place in community life.

Part-time Employment.--In regard to part-time work Mohs (32, pp. 25-26) stated the arguments for part-time placement are fairly substantial. In summary the benefits he stated are:

Value to the Student:

1. The education the student receives from the job both from the technical and human relations stand point.

2. Vocational and occupational information acquired first-hand from working in the field.

3. The maturing effect of working with adults.

4. The earning of money which enables the student to remain in school.

Value to the Employer:

1. The provision of screened help to fill marginal hours and lower level positions.

2. The opportunity to try out workers for jobs which may develop into full-time positions after graduation.

Value to the College:

1. The establishment of friendly relations which may later result in full-time orders.

2. The provision of laboratories off-campus which in effect enlarge school facilities with better equipment than the school can provide.

3. The flow-back of information from business or industry which keeps the school technically upgraded.

4. The public relations values accruing to any institution which provides a professional and needed service to the community.

5. Information gained about the student as a basis for recommendation for full-time employment later.

Summer Employment.--Summer employment, as with work experiences and part-time employment, can not only provide benefits to the student but also to the employer and the school. According to Management's Talent Search: Recruiting Professional Personnel (41, pp. 141-142) the intrinsic employment benefits are: (1) the employer has a chance to get a good reading on the student and to sell him on the opportunities that await him; (2) the student can find out what he has to know before deciding whether the organization has what he seeks in a permanent job, thereby reducing the likelihood of his becoming an after-one-year resignee; and (3) the biggest gain may well be in the area of image construction where the student will be able to relate his educational experiences with the real world of work.

The literature emphasized the importance of part-time and/or summer work to a point the investigator felt a question directed to the 77 Oklahoma employer representatives on this subject would be fruitful. The following question was directed to each of the representatives: Do you place technical students in part-time work during the school year or summer?

Suggested Recruiting Techniques and Policies.--Maloney (41, p. 34) suggested that decision making in the hectic season of recruitment will not tolerate long chains of command. Fast acting organizations will force the slow acting ones to search for new hirees all over. He states:

> Though management may be willing to wait it out the candidate may not; and he has the final say. The fast-moving organization will leave only picked bones for the laggard. To be specific if it takes a month to decide whether or not to invite a man to the plant, the employer may find that the candidate has already managed for as many visits as the school will allow...The February graduate who gets an offer in mid-March will already have two weeks service with a competitor under his belt.

Problems Related to Employment.--A problem associated with employment was expressed by Rudolph Corvini in "A Closer Look at Colleges Recruiting" (43, p. 373) when he stated that as a result of hordes of company representatives swarming over college campuses--in some cases outnumbering the students whom they come to interview--the emphasis, particularly in engineering and the physical sciences, has been on enticing men to accept offers rather than on selection.

Schools' Criticisms of Recruiters.--Corvini in "A Closer Look at College Recruiting" (43, p. 373), which provided information about recruiting practices at 60 "better known public and private colleges and universities," stated that "consensus of the placement officers was that their criticisms were minor and directed at a very few recruiters."

Corvini summarized:

> Most of the criticisms have to do with the mechanics of recruiting and relate to practices obviously not business-like, which are being used by inexperiences, unqualified, or inconsiderate recruiters. For example, placement officers are justifiably critical of recruiters who fail to supply adequate information in advance concerning the company and its job opportunities, who do not follow up campus visits either with students or placement officers for an unreasonably long time, or who fail to keep the placement officer informed of their negotiations with students.

A question was directed to each of the employer representatives asking if their organization sent a list of job openings and literature to schools explaining the benefits of working with their organization. Those employer representatives answering in the affirmative were then asked to identify the schools this information was sent.

Employment Manager-Placement Officer Functions.--The functions of the employment manager and the placement officer complement one another. Without a total commitment of both, the placement/employment activities of schools and employing organizations are something less than needed. Corvini (43, pp. 374-375) summarized these functions when he said the employment manager's objective is to fill a job with the most qualified person available and the vocational counselor's objective is to help the student make an occupational adjustment which will maximize his talents and afford him the greatest satisfaction.

In summary, the key activities which seem to be associated with successful employment practices as referred to in the literature are: (1) Organizations must actively recruit on campus; (2) be actively involved in student summer and part-time employment; (3) mail-out job offer letter soon after interview, and (4) supply placement personnel with adequate information in advance concerning the company and its job

opportunities as well as keep the placement officer informed of their negotiations with students.

One of the purposes of this study was to investigate the employment practices of Oklahoma organizations employing graduating technicians. An information sheet was designed, pre-tested, and implemented to obtain the desired employment information in areas such as ratio of technicians to engineers and physical scientists, sources of technicians, vertical mobility of technicians, communication patterns with educational institutions graduating technicians, and projected technician manpower needs.

Interrelationships of Placement and Employment Practices

Statements regarding the purpose and importance of the coordination and interrelationships of placement and employment activities of schools and employing organizations were found in the literature. The purpose of placement-employment activities appear from the literature to be the matching of jobs and graduates. According to the literature the degree to which this can be accomplished depends upon the creation of jobs in industry and the development of worker abilities in schools. Too, according to the literature, this requires a closer relationship between educational institutions and employing organizations. Ways and means suggested in the literature to bring about the necessary dialog between schools and industry are: (1) To give industry more of an investment in school programs and it is predicted they will more actively hire the graduates and more fully support the school, and (2) conduct follow-up studies of graduates and utilize the results. And finally the literature emphasized the need for the establishment of a national research and planning body which could analyze available data

from national, state, and local agencies to determine occupational change, manpower needs, and other economic and service pattern changes. References regarding these activities will follow.

Purpose of Placement-Employment Activities.--Corvini (43, p. 374) stated that selection and placement can be thought of as the process of matching men and jobs through analysis of men and jobs, and eventual evaluation to determine the adequacy of the matching process. Corvini also stated that selection and placement can be thought of as an attempt to predict behavior.

The President's Committee on Manpower reported in the 1965 Manpower Report To The President (31, p. 143):

> Matching workers and jobs is one of the chief goals of an active manpower policy. The progress we make toward this objective depends, in part on achievements in the two other major areas of manpower policy--the creation of jobs and the development of workers abilities. But the degree of worker mobility--between employers, industries, occupation, and geographic areas--is another determining factor.

Job Placement Records and Hiring Practices.--In regard to school job placement record and hiring practices of employers, Samuel M. Burt (44, pp. 109-110) concluded and recommended from manpower and skill needs studies and related matters that no other area of industry-education cooperation calls for so much participation by industry, either formally or informally.

Need for Cooperation between Educators and Employment Service Staff.--Burt in Industry and Vocational-Technical Education (44, p. 110) stated:

> ...It is apparent that if educators and state employment service professionals are to coordinate their manpower and skill needs surveys, as required by the Vocational Education Act of 1963, closer working relationship will be necessary to develop survey techniques and instruments useful to both groups.

Burt suggests the Employment Service needs to develop improved instruments, techniques and procedures for conducting manpower and skill needs surveys. Both the Employment Service and educators, he said, must develop a reasonable program for the sharing of Vocational Education Act of 1963 funds provided for educators to conduct such surveys. Also, Burt suggests that educators learn to utilize other programs and services of the Employment Service.

Results of Better Relations Between Industry and Education.--According to Mohs (32, p. 13) the relationships established between the colleges and industry via the officers of the placement bureau can produce powerful and effective friends for both institutions. There are points of similarity, he said, between the two organizations which should engender sympathetic understanding and cooperation.

Regarding the need for employers to revise hiring practices to employ more occupational education program graduates, Burt (44, pp. 116-117) stated that:

> It is felt that employers will participate more fully and actively in the conduct of the school program and the hiring of its graduates if their investment in the program is in part direct and personal, rather than entirely from "impersonal" local, state and federal taxes.

Burt propounded that unless close, meaningful relationships are developed between industry and the schools so that employers do hire graduates of the occupational programs, it is pointless to engage in and conduct sophisticated manpower and skill needs surveys by and for use of educators.

Corvini (43, p. 375) further emphasized and summarized the results of better relations between industry and education when he stated:

> If industry will make long-range plans for manpower, employ competent specialists to determine job specifications in

> terms of individual traits unrelated to race, creed, or color, do a good job of frankly communicating its needs to colleges and universities, and cooperating with colleges and universities in setting up mutually advantageous programs such as summer work for students and exchange programs of faculty members and industry personnel wherever, feasible; and if colleges and universities will use information provided by industry along with similar information from government, and professions, and health, welfare, and education agencies to set up pertinent curricula, realistic standards of admissions, and effective counseling and placement services--then, in time, the following benefits should result: (1) More effective screening by business and professional schools of applicants for admissions; (2) more selfscreening by applicants in job hunting; (3) more selective placement by college placement officers; (4) fewer school visits and fewer interviews for each person hired; (5) more attention to the individual by both placement officers and company recruiters; (6) elimination of stock-piling and hand-to-mouth procurements; (7) elimination of distortion in the manpower demand-supply situation; (8) elimination of unnecessary competition which raises the market price for high-talent manpower.

An endeavor was made in this study, as a result of the emphasis Burt, Mohs, and Corvini placed in the importance of close school-industry relations, to investigate the communication patterns of Oklahoma schools and industry graduating and employing graduating technicians. Several questions were directed to school and industrial representatives in an effort to identify the communication patterns between schools and employing organizations.

Ways of Establishing and Maintaining Cooperation Between Schools and Industry.--G. Ross Henninger propounded in several sections of The Technical Institute in America (45, p. 141) the effectiveness of close and continuing relationship between the technical institute and the employers in its community or service area. Henninger stated:

> One of the methods which will maintain such relationships on a strong foundation and which will greatly assist the technical institute in keeping pace with the rapid changes in technology is a continuing program of follow-up of graduates...Aside from yielding direct benefit to the improved

> operation of the individual technical institute the information collected can provide a valuable and authentic source for informing the public about the technical institute and its contributions to the community. It also can serve to focus public attention upon the good working relationship between industry and education and serve as a vehicle for public recognition and acknowledgment of such operation. For all these reasons, a sound, efficient program of follow-up of graduates has become an essential feature of the successful technical institute.

An aid in establishing and maintaining cooperation between schools and industry was proposed when Burt (44, p. 110) suggested that the:

> Establishment of a national research and planning body whose sole purpose would be to analyze available data from national, state, and local agencies and other organizations to determine trends in occupational change, economic growth, manpower needs, population shifts, and social patterns is a proposal of some merit. Particularly important would be the interpretation of this information in terms of implications for occupational education program requirements and priorities. It is also proposed that the same type of planning body be established in each of the states and that area conferences be convened periodically to discuss among other items, occupational needs of the areas and long-range plans of educators to meet these needs.

CHAPTER III

DESIGN AND METHODOLOGY

The purpose of this chapter is to describe the design of the study, the methods by which the populations for the study were determined, and the methods of data collection and analysis. The selection of a research methodology was influenced by the dearth of established guide lines not only in the educational field, but also in the industrial and business fields. This lack of uniform standards and descriptive terminology while, justifying to a degree the need for the study, also precluded the use of certain investigative techniques. Normative-survey techniques utilizing check lists, rating scales, or score cards did not appear to be suitable means of gathering placement and employment information. Mailed questionnaires also appeared to be of limited value. Lacking established parameters for technical terms, it became necessary to obtain data especially from employer representatives by a more direct means of investigation. There appeared to be a better chance of obtaining consistent results by a personal face-to-face discussion with school representatives and a group-conference with employer representatives where technical and educational terms were defined before seeking information about their organizations' employment practices. These procedures were expected to reduce the chance for misunderstanding and misinterpretation arising from the use of nonstandardized terms.

The techniques selected for the study were to interview school

representatives in educational institutions about their placement practices of graduating technicians and to conduct employer conferences where the engineering and physical science technicians were first identified and their abilities and potentials discussed before asking employer representatives to complete the prepared information sheet on employment practices.

Design Rationale

An ex-post-facto design seemed desirable for this study, even though such a design has limitations, because the independent variables had already occurred and the study did not lend itself to experimental inquiry. The ex-post-facto design of this study conforms to Fred N. Kerlinger's definition stated in Foundations of Behavioral Research (46, p. 360):

> Ex post facto research may be defined as that research in which the independent variable or variables have already occurred in which the researcher starts with the observation of a dependent variable or variables. He then studies the independent variables in retrospect for their possible relations to, and effect on, the dependent variable or variables.

With regard to the limitations of ex-post-facto research, Kerlinger (46, p. 371) cautioned that:

> Ex post facto research has three major weaknesses: (1) the inability to manipulate independent variables, (2) the lack of power to randomize, and (3) the risk of improper interpretation.

Kerlinger (46, p. 372), however, in speaking of the value of ex-post-facto designs stated:

> Despite its weakness, much ex post facto research must be done...simply because many research problems...do not lend themselves to experimental inquiry.

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> It can even be said that ex post facto research is more important than experimental research. This is, of course not a methodological observation. It means, rather, that the most important social, scientific, and educational research problems do not lend themselves to experimentation, although many of them do lend themselves to controlled inquiry of the ex post facto design.

Ex-post-facto research by nature is usually involved with "follow-up" procedures. A description of follow-up studies was provided when Laure M. Sharp and Rebecca Krasnegor (47, p. 1) stated follow-up studies involve research designs which require a contact with individuals who have shared experience in the past and whom the researcher desires to study or restudy.

Follow-up studies can be divided into two main classifications: explanatory and descriptive studies. Of course, some studies combine the two techniques.

Explanatory studies attempt to explain a situation, test a theory, or draw inferences of causality. There are two types, diagnostic, which search for possible causes in evaluating a situation, and experimental which try to create new situations by manipulating the environment and introducing experimental factors to gain an understanding of the actual operation of a system.

Descriptive studies, in general, describe the characteristics of individuals, groups, or situations by drawing inference from data primarily with an informative rather than heuristic purpose.

The design of this study, it would then appear, could be considered as ex post facto of a descriptive nature implemented by personal interviews and group conferences.

Design

The ex-post-facto design of this study manifests itself in the following methodological steps:

1. The purpose of the study was carefully reviewed.
2. The population for the study was identified and divided into educational institutions and employing organizations which graduate and employ technicians respectively.
3. The separate instruments for data collection were constructed, pre-tested, and finalized relating to the two populations identified above.
4. Data collection procedures were concentrated in the personal interview method, in the educational institution population, and the conference.
5. The analysis was structured similar to the present chapter in that the placement and employment practices were first analyzed separately and then specific comparative analysis undertaken where much analysis was fruitful. The primary statistical analysis approach will be number and percentage comparisons, the Chi-square technique, simple listings, and pertinent remarks.

The remainder of this chapter, with the exception of a short analysis summary, will be devoted to a separate review of the population, instrumentation, data collection and analysis of the following two phases of the study:

1. The methodology relating to a placement practice phase accomplished by personal interviews, using a previously

prepared interview schedule, with chief administrators of technical programs at eleven educational institutions.

2. The methodology relating to an employment practice phase accomplished through employer conferences, using a previously prepared information sheet, where employer representatives were briefed on the technician before they were asked to complete the information sheet.

Methodology for Placement Practices

Selection of School Population

All schools in Oklahoma that graduated engineering and physical science related technicians in the spring of 1967 were selected for inclusion in the study because of the small number of schools and to exclude errors which might be introduced by sampling. There are eight junior colleges, two technical institutes, one trade-technical school, and one university in the state of Oklahoma which provide engineering and physical science technician programs. These institutions include: (1) Altus Junior College, (2) Cameron State College, (3) Connors State College, (4) Eastern Oklahoma A. & M. College, (5) Langston University, (6) Murray State College, (7) Northeastern Oklahoma A. & M. College, (8) Northern Oklahoma College, (9) Oklahoma State Tech, Okmulgee, (10) Oklahoma State University Technical Institute, Oklahoma City, (11) Oklahoma State University Technical Institute, Stillwater, and (12) Sayre Junior College. Altus Junior College was not included in the study since the school was not graduating engineering and physical science related technicians in 1967.

Instrumentation and Data Collection of Placement Practices

Instrumentation.--Research utilizing the follow-up procedure is usually carried out through personal interviews with the persons of whom information is desired, or through the use of self-administered or group-administered questionnaires. The method of gathering placement data for this study utilized personal interviews using a previously prepared interview schedule with chief administrators of the eleven educational institutions.

An interview schedule was developed and pre-tested with the cooperation of two administrators in the Oklahoma State University Technical Institute, Stillwater. Needed changes were made and a revised interview schedule was developed (see Appendix A).

Approximately ten days before the interviews were to be held the chief administrators of the eleven campuses were contacted by letter (see Appendix B) and a convenient date was arranged for the interviews. An interview schedule was included with each letter so the president or director could determine which school official could best supply the kind of information requested in the interview schedule.

Data Collection.--Placement data for the study were obtained during the period from April 1, to April 8, 1968. Personal visits were made to all of the Oklahoma schools graduating engineering and physical science related technicians in the spring of 1967. The procedure followed during the interviews was the same at each institution. From one to two hours was spent at each of the eleven schools. The person interviewed at each school was either the chief administrative official or a school representative whom the chief administrator felt was better qualified to answer questions regarding the school's placement practices

of its graduating technicians. Responses were obtained to all of the questions called for on the interview schedule from each of the school representatives. All persons interviewed were encouraged to express freely their opinions on the subjects under discussion. All interviews were recorded, using a portable tape recorder, to free the investigator from writing activities while the interview was conducted. No school representative expressed opposition to the tape recorder being used. The following questions formed a basis for these interviews.

POLICIES AND PROCEDURES--GENERAL:

Which of the following statements best represents your institution's practices with regard to the placement of your 1967 technician graduates?

Placement was considered a primary function of our total guidance program.

Placement was the primary responsibility of the students and/or other organizations.

Placement was the total responsibility of the students and/or other organizations.

Were adequate resources devoted to technician placement activities?

Who at your school had the primary responsibility for technician placement?

SOURCES OF INFORMATION ON TECHNICIAN JOB OPPORTUNITIES:

What sources of information did your school use in determining technician manpower needs and employment opportunities for graduating technicians?

GETTING INFORMATION TO STUDENTS:

How did your school communicate placement/employment information to technician students?

GETTING INFORMATION TO EMPLOYERS:

How did your school disseminate technician placement/employment information to Oklahoma employing organizations?

IN-STATE/OUT-OF-STATE DIFFERENCES IN SCHOOL-INDUSTRY RELATIONSHIPS:

What was the approximate distribution of the total school-industry placement/employment effort between in-state employers and out-of-state employers?

Who in your judgement rated the highest, in-state employers or out-of-state employers, in the following employment activities?

Number of inquiries about graduating technicians.

Detailed literature giving information about employing organizations.

Provides literature with regard to technician job openings.

Number of requests to meet with technician groups on campus.

Number of requests for technician classes to visit employing organizations.

Provides well-defined paths for technicians to advance to positions of increased responsibility and pay.

Number of interviews conducted on campus.

Provide opportunities for individual graduates to visit employing organizations for interviews.

Pay for interview trip to employing organizations.

Attractiveness of job title.

Offers the highest level of entry positions commensurate with ability level.

Provides opportunity for additional formal education (education expenses, time-off, etc.)

Other fringe benefits (moving expenses, temporary housing, etc.).

The interview schedule was used as a framework for discussing placement practices with school representatives. There appeared to be no reluctance on the part of any of the eleven school representatives interviewed to discuss the major topics being investigated. Where

differences of opinion appeared between two school officials the opinion of the higher official was recorded.

Throughout the interviews with school representatives it was evident the problem being studied was one of interest and concern to most school personnel. Without exception the persons participating in the study were helpful and cooperative. A factor which contributed to the success of the information-gathering process was the personal acquaintance of the investigator with representatives of the institutions in which the placement study was made. The personal nature of the interviews required a contribution of time and effort on the part of all individuals concerned. This contribution was made willingly in a spirit of professional service.

In general the information obtained and reported in the following chapter on presentation and analysis of the data was gathered as planned. This information was obtained from all Oklahoma schools graduating engineering and physical science technicians in the spring, 1967.

Data Analysis of Placement Practices

Since the placement study involved a complete population, the method of analysis which could provide the understanding needed was determined to be a frequency and percentage analysis. A frequency and percentage analysis of placement data was obtained in a manner so as to permit comparison of placement practices with employment practices.

Methodology for Employment Practices

Selection of Employer Population

Key factors in the selection of an employer population were constraints such as budget, time, and research manpower and the recommendations made by two Oklahoma State University Manpower specialists for technician manpower studies in Oklahoma. R. L. Sandmeyer and Larkin B. Warner, contributors to the preliminary report of the statewide study Occupational Education Beyond the High School in Oklahoma (4) estimated, with the purpose of estimating technician employment to provide a foundation for educational planning in technician areas and identify establishment for field survey purposes, there were between nine and ten thousand technicians in Oklahoma. The efforts of R. L. Sandmeyer and Larkin B. Warner were related to estimating current technician employment in Oklahoma by using national percentages of technician employment by industry class as established by the Bureau of Labor Statistics. The distribution of these technicians by technician category was found by R. L. Sandmeyer and Larkin B. Warner (4, p. 25) to approximate the national distribution and was roughly as follows:

Engineering and physical science, 50 percent;
Drafting, 25 percent;
Life sciences, 7 to 8 percent; and
"Other" technicians, 15 percent.

The Oklahoma City and Tulsa Standard Metropolitan Statistical Areas were found by R. L. Sandmeyer and Larkin B. Warner (4, p. 36) to account for almost two-thirds of the estimated employment of technicians. Furthermore, Sandmeyer and Warner (4, p. 39) found the technicians to be concentrated in Oklahoma by industry division as follows:

Manufacturing, 27.5 percent;
Government, 32.5 percent;
Transportation, communication, gas, and sanitary services, 7.2 percent;
Mining (including petroleum), 7.3 percent;
Construction, 3.4 percent; and
"Other" industries, 22.1 percent.

It was decided because of constraints with respect to budget, time, and research manpower to discard any attempt at random sampling with the exception of the manufacturing sector. The selection of establishments within the above constraints would, of course, concentrate on large establishments in the metropolitan areas of Oklahoma City and Tulsa.

Manufacturing.--A new (1967) edition of the Directory of Oklahoma Manufactures (48) provided the information needed to draw a sample of establishments from the manufacturing sector. It was decided to categorize manufacturing establishments listed in the directory by the number of employees. The number of Oklahoma organizations given an invitation to participate in the study were: All organizations with an employment of 300 or more; all organizations with a total employment of 200 to 299 which would normally be thought to hire technicians; 50 percent of all organizations with an employment of 100 to 199 and 25 percent of all organizations with an employment of 50 to 99 which are thought to employ engineering and physical science related technicians. The 50 to 25 percent samples were selected by the use of a table of random numbers (49, pp. 428-431). The groups of establishments by employee size, number, number considered employers of technicians and sample size are listed in Table I.

The selection of establishments in the 50-299 employees classification was completed on the basis of the judgment of a committee in the

Technical Education Department. The primary criteria of the selection was the nature of product and previous experience with the placement of technician graduates in Oklahoma.

TABLE I

MANUFACTURING AND RELATED ESTABLISHMENTS

Establishment By No. of Employees	Number	Considered Employers of Technician	Percent In Sample	Sample Size	Actual Return	Percent Return
500 and over	29	29	100	29	28	97
400-499	12	12	100	12	4	33
300-399	23	23	100	23	4	17
200-299	55	33	100	33	3	9
100-199	128	74	50	37	4	11
50-99	177	88	25	22	3	14
Totals	424	195		156	46	

Non-Manufacturing.--It was decided because of constraints with respect to budget and time to discard any attempt at random sampling in non-manufacturing categories and simply select the local, state, and federal government establishments known to utilize technician manpower as follows:

1. Local government--all eleven city governments representing 25,000 population and over.
2. State government--State Highway Department
3. Federal government--five establishments--Oklahoma City

Air Material Area, Fort Sill, U. S. Bureau of Mines, Federal Aviation Agency, U. S. Army Corps of Engineers, and U. S. Naval Ammunition Depot.

The categories of wholesale and retail trade, finance-insurance, real estate, and service were not included in the population for study since there is a relatively low concentration of engineering and physical science technicians in these activities.

Instrumentation and Data Collection of Employment Practices

Instrumentation.--The approach to identify employment practices of post-high school technician education graduates by selected Oklahoma employers was somewhat unique in methodology. The approach was very direct, in that Oklahoma employers were asked to provide specific statistical and policy information relating to the employment of two year post-high school technician graduates, and not just "technicians." The unique feature was the procedure used to obtain this information from Oklahoma employers. Group conferences were held in which employers were given a detailed explanation of technician education. The scope and level of a two year post-high school technology curriculum was illustrated to make certain that the technical level of the occupations under study was well identified.

The study of employment practices began with a meeting of sixteen Oklahoma employers who served as a steering committee. The steering committee was selected by the Oklahoma City and Tulsa chambers of commerce and met on October 5, 1967 at the Oklahoma State University in Stillwater. (See Appendixes C and D for an agenda of the meeting and a list of participants.)

Upon completion of briefing the committee on the purpose and level of the study an instrument designed by the investigator to gather employment information was critiqued and further developed by the steering committee (see Appendix E). Each member of the steering committee was then asked to complete the revised information sheets relative to their organization's employment practices of technicians and return them by mail to the investigator.

The instrument used to gather the statistical and policy information consisted of several different types of items. Many of the items were questions and tables asking for specific statistical data from the organization's records. One table asked for the respondent to make employment estimates about the future based on present trends and future expectations. Other items were to be ranked according to policy and practice. Several of the questions provided space for the respondent to add information considered to be pertinent but not included in the instrument.

Data Collection.--Acting upon the recommendations of the October 5 steering committee meeting, a series of four conferences with Oklahoma employers were held in November, 1967 at the Oklahoma State University and one each in Oklahoma City and Tulsa during the month of December, 1967 for those organizations whose representatives were unable to attend one of the first four conferences. The content and contributors of all employer conferences were similar in order to keep all conditions as constant as possible. A typical agenda for each of the November and December conferences is shown in Appendix F. At each of the conferences the employer representatives were briefed on the purpose of the study and the specific type of "technician education graduate" being studied.

Then the system for collecting employment information was discussed in detail by the investigator. The data gathering instruments were then given to the participants to be completed and returned to the investigator. The following questions formed a basis for obtaining specific information in selected areas.

Engineering and Scientific Personnel:

What is the approximate number of personnel presently employed in engineering and physical scientist job classifications?

Of those presently employed in engineering and physical scientist job classifications, what number have engineering degrees, physical science degrees, and other education?

Technical Personnel (Semi-professional):

What is the approximate number of personnel presently employed in your organization in semi-professional technical positions (engineering or physical science related)?

Current Technician Employment Practices:

From what sources does your organization fill semi-professional technical positions?

Do you primarily fill semi-professional technical positions with recent graduates of 2-year post-high school technical programs or with experienced technicians?

What geographic location is your primary source of technicians?

Do you actively recruit graduates of 2-year specialized post-high school technical programs?

Do you have positions for which a 2-year post-high school technical graduate is given employment preference over those with other educational backgrounds (including non-technical B.S. degrees)?

Does your organization hire 2-year post-high school technical graduates who have not fulfilled their military requirements?

Do technicians in your organization have a well-defined path for advancing to positions of increased responsibility and pay?

What are your relations with two year post-high schools in Oklahoma which graduate technicians?

Projected Technician Employment Practices:

How many 2-year post-high school technical graduates, including additional positions and replacements, do you anticipate hiring over the next five years?

Throughout the industrial conferences it was evident the employment problem being studied was one of interest and concern to employers. Without exception the persons participating in the employment study were helpful and cooperative. All gave generously of their time. Factors contributing to the success of the information-gathering process was the active participation of a nationally known technical education specialist and three outstanding industrial representatives who also participated on the program of the seven industrial conferences.

Weakness in the employment research procedure, while not considered serious, did exist. Necessary time and finances prevented a study of employment practices in greater depth. Invitations to attend the conferences were not honored to the degree as the investigator had hoped. The attendance at the conferences may have been greater had the investigator mailed invitations to key employer representatives. The names of key persons might have been obtained from industrialists attending the first planning conference.

In general, however, the employment information obtained and reported in the following chapter on presentation and analysis of the data was gathered as planned.

Data Analysis of Employment Practices

The facilities of the Oklahoma State University Computer Center were used to make the analysis of the employment data. The analysis of data was broken down by relative emphasis, namely by: Major activity

number of technicians employed, number of total employees, and geographic location of employers. The flow begins with the employment practices of technicians, continues with future employment practices, and concludes with placement/employment communication patterns between educational institutions and employing organizations.

Overall Analysis

Chapter IV, Presentation and Analysis of the Data, will consider the data collected in this study in the following form:

1. A separate analysis of placement practice phase.
2. A separate analysis of employment practice phase.
3. A comparative analysis of data where fruitful results are indicated.

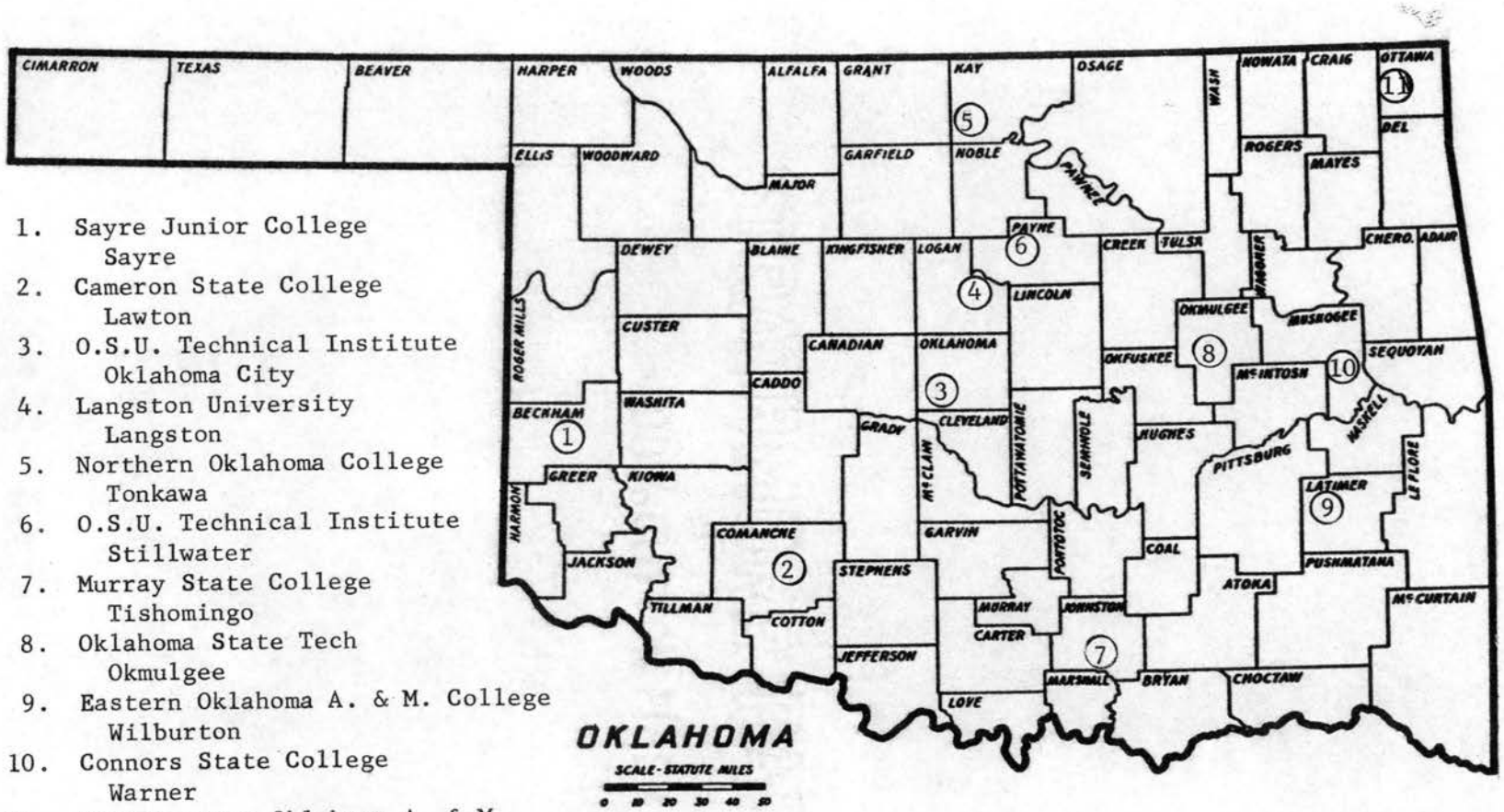
CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

The objective of this chapter is threefold: (1) To analyze the technician placement practices of Oklahoma educational institutions graduating engineering and physical science related technicians, (2) to analyze the employment practices of Oklahoma organizations employing two year post-high school technicians during the spring of 1967, and (3) to indicate areas of association between (1) and (2) above. The chapter is organized around individual research questions.

Background Information on Placement Practices

Placement information for this study was obtained from school representatives of all eleven post-high schools in Oklahoma who graduated engineering and physical science related technicians in the spring of 1967. The eleven educational institutions consist of seven (7) junior colleges, two (2) technical institutes, one (1) university, and one (1) trade-technical school. The location of the eleven schools is shown in Figure 1. The 1967 spring enrollments of the eleven schools varied from one junior college enrollment of 176 to a university (main campus) enrollment of 14,495. A listing of the school population and enrollments is shown in Table II. The number of graduating technicians at any one school varied from three to seventy-one. Table III provides a frequency analysis of the technical programs and graduates of the



1. Sayre Junior College
   Sayre
2. Cameron State College
   Lawton
3. O.S.U. Technical Institute
   Oklahoma City
4. Langston University
   Langston
5. Northern Oklahoma College
   Tonkawa
6. O.S.U. Technical Institute
   Stillwater
7. Murray State College
   Tishomingo
8. Oklahoma State Tech
   Okmulgee
9. Eastern Oklahoma A. & M. College
   Wilburton
10. Connors State College
    Warner
11. Northeastern Oklahoma A. & M.
    College, Miami

Figure 1. Location of Eleven Oklahoma Schools That Graduated Engineering and Physical Science Technicians, Spring, 1967.

TABLE II

ENROLLMENTS OF ELEVEN OKLAHOMA SCHOOLS
SPRING, 1967[a]

Institution	Head-Count Enrollment	FTE Enrollment[b]
Cameron State College	2,274	1,712
Connors State College	507	474
Eastern Oklahoma A. & M. College	958	970
Langston University	1,206	1,238
Murray State College	607	589
Northeastern Oklahoma A. & M. College	1,519	1,498
Northern Oklahoma College	943	837
Oklahoma State Tech (Okmulgee)	2,080	--
Oklahoma State University Technical Institute (Oklahoma City)	581	--
Oklahoma State University Technical Institute (Stillwater)	14,495	13,838
Sayre Junior College	176	157

[a]Excludes enrollments in off-campus centers, and those in extension, correspondence, or adult education courses.

[b]The FTE enrollment is calculated as follows: The total semester credit-hours earned by undergraduate students are divided by the figure 15, and the total semester-credit hours earned by the graduate students are divided by the figure 12. The sum of these two calculations constitutes the FTE enrollment.

Source: Oklahoma State Regents for Higher Education. Enrollments in Oklahoma Higher Education, Spring Semester, 1967. Oklahoma City: Oklahoma State Regents for Higher Education, 1967.

TABLE III

NUMBER OF TECHNICIAN PROGRAMS AND GRADUATES OF ELEVEN OKLAHOMA SCHOOLS SPRING, 1967

Institution	Number of Technician Programs	Number of Graduating Technicians
Cameron State College	2	10
Connors State College	1	2
Eastern Oklahoma A. & M. College	5	15
Langston University	1	3
Murray State College	1	3
Northeastern Oklahoma A. & M. College	5	36
Northern Oklahoma College	2	10
Oklahoma State Tech (Okmulgee)	3	56
Oklahoma State University Technical Institute (Oklahoma City)	6	25
Oklahoma State University Technical Institute (Stillwater)	8	71
Sayre Junior College	1	3

Source: State Board for Vocational and Technical Education, Stillwater, Oklahoma, and Wilfred M. Bates, "An Examination of the Relationships of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate Degree Programs In Oklahoma." (unpub. Ed.D. dissertation) Oklahoma State University, Stillwater, Oklahoma, Jan. 1968.

eleven schools.

The placement practices were analyzed by grouping the data into the following areas: Number of graduating technicians, total school enrollment, type of educational institution, and geographic location of schools. The four groupings of placement practices were utilized in investigating four research questions. The four research questions were:

1. How is the number of graduating technicians of an educational institution associated with the placement practices of its graduating technicians?
2. How is the total enrollment of an educational institution associated with the placement practices of its graduating technicians?
3. How is the type of educational institution associated with the placement practices of its graduating technicians?
4. How is the geographic location of an educational institution associated with the placement practices of its graduating technicians?

Testing of Research Questions Associated with Placement Practices

Question 1.--How is the number of graduating technicians of an educational institution associated with the placement practices of its graduating technicians?

The representatives of the eleven Oklahoma schools were more likely to perceive adequate technician placement resources as the number of graduates increased. Table IV shows that five of the eleven Oklahoma school representatives felt their school's placement resources were

adequate. This contrasts with representatives from six schools having 15 or less graduates who perceived of their school as having inadequate placement resources. Of the six representatives who perceived inadequate resources, "personnel" and "lack of interest on the part of technical personnel and school administrators" were most frequently mentioned.

The eleven schools graduating engineering and physical science technicians necessitated careful grouping in order to have sufficient group frequency for meaningful analysis. Therefore, the number of graduating technicians were grouped in Tables IV through XI in such a manner that approximately the same number of schools could be included in each of three groups. It was found when so grouped, four schools fell within the 1-6 group, three fell within the 7-15 group, and four schools fell within the 16 and over group.

TABLE IV

TECHNICIAN PLACEMENT RESOURCES IN ELEVEN OKLAHOMA SCHOOLS BY NUMBER OF GRADUATING TECHNICIANS

Perception of Placement Resources	Number of Graduating Technicians		
	1-6	7-15	16 and over
Adequate	0	1	4
Inadequate	4	2	0
Total	4	3	4

The persons more likely to have been primarily responsible for technician placement were instructors or heads of the technology programs. Data presented in Table V indicate representatives in six schools out of the eleven considered the highly technical staff and faculty to have been primarily responsible for technician placement. The school representatives further indicated as the number of technician graduates increase the less frequently the instructors were considered primarily responsible for placement and the responsibility was shifted more toward the head of the single technology program.

TABLE V

PERSONS PRIMARILY RESPONSIBLE FOR TECHNICIAN PLACEMENT IN ELEVEN OKLAHOMA SCHOOLS BY NUMBER OF GRADUATING TECHNICIANS

Person Primarily Responsible for Placement	Number of Graduating Technicians		
	1-6	7-15	16 and over
School's Placement Officer	1	0	1
Director of all technologies	0	0	1
Assistant Director	0	0	1
Head of single technology program	0	2	1
Instructors in technology programs	2	1	0
No one responsible	1	0	0
Total	4	3	4

The schools were more likely to experience a greater number of placement/employment information contacts as the number of technician graduates increases. Table VI shows the larger the technician graduating class the more frequently any one method of disseminating placement/employment to students was used. As the size of the technician graduating class decreases, the data indicates the less frequently any one method was used to disseminate placement/employment information. The response given most frequently by school representatives as to the methods used to disseminate placement/employment information was "a current list was made available of employers desiring to employ technicians." The interview schedule allowed for multiple responses to the methods used to disseminate placement/employment information to technician students.

Representatives of the eleven schools indicated they perceived "representatives of employing organizations discussing technician needs and opportunities with students on campus" as being the most important method of communicating placement/employment information to technician students. The data in Table VII indicates one-half of the school representatives in schools graduating from one to six and 16 and over technicians and one-third of the representatives in schools graduating from seven to 15 technicians perceived the most important method of disseminating placement/employment information as being "employing organizations representatives discussing technician needs and opportunities with students on campus."

With regard to the methods used to communicate placement/employment information to employing organizations, schools were more likely to use an increasing number of methods to disseminate information as the number

TABLE VI

A PERCENTAGE ANALYSIS OF METHODS USED TO COMMUNICATE PLACEMENT/EMPLOYMENT INFORMATION TO GRADUATING TECHNICIANS IN ELEVEN OKLAHOMA SCHOOLS

Methods Used to Disseminate Placement/Employment Information To Technician Students	Number of Graduating Technicians					
	1-6		7-15		16 and over	
	No.	Pct.	No.	Pct.	No.	Pct.
Employer representatives discussed technician needs and opportunities with students on campus.	1	9.1	3	27.3	3	15.8
School initiated class trips to employing organizations	1	9.1	3	27.3	3	15.8
Industry initiated class trips to employing organizations	1	9.1	2	18.2	2	10.5
Current list made available of employers desiring to employ technicians	3	27.3	2	18.2	4	21.1
Provided case histories of former graduates	1	9.1	1	9.1	3	15.8
Other	4	36.4	0	0	4	21.1
Total	11	100.1	11	100.1	19	100.1

TABLE VII

PRACTICES CONSIDERED IMPORTANT IN COMMUNICATING PLACEMENT/EMPLOYMENT INFORMATION TO GRADUATING TECHNICIANS

Practices Considered Most Important in Disseminating Placement/Employment Information to Technician Students	Number of Graduating Technicians		
	1-6	7-15	16 and over
Employer representatives discussed technician needs and opportunities with students on campus	2	1	2
School initiated class trips to employing organizations	1	0	0
Industry initiated class trips to employing organizations	0	0	1
Current list made available of employers desiring to employ technicians	0	1	1
Provided case histories of former graduates	0	1	0
Other	1	0	0
Total	4	3	4

of technician graduates increase. Table VIII, which allowed for multiple response, shows that representatives of all schools graduating over 15 technicians indicated their school sent printed materials to prospective employers about technology programs and half of the same schools sent printed materials to prospective employers about technician graduates. The data indicates that no schools graduating less than 16 technicians sent printed materials to prospective employers about technician graduates. Also, it is indicated that one-half of the representatives in schools graduating less than seven technicians reported their school disseminated placement/employment information to representatives of employer organizations by sending them printed materials about the schools' technology programs. Of the six school representatives who reported other methods were used to disseminate placement/employment information to employing organizations the following two methods were most frequently mentioned: (1) when recruiters visit the campus they are requested to talk with the director and department heads, and (2) give talks before civic groups, trade organizations, chamber of commerce, and professional organizations.

Representatives of the eleven schools perceived "sending of school representatives to employing organizations" as being the most important method of disseminating information to prospective employers about technical programs and students. The data presented in Table IX shows six school representatives out of the 11 interviewed considered "sending school representatives to employing organizations" as being the most important method of communicating placement/employment information to prospective employers about technical programs and students. The data also indicates the representatives of the four schools graduating over

15 technicians did not consider any one method in disseminating placement/employment information to be more important than another.

TABLE VIII

A PERCENTAGE ANALYSIS OF METHODS USED BY ELEVEN OKLAHOMA SCHOOLS TO DISSEMINATE PLACEMENT/EMPLOYMENT INFORMATION TO EMPLOYERS

Methods Used to Disseminate Placement/Employment Information To Employing Organizations	Number of Graduating Technicians 1-6		7-15		16 and over	
	No.	Pct.	No.	Pct.	No.	Pct.
Sent printed materials to prospective employers about technology programs	0	0.0	2	40.0	4	36.4
Sent printed materials to prospective employers about technician graduates	0	0.0	0	0.0	2	18.2
Sent representatives to inform prospective employers about technical programs and students	2	50.0	2	40.0	2	18.2
Other	2	50.0	1	20.0	3	27.3
Total	4	100.0	5	100.0	11	100.1

TABLE IX

PRACTICES CONSIDERED IMPORTANT IN DISSEMINATING PLACEMENT/EMPLOYMENT INFORMATION TO EMPLOYERS BY NUMBER OF GRADUATING TECHNICIANS

Practice Considered Most Important In Disseminating Placement/Employment Information to Employing Organizations	Number of Graduating Technicians		
	1-6	7-15	16 and over
Sent printed materials to prospective employers about technology programs	0	1	1
Sent printed materials to prospective employers about technician graduates	0	0	1
Sent representatives to inform prospective employers about technical programs and students	3	2	1
Other	1	0	1
Total	4	3	4

The total school-industry placement/employment effort was perceived by representatives of the eleven schools as having been greatest among the out-of-state employers. Table X indicates 50 percent of the representatives in schools graduating more than 15 technicians perceived the efforts of in-state employers to have been the greatest; while to the contrary, the other two, or 50 percent of the representatives from schools graduating more than 15 technicians indicated they felt the out-of-state effort was greater than the in-state effort. Four (or a majority) of the representatives from schools graduating less than 16 technicians reported they believed the efforts of out-of-state employers

exceeded the efforts of in-state employers. No representatives of schools graduating less than 16 technicians indicated they perceived the in-state efforts to have been greater than the out-of-state efforts.

TABLE X

TOTAL SCHOOL-INDUSTRY PLACEMENT/EMPLOYMENT EFFORT BY NUMBER OF GRADUATING TECHNICIANS

Perceived In-State Effort in Percent	Number of Graduating Technicians		
	1-6	7-15	16 and over
95			1
90			
75			
70			1
60			
50	3		
40			1
30		2	
25	1	1	
10			1
5			
Total	4	3	4

The representatives of the eleven Oklahoma schools were more likely to have perceived selected employer activities as being more significant as the number of technician graduates increased. It is further indicated that out-of-state employers were perceived by school representatives as rating higher in a number of selected employer activities than in-state employers. The data presented in Table XI discloses representatives in schools with a technician graduating class from one to six rate in-state employer activities higher than out-of-state employer activities with an exception being in the area of "attractiveness of job title." The inverse was indicated, however, by representatives of schools graduating over six technicians. Here the school representatives perceived out-of-state employer activities as rating higher with an exception being in the area of "number of requests for technician classes to visit employing organizations."

Question 2.--How is the total enrollment of an educational institution associated with the placement practices of its graduating technicians?

Representatives of the eleven schools in Oklahoma indicated technician placement becomes more of a primary function of the total guidance program as the total enrollment of schools increased. Data presented in Table XII indicates that 86 percent of the representatives of schools with a total enrollment of over 700 reported technician placement was a primary function of the total guidance program. This contrasts with three, or 75 percent, of the schools with a total enrollment of 700 or less where technician placement was not considered a primary function of the total guidance program. Two representatives of the four schools in the 1-700 group indicated technician placement

TABLE XI

IN-STATE AND OUT-OF-STATE EMPLOYMENT ACTIVITIES OF ELEVEN OKLAHOMA SCHOOLS BY NUMBER OF GRADUATING TECHNICIANS

Employment Activities	Number of Graduating Technicians								
	0-6			7-15			16 and over		
	I[a]	O[b]	N[c]	I	O	N	I	O	N
Number of inquires about graduating technicians.	1	1	2		3		2	2	
Detailed literature giving information about employing organizations.	1		3		3		2	2	
Provides literature with regard to technical job openings.	2		2		3		1	3	
Number of requests to meet with technician groups on campus.	1		3		3		2	2	
Number of requests for technician classes to visit employing organizations.			4	2	1		2		2
Provides well-defined paths for technicians to advance to positions of increased responsibility and pay.	1	1	2		2	1	1	3	
Number of interviews conducted on campus.	2		2	1	2		2	2	
Provide opportunities for individual graduates to visit employing organizations for interviews.	1		3	1	1	1	2	2	
Pay for interview trip to employing organizations.			4			3	1	1	2
Attractiveness of job title.		1	3		1	2		3	1
Offers the highest level of entry positions commensurate with ability level.	2	1	1		3			4	
Provides opportunity for additional formal education (education expenses, time-off, etc.).	2	1	1		1	2	1	1	2
Other fringe benefits (moving expenses, temporary housing, etc.).	1	1	2		1	2		2	2
Total	14	6	32	4	24	11	16	27	9

[a] In-state employers.

[b] Out-of-state employers.

[c] Not significant (as considered by school representative).

was considered a primary responsibility of the students and/or other organizations.

The total enrollment of schools were grouped in Tables XII and XIII in such a manner that each of the three groups would contain approximately the same number of schools. It was found when so grouped, four schools fell within the 1-700 group, three fell within the 701-1300 group, and four schools fell within the 1301 and over group. Full-time equivalent (FTE) enrollments were used in the groupings rather than head-count enrollments because the investigator felt data in this form would be more meaningful.

TABLE XII

TECHNICIAN PLACEMENT POLICIES OF ELEVEN OKLAHOMA SCHOOLS BY TOTAL ENROLLMENT

Placement Policy	Total Enrollment of Schools*		
	1-700	701-1300	1301 and over
Placement was considered primary function of total guidance program.	1	3	3
Placement was considered primary responsibility of students and/or other organizations.	2	0	1
Placement was total responsibility of students and/or other organizations.	1	0	0
Total	4	3	4

*Full-time-equivalent.

Representatives of the eleven schools were more likely to perceive the out-of-state employment effort exceeding the efforts of in-state employers. Table XIII indicates school representatives perceived the out-of-state effort of employers to approximately equal the efforts of in-state employers in schools with a total enrollment of 1,301 and over. This is in contrast to the perception of four, or 57 percent, of the representatives in schools with a total enrollment of less than 1,301 who indicated the out-of-state employer efforts were the greatest.

TABLE XIII

TOTAL SCHOOL-INDUSTRY PLACEMENT/EMPLOYMENT EFFORT OF IN-STATE AND OUT-OF-STATE EMPLOYERS BY TOTAL SCHOOL ENROLLMENT

Perceived In-State Effort In Percent	Total Enrollment of Schools*		
	1-700	701-1300	1301 and over
95			1
90			
75			
70			1
60			
50	2	1	
40	1		
30		2	
25	1		1
10			1
5			
Total	4	3	4

*Full-time-equivalent.

Question 3.--How is the type of educational institution associated with the placement practices of its graduating technicians?

Representatives of the eleven Oklahoma schools indicated technician placement was a primary function of the total guidance program in trade-technical schools, technical institutes, and universities and technician placement in junior colleges was primarily the responsibility of students and/or other organizations. The findings, as shown in Table XIV, disclose that representatives in 57 percent of the junior colleges reported placement was primarily the responsibility of students and/or other organizations. Representatives in all trade-technical schools, technical institutes, and universities indicated placement was primarily the function of the educational institutions' guidance programs.

The types of educational institutions in Tables XIV through XX were grouped as trade-technical schools, technical institutes, universities, and junior colleges since these groups represent all the different types of educational institutions in Oklahoma that graduated two year post-high school engineering and physical science related technicians in the spring of 1967. It should be pointed out that one of the two technical institutes is located on the main campus of a state university; while the other technical institute is a part of the same university, but located in a metropolitan area approximately 63 miles from the university's main campus.

The Oklahoma school representatives perceived of their schools' placement resources as not being adequate in junior colleges. Representatives of all technical institutes, trade-technical schools, and 28.6 percent from the junior colleges indicated their educational institutions possessed adequate resources for technician placement as shown

in Table XV. Seventy-one and four tenths percent of the representatives from junior colleges and 54.4 percent of all school representatives perceived their schools' resources for the placement of technicians as being inadequate. Twenty-eight and six-tenths of the junior college representatives gave "personnel" as a major placement resource needed while 57.2 percent of the junior college representatives gave "lack of interest on the part of technical personnel and school administrators."

TABLE XIV

TECHNICIAN PLACEMENT POLICIES OF ELEVEN OKLAHOMA SCHOOLS BY INSTITUTION

Placement Policy	Type of Institution			
	Trade-Technical	Technical Institute	University	Junior College
Placement was considered a primary function of total guidance program.	1	2	1	3
Placement was considered a primary responsibility of students and/or other organizations.	0	0	0	3
Placement was the total responsibility of students and/or other organizations.	0	0	0	1
Total	1	2	1	7

TABLE XV

TECHNICIAN PLACEMENT RESOURCES OF ELEVEN OKLAHOMA SCHOOLS BY INSTITUTION

Perception of Placement Resources	Type of Institution			
	Trade-Technical	Technical Institute	University	Junior College
Adequate	1	2	0	2
Inadequate	0	0	1	5
Total	1	2	1	7

Representatives of the eleven schools indicated the persons primarily responsible for technician placement were the heads and instructors in the technology programs. Data shown in Table XVI indicates representatives in 42.8 percent of the junior colleges reported instructors in the technology programs were the persons responsible for technician placement. All junior college representatives indicated the person primarily responsible for placement was a technical specialist even though he may have been serving as an administrator.

Representatives of the Oklahoma schools graduating technicians reported results of statewide surveys and/or studies were the most frequently used source of information on technician manpower needs and employment opportunities in junior colleges. The data indicates, in Table XVII, one-third of the junior college representatives reported

results of surveys and/or studies were the most frequently used source of technician manpower information. The data also indicates junior colleges and universities used advisory committee referrals less frequently than all other suggested sources of information on technician needs and opportunities. Multiple responses to sources of information on technician needs and opportunities were recorded in Table XVII.

TABLE XVI

PERSONS RESPONSIBLE FOR TECHNICIAN PLACEMENT IN ELEVEN OKLAHOMA SCHOOLS BY TYPE OF INSTITUTION

Person Primarily Responsible For Placement	Type of Institution			
	Trade-Technical	Technical Institute	University	Junior College
School's Placement Officer	0	1	1	0
Director of all technology programs.	0	0	0	1
Assistant Director	0	1	0	0
Head of single technology programs.	1	0	0	2
Instructors in technology programs.	0	0	0	3
No one responsible	0	0	0	1
Total	1	2	1	7

TABLE XVII

A PERCENTAGE ANALYSIS OF SOURCES OF INFORMATION ON TECHNICIAN MANPOWER NEEDS AND EMPLOYMENT OPPORTUNITIES BY TYPE OF INSTITUTION

Sources of Information on Technician Needs and Opportunities	Type of Institution							
	Trade-Technical		Technical Institute		University		Junior College	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Results of surveys and/or studies	0	0.0	1	16.7	1	25.0	6	33.3
Employers sent list of job openings	1	33.3	1	16.7	1	25.0	4	22.2
School representatives visited employers	0	0.0	1	16.7	1	25.0	4	22.2
Advisory committee referrals	1	33.3	1	16.7	0	0.0	1	5.6
Other	1	33.3	2	33.3	1	25.0	3	16.7
Total	3	99.9	6	100.1	4	100.0	18	100.0

Representatives of the eleven Oklahoma schools were more likely to perceive of "school representatives visiting employers" as being the most important source of information for universities and junior colleges on technician job opportunities and "receiving employer lists of job openings" for trade-technical schools. Table XVIII indicates 45.5 percent of the eleven school representatives were more likely to view "school representatives visiting employers" as the most important method of obtaining technician employment information for technical institutes, universities, and junior colleges.

TABLE XVIII

SOURCES OF INFORMATION ON TECHNICIAN JOB OPPORTUNITIES CONSIDERED IMPORTANT IN ELEVEN OKLAHOMA SCHOOLS BY TYPE OF INSTITUTION

Source of Employment Information Considered Most Important	Type of Institution			
	Trade-Technical	Technical Institute	University	Junior College
Results of surveys and/or studies	0	0	0	2
Employers sent list of job openings	1	0	0	0
School representatives visited employers	0	1	1	3
Other	0	1	0	2
Total	1	2	1	7

The representatives of the eleven Oklahoma schools were more likely to perceive of the total school-industry placement/employment effort as having been greater with out-of-state employers in technical institutes and junior colleges than with in-state employers, and the in-state effort as having been greater in trade-technical schools. The data shown in Table XIX discloses that representatives of all the trade-technical schools and 14.3 percent of the representatives of the junior colleges viewed in-state employment effort as being greater than the out-of-state effort. This contrasts with representatives of all technical institutes and 57.2 percent of the junior college representatives which indicated the total out-of-state employment effort was greater than the total in-state effort.

TABLE XIX

TOTAL SCHOOL-INDUSTRY PLACEMENT/EMPLOYMENT EFFORT
BY TYPE OF EDUCATIONAL INSTITUTION

Perceived In-State Effort In Percent	Type of Institution			
	Trade-Technical	Technical Institute	University	Junior College
95	1			
90				
75				
70				1
60				
50			1	2
40		1		
30				2
25				2
10		1		
5				
Other	1	2	1	7

Representatives of the eleven schools were more likely to perceive officials of trade-technical schools and universities ranking in-state employers higher in selected employer activities and officials of technical institutes and junior colleges ranking out-of-state employers higher. The date shown in Table XX indicates representatives in the universities and trade-technical schools rated in-state employers higher in more of the selected employer activities. Representatives of the junior colleges and technical institutes on the contrary were more likely to rank out-of-state employers higher in selected employer activities.

TABLE XX

IN-STATE AND OUT-OF-STATE EMPLOYMENT ACTIVITIES
OF ELEVEN OKLAHOMA SCHOOLS
BY TYPE OF INSTITUTION

Employment Activities	Type of Institution											
	Trade-Technical			Technical Institute			University			Junior College		
	I[a]	O[b]	N[c]	I	O	N	I	O	N	I	O	N
Number of inquires about graduating technicians	1				2			1		2	3	2
Detailed literature giving information about employing organizations	1				2		1			1	3	3
Provides Literature with regard to technician job openings	1				2		1			1	4	2
Number of requests to meet with technician groups on campus	1			2	2	1	1			1	3	3
Number of requests for technician classes to visit employing organizations			1			1			1	3	1	3
Provides well-defined paths for technicians to advance to positions of increased responsibility and pay	1				2		1				4	3
Number of interviews conducted on campus	1				2		1			3	2	2
Provide opportunities for individual graduates to visit employing organizations for interviews	1				2		1			2	1	4
Pay for interview trip to employing organizations			1		1	1			1	1		6
Attractiveness of job title			1		2				1		3	4
Offers the highest level of entry positions commensurate with ability level		1			2		1			1	5	1
Provides opportunity for additional formal education (education expenses, time-off, etc.)			1	1	1		1			1	1	5
Other fringe benefits (moving expenses, temporary housing, etc.)			1		1	1			1	1	3	3
Total	7	1	5	2	21	3	8	1	4	17	33	41

[a] In-state employers.

[b] Out-of-state employers.

[c] Not significant.

Question 4.--How is the geographic location of an educational institution associated with the placement practices of its graduating technicians?

The representatives of the eleven Oklahoma educational institutions indicated schools located the greatest distance from a Standard Metropolitan Statistical Area (SMSA) used results of state surveys and/or state studies more frequently and using employer list of job openings less frequently as a source of information on technician manpower and employment opportunities.

Table XXI, which shows multiple responses were permitted, indicates 50 percent of the representatives from schools greater than 100 miles from the center of an SMSA reported their school used results of state surveys and/or state studies as a means of obtaining information on technician job opportunities more frequently than any other single source. The data further indicates the closer schools are located to an SMSA the less frequently they used the results of surveys and/or studies, but were more likely to utilize employer lists of job openings as a source of information on technician manpower needs. The location of the eleven Oklahoma schools that graduated engineering and physical science technicians during the spring of 1967 are shown in Figure 2 in relation to the Tulsa and Oklahoma City Standard Metropolitan Statistical Areas.

The distances schools are located from the center of the nearest SMSA were grouped in Tables XXI and XXII in such a manner that approximately the same number of schools would appear in each of the three equal distance groupings. It was found that when so grouped three schools fell within the 0-50 miles group, five schools fell within the

51-100 miles group, and three schools fell within the 101-150 miles group. Distances were obtained from the Official Oklahoma State Highway Map, 1967.

TABLE XXI

A PERCENTAGE ANALYSIS OF INFORMATION ON TECHNICIAN MANPOWER NEEDS AND EMPLOYMENT OPPORTUNITIES BY GEOGRAPHIC LOCATION OF ELEVEN OKLAHOMA SCHOOLS

Sources of Information On Technician Opportunities	Distance in Miles to Center of Nearest SMSA					
	0-50		51-100		101-150	
	No.	Pct.	No.	Pct.	No.	Pct.
Results of surveys and/or studies	2	16.7	3	23.1	3	50.0
Employers sent list of job openings	3	25.0	3	23.1	1	16.7
School representatives visited employers	2	16.7	3	23.1	1	16.7
Advisory committee referrals	2	16.7	1	7.7	0	0.0
Other	3	25.0	3	23.1	1	16.7
Total	12	100.1	13	100.1	6	100.1

Representatives of the Oklahoma schools graduating technicians indicate that school personnel visitations to employing organizations was the most important method of obtaining information on technician job opportunities. Data presented in Table XXII indicates that 45.5

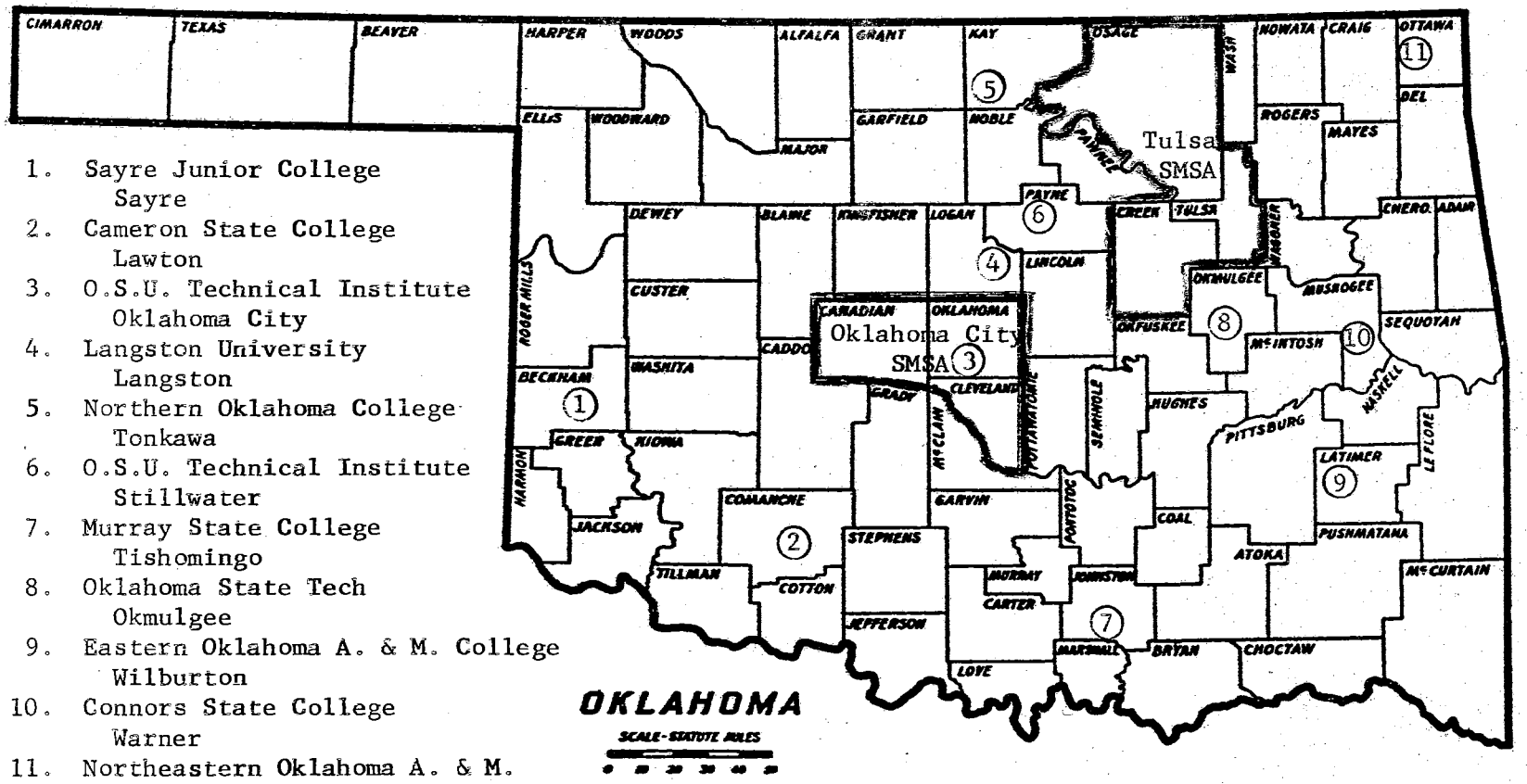


Figure 2. Location of Eleven Oklahoma Schools in Relation to the Tulsa and Oklahoma City Standard Metropolitan Statistical Areas

percent of all the school representatives viewed employer visitations as being the best method of obtaining information about technician job opportunities. However, those schools using employer visitations did not concentrate in any one distance from an SMSA.

TABLE XXII

SOURCES OF INFORMATION ON TECHNICIAN JOB OPPORTUNITIES CONSIDERED IMPORTANT BY GEOGRAPHIC LOCATION OF ELEVEN OKLAHOMA SCHOOLS

Sources of Information Considered Most Important	Distance in Miles to Center of Nearest SMSA		
	0-50	51-100	101-150
Results of surveys and/or studies	0	2	0
Employers sent list of job openings	1	0	0
School representatives visited employers	2	1	2
Other	0	2	1
Total	3	5	3

Background Information on Employment Practices

Employment information for this study was obtained from representatives of 57 organizations in Oklahoma. These 57 organizations represent 74 percent of the 77 organizations represented at the seven employer conferences. The employment data were collected in the fall

of 1967.

The 57 Oklahoma organizations returning information sheets represented approximately 14.5 percent of the Oklahoma nonfarm employment and approximately 60 percent of the employed engineers and physical scientists in Oklahoma. Since engineering technicians work in direct support of engineers and physical scientists, it seems reasonable to assume that approximately 60 percent of the above mentioned technician demand is included in this study. The Oklahoma employers, categorized by major activity, represented the following: 30 manufacturing, 5 public utilities, 11 government, and 11 petroleum. A listing of the major activities, total employment, and number of technicians of the 57 organizations are shown in Table XXIII.

TABLE XXIII

MAJOR ACTIVITIES AND TOTAL EMPLOYMENT OF 57 OKLAHOMA ORGANIZATIONS IN 1967

Major Activities	Number of Firms	Total Number of Employees	Total Number of Technicians	Total Number of Engineers and Scientists
Manufacturing	30	28,458	1399	1456
Public Utilities	5	17,106	242	347
Government	11	39,298	3307	1975
Petroleum*	11	16,945	1259	4620
Total	57	101,807	6,207	8,398

*Includes petroleum activities in mining and/or manufacturing.

The categories of finance-insurance and real estate were not included in the study since there is a relatively low concentration of engineering and physical science technicians in these activities. The mining category consisted exclusively of petroleum and natural gas industries and was classified with petroleum for purposes of this report. Since only one organization in the trade category and one organization in the service category furnished employment information, the one "trade" organization was included in the manufacturing category and the "service" organization was included in the public utilities category. Construction firms were not represented at the conferences.

The analysis of employment data was facilitated by utilizing four key variables, i.e., by breaking it down by number of technicians employed, number of total employees, major activities, and geographic location of the organizations as to the employment of technicians. In order to determine if any significant interdependency existed between the above key variables the Chi-square test was applied to all possible combinations. The statistical significance was set at the .05 level of confidence.

Table XXIV presents a Chi-square analysis of the total number of technicians in relation to the total number of employees. The Chi-square of 10.87 was not in excess of the .05 level of confidence, therefore no statistically significant differences was suggested among the number of technicians and total number of employees. Consequently, number of technicians and total number of employees were regarded as independent variables.

Table XXV presents a Chi-square analysis of the number of technicians employed in relation to the major activities of the employers.

The Chi-square of 7.85 was not in excess of the .05 level of confidence, therefore the statistically significant difference among number of technicians and major activities was not suggested.

Table XXVI presents a Chi-square analysis of the number of technicians employed in relation to the geographic location of employers. The Chi-square of 7.61 was not in excess of the .05 level of confidence, therefore not suggesting any statistically significant difference among the number of technicians and the geographic location of employers.

TABLE XXIV

A CHI-SQUARE ANALYSIS OF THE NUMBER OF TECHNICIANS IN RELATION TO THE NUMBER OF EMPLOYEES

Total Number of Employees	Number of Technicians				
	0-9	10-19	20-99	100 and over	Total
0-200	4	2	2	0	8
201-400	7	3	4	0	14
401 and over	7	7	10	11	35
	18	12	16	11	57
df=6 Sign. .05=12.6		X^2=10.87		Not significant	

TABLE XXV

A CHI-SQUARE ANALYSIS OF THE NUMBER OF TECHNICIANS IN RELATION TO THE MAJOR ACTIVITIES

Major Activities	Number of Technicians				
	0-9	10-19	20-99	100 and over	Total
Manufacturing	11	2	3	2	18
Public Utilities	6	0	3	3	12
Government	10	2	1	3	16
Petroleum*	3	1	4	3	11
Total	30	5	11	11	57
df=9 Sign. .05=16.9	X^2=7.85		Not significant		

*Includes petroleum activities in mining and/or manufacturing.

TABLE XXVI

A CHI-SQUARE ANALYSIS OF THE NUMBER OF TECHNICIANS IN RELATION TO THE LOCATION OF EMPLOYERS

Geographic Location Of Employers	Number of Technicians				
	0-9	10-19	20-99	100 and over	Total
SMSA*	9	5	13	9	36
Other	9	7	3	2	21
Total	18	12	16	11	57
df=3 Sign. .05=7.81	X^2=7.61		Not Significant		

*Standard Metropolitan Statistical Area.

Table XXVII presents a Chi-square analysis of the total number of employees in relation to the major activities of the employers. The Chi-square of 6.71 was not in excess of the .05 level of confidence, therefore no statistically significant difference was suggested among total number of employees and major activities of employers. Consequently, total number of employees and major activities of employers were regarded as independent variables.

TABLE XXVII

A CHI-SQUARE ANALYSIS OF THE NUMBER OF EMPLOYEES IN RELATION TO THE MAJOR ACTIVITIES

Major Activities	Total Number of Employees			
	0-200	201-400	401 and over	Total
Manufacturing	6	7	17	30
Public Utilities	1	0	4	5
Government	0	5	6	11
Petroleum	1	2	8	11
Total	8	14	35	57

df=6 Sign. .05=12.6 X^2=6.71 Not Significant

Table XXVIII presents a Chi-square analysis of the total number of employees in relation to the geographic location of employers. The Chi-square of 15.29 was in excess of the .05 level of confidence, therefore suggesting a statistically significant difference among the total number of employees and the geographic location of employers. This suggests the total number of employees is significantly associated with geographic location of the employers, and must be remembered in any subsequent analysis.

TABLE XXVIII

A CHI-SQUARE ANALYSIS OF THE NUMBER OF EMPLOYEES IN RELATION TO THE LOCATION OF EMPLOYERS

Geographic Location of Employers	Total Number of Employees			
	0-200	201-400	401 and over	Total
SMSA	3	4	29	36
Other	5	10	6	21
Total	8	14	35	57
df=2 Sign. .05=5.99	X^2=15.29	Significant		

Table XXIX presents a Chi-square analysis of the major activities of employees in relation to their geographic location. The Chi-square of 4.39 was not in excess of the .05 level of confidence, therefore not

suggesting any statistically significant difference among the major activities and geographic location of employers.

TABLE XXIX

A CHI-SQUARE ANALYSIS OF THE MAJOR ACTIVITIES IN RELATION TO THE LOCATION OF EMPLOYERS

Geographic Location of Employers	Major Activities of Employers				
	Manufac-turing	Public Utilities	Government	Petroleum	Total
SMSA	19	5	7	5	36
Other	11	0	4	6	21
Total	30	5	11	11	57

df=3 Sign. .05=7.81 X^2=4.39 Not Significant

The flow of the employment analysis begins with four research questions and continues with estimated present and projected need for technicians, including emerging technician manpower requirements, and follows with placement/employment communication patterns between educational institutions and employing organizations.

Testing of Research Questions Associated with Employment Practices

Question 5.--How is the number of technicians employed by an organization associated with its technician employment practices?

Representatives of the 57 Oklahoma organizations viewed employers not hiring graduating technicians without military experience as the number of technicians employed decreases. Table XXX shows the greater the number of technicians employed by an organization the more apt they were to hire technician graduates without military experience. Organizations with a low technician employment, on the contrary, were inclined to hire only technicians with military experience.

TABLE XXX

A PERCENTAGE ANALYSIS OF THE MILITARY REQUIREMENTS OF 57 OKLAHOMA ORGANIZATIONS BY NUMBER OF TECHNICIANS

Military Requirements	Number of Technicians									
	0-9		10-19		20-99		100 and over		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
No response	2	3.5	2	3.5	1	1.8	1	1.8	6	10.5
Hired graduating technicians without military experience	10	17.5	7	12.3	13	22.8	10	17.5	40	70.2
Did not hire technicians without military experience	6	10.5	3	5.3	2	3.5	0	0	11	19.3
Total	18	31.6	12	21.1	16	28.1	11	19.3	57	100.0

The employer representatives were not as likely to have viewed

organizations with 10 to 19 technicians as having a well-defined path for technicians to advance to positions of increased responsibility and pay. The data presented in Table XXXI indicates, however, that the number of technician jobs with well-defined paths is generally well distributed between the upper and lower technician employee class categories. The data indicates 70.2 percent of the organizations did have a well-defined path for technicians to advance. Twenty-two and eight tenths percent of the 57 representatives, however, indicated their organizations did not have well-defined paths through which technicians could have advanced to positions of increased responsibility and pay.

TABLE XXXI

A PERCENTAGE ANALYSIS OF TECHNICIAN ADVANCEMENT IN 57 OKLAHOMA ORGANIZATIONS BY NUMBER OF TECHNICIANS

Paths for Technician Advancement	Number of Technicians									
	0-9		10-19		20-99		100 and over		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
No response	1	1.8	0	0	2	3.5	1	1.8	4	7.0
Well-defined path	15	26.3	5	8.8	12	21.1	8	14.0	40	70.2
No path	2	3.5	7	12.3	2	3.5	2	3.5	13	22.8
Total	18	31.6	12	21.1	16	28.1	11	19.3	57	100.0

Question 6.--How is the number of total employees of an organization associated with its technician employment practices?

Representatives of the 57 Oklahoma organizations indicated upgrading presently employed personnel was the source used most frequently to fill industry's semi-professional technical positions. Table XXXII indicates the greater the number of employees the greater the number of sources organizations used to fill technical positions. The data indicates as the number of employees decreased the frequency of organizations using "upgrading presently employed personnel" increased and other sources were used less frequently to fill technical positions. Even though the above statements are indicated by the data, no statistical tests were used which shows the sources used by employers to fill technical positions were significantly dependent upon the number of employees. Information was presented previously on the results of a Chi-square test which indicated there was significant dependence at the .05 level of confidence among geographic location of organizations and number of employees. Therefore, no findings can be contributed solely to the number of employees with the statistics used in this study. All analysis presented in this study with regard to number of employees or geographic location of employers may be influenced by the other, since one was found to be significantly dependent upon the other.

The employer representatives indicated that 37, or 64.9 percent, of the 57 Oklahoma organizations used experienced technicians to fill semi-professional technical positions. Table XXXIII presents a Chi-square analysis of the kinds of technicians used to fill technical positions in relation to number of employees. The Chi-square of 4.35

was not in excess of the .05 level of confidence, therefore no statistically significant difference among the kinds of technicians used to fill technical positions and number of employees was suggested.

TABLE XXXII

A PERCENTAGE ANALYSIS OF SOURCES USED BY 57 OKLAHOMA ORGANIZATIONS TO FILL TECHNICAL POSITIONS BY NUMBER OF EMPLOYEES

Sources Used To Fill Technician Positions	Total Number of Employees							
	0-200		201-400		401 and over		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
No response	0	0	2	3.5	0	0	2	3.5
Upgrading presently employed personnel	4	7.0	5	8.8	15	26.3	24	42.1
Walk-ins	0	0	0	0	2	3.5	2	3.5
Employee referrals	0	0	0	0	1	1.8	1	1.8
Other	4	7.0	7	12.3	17	29.8	28	49.1
Total	8	14.0	14	24.6	35	61.4	57	100.0

TABLE XXXIII

A CHI-SQUARE ANALYSIS OF TECHNICIANS USED TO FILL TECHNICAL POSITIONS IN RELATION TO NUMBER OF EMPLOYEES

Kinds of Technicians Used to Fill Technical Positions	Total Number of Employees			
	0-200	201-400	401 and over	Total
No response	1	2	1	4
Recent 2-year technician graduates	1	3	7	11
Experienced technicians	6	7	24	37
Other	0	2	3	5
Total	8	14	35	57

df=6 Sign. .05=12.6 X^2=4.35 Not Significant

Employer representatives indicated the primary geographic source of technicians was from the state of Oklahoma. Representatives indicated the smaller the number of employees, the greater the emphasis was to obtain technicians from other states. Representatives from 8.8 percent of the 57 organizations indicated states other than Oklahoma was their primary source of technicians. The primary source of technicians for 86 percent of the organizations, as indicated by the representatives, was from the state of Oklahoma. Table XXXIV presents a Chi-square analysis of geographic location of primary source of technicians in relation to total number of employees. The Chi-square of 12.76 was in excess of the .05 level of confidence, therefore suggesting a

statistically significant difference among the total number of employees. This suggests the larger the number of employees, the more apt employers are to obtain technicians from within the state of Oklahoma.

TABLE XXXIV

A CHI-SQUARE ANALYSIS OF SOURCES OF TECHNICIANS IN RELATION TO NUMBER OF EMPLOYEES

Primary Source of Technicians	Total Number of Employees			
	0-200	201-400	401 and over	Total
No response	0	3	0	3
Oklahoma	6	10	33	49
Other States	2	1	2	5
Total	8	14	35	57
df=4 Sign. .05=9.49	X^2=12.76	Significant		

Question 7.--How is the major activity of an organization associated with its technician employment practices?

Employer representatives indicated they did not perceive of manufacturing, public utilities, and government organizations actively recruiting graduating technicians. The data in Table XXXV indicates 24, or 42.1 percent, of the organizations studied did actively recruit graduating technicians. The data further shows, however, that 56.1

percent of the Oklahoma organizations consisting of manufacturing, public utilities, and government, did not actively recruit recent technician graduates. The data indicates petroleum organizations recruited graduating technicians more actively than manufacturing, public utilities, or government.

TABLE XXXV

A PERCENTAGE ANALYSIS OF INDUSTRY'S TECHNICIAN RECRUITMENT PRACTICES IN RELATION TO MAJOR ACTIVITIES OF 57 OKLAHOMA ORGANIZATIONS

Recruitment Practices of Graduating Technicians	Major Activities									
	Manufacturing		Public Utilities		Government		Petroleum		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
No response	0	0	0	0	1	18	0	0	1	18
Actively recruit graduating technicians	12	21.1	2	3.5	3	5.3	7	12.3	24	42.1
Do not actively recruit graduating technicians	18	31.6	3	5.3	7	12.3	4	7.0	32	56.1
Total	30	52.6	5	8.8	11	19.3	11	19.3	57	100.0

The representatives of the 57 Oklahoma organizations indicated they perceived 54.4 percent of the government organizations as not having positions for which two-year post-high school technical graduates

were given preference over those with other educational backgrounds. The representatives further indicated they perceived 86.7 percent of the manufacturing organizations had positions for which two-year post-high school technician graduates were given employment preference. A Chi-square analysis used to test for significance among employer preferences and major activities is presented in Table XXXVI. The Chi-square of 13.33 was in excess of the .05 level of confidence, therefore suggesting a statistically significant difference among employer preferences and major activities. This suggests that a higher proportion of manufacturing and public utilities organizations gave preference to two-year technician graduates in filling semi-professional technical jobs.

TABLE XXXVI

A CHI-SQUARE ANALYSIS OF EMPLOYER PREFERENCES IN FILLING TECHNICAL POSITIONS IN RELATION TO MAJOR ACTIVITIES OF 57 OKLAHOMA ORGANIZATIONS

Employer Preferences	Major Activities				
	Manufac-turing	Public Utilities	Government	Petroleum	Total
No response	0	0	1	1	2
Two-year technician graduates given preference	26	3	4	5	38
No preference given to 2-year technician graduates	4	2	6	5	17
Total	30	5	11	11	57

df=6 Sign. .05=12.6 X^2=13.33 Significant

Representatives of the 57 organizations studied indicated they are more likely to perceive of manufacturing and petroleum organizations as given preference to two-year technician graduates over all others to fill technical positions because the technician was productive with a minimum of training. The employer representatives did not perceive of public utility organizations, however, as giving preference to technicians for this reason; but rather, they viewed public utilities as giving technician graduates preference because of the technician graduate's potential to move to higher positions. Table XXXVII presents a Chi-square analysis of why employers give preference to two-year technician graduates over others to fill technical positions in relation to major employer activities. The Chi-square of 29.74 was in excess of the .05 level of confidence, therefore suggesting a statistically significant difference between the major activities. This suggests the reasons employers give preference to two-year technician graduates depends upon the major activity of the organizations.

The major reason indicated by representatives why organizations did not give preference to technician graduates to fill technical positions was that employers upgrade present employees. Employer representatives viewed government and petroleum organizations upgrading their present employees to technician jobs more frequently than manufacturing and public utility organizations. Table XXXVIII shows that 12.3 percent of all the organizations studied, preference was not given to technician graduates because present employees are upgraded. The data further shows that 1.8 percent of the manufacturing organizations and 1.8 percent of the government organizations--a total of 3.6 percent--were unfamiliar with the ability level of technicians.

TABLE XXXVII

A CHI-SQUARE ANALYSIS OF WHY EMPLOYERS GIVE PREFERENCE TO TECHNICIAN GRADUATES IN RELATION TO MAJOR ACTIVITIES

Reason for Giving Technician Employment Preference	Major Activities				
	Manufac-turing	Public Utilities	Government	Petroleum	Total
No response	4	2	6	4	16
Productive with a minimum of training	10	0	2	6	18
Potential to move to higher position	5	2	2	1	10
Technical background permits flexibility in job assignments	8	0	1	0	9
Educational background to keep current in technical field	2	0	0	0	2
Feels responsible for proving himself	1	0	0	0	1
Other	0	1	0	0	1
Total	30	5	11	11	57

df=18 Sign. .05=28.9 X^2=29.74 Significant

TABLE XXXVIII

A PERCENTAGE ANALYSIS OF REASONS FOR NOT GIVING PREFERENCE TO TECHNICIAN GRADUATES IN RELATION TO MAJOR ACTIVITIES

Reason for Not Giving Preference to Technician Graduates	Major Activities									
	Manufacturing		Public Utilities		Government		Petroleum		Total	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Giving Preference	26	45.6	3	53	6	10.5	7	12.3	42	73.7
Do not have technical jobs	1	1.8	0	0	0	0	0	0	1	1.8
Union covers technician jobs	0	0	0	0	0	0	2	3.5	2	3.5
Unfamiliar with ability level of technician	1	1.8	0	0	1	1.8	0	0	2	3.5
Upgrade present employees	2	3.5	1	1.8	2	3.5	2	3.5	7	12.3
Other	0	0	1	1.8	2	3.5	0	0	3	5.3
Total	30	52.6	5	8.8	11	19.3	11	19.3	57	100.0

Question 8.--How is the geographic location of an organization associated with its technician employment practices?

Representatives of the 57 Oklahoma organizations indicated experienced technicians, rather than recent technician graduates, were used primarily to fill semi-professional technical positions in all geographic areas. The representatives indicated employers within an SMSA area are more apt to fill technical positions with experienced technicians than organizations outside the SMSAs. The employer representatives indicated 77.8 percent of the organizations studied in the Standard Metropolitan Statistical Areas (SMSA) used experienced technicians to fill semi-professional technical jobs; whereas, only 42.9 percent of the organizations outside the SMSAs used experienced technicians to fill technical positions. A Chi-square analysis of the primary kind of technicians used to fill semi-professional technical positions in relation to the geographic location of employers is presented in Table XXXIX. The Chi-square of 10.85 was in excess of the .05 level of confidence, therefore suggesting a statistically significant difference among the kinds of technicians used to fill technical positions. This further suggests organizations within an SMSA were more apt to have filled semi-professional technical positions with experienced technicians than with recent technician graduates.

The employer representatives indicated the primary source of technicians in the 57 Oklahoma organizations was from the state of Oklahoma. The representatives indicated organizations within SMSAs are more apt to employ a greater percentage of their technicians from the state of Oklahoma than organizations outside the SMSAs. Ninety one and seven tenths percent of the organizations in the SMSAs, according

to the representatives, obtained technicians from the state of Oklahoma as opposed to 5.6 percent of the organizations in the SMSAs which indicated their primary source of technicians was from other states. Organizations outside the SMSAs also considered Oklahoma as the primary source of their technicians according to the employer representatives. However, these employers were more apt to consider other states as a source of technicians than did employers within the SMSAs. Table XL presents a Chi-square analysis of the geographic location of the primary source of technicians in relation to the geographic location of employers. The Chi-square of 2.66 was not in excess of the .05 level of confidence, therefore not suggesting any statistically significant difference among the geographic sources of technicians and geographic location of employers.

TABLE XXXIX

A CHI-SQUARE ANALYSIS OF TECHNICIANS USED TO FILL TECHNICAL POSITIONS IN RELATION TO LOCATION OF EMPLOYERS

Geographic Location of Employers	Technicians Used to Fill Technical Positions				
	No Response	Recent 2-year Technician Graduates	Experienced Technicians	Other	Total
SMSA	0	5	28	3	36
Other	4	6	9	2	21
Total	4	11	37	5	57

df=3 Sign. .05=7.81 X^2=10.85 Significant

TABLE XL

A CHI-SQUARE ANALYSIS OF PRIMARY SOURCES OF TECHNICIANS IN RELATION TO LOCATION OF EMPLOYERS

Geographic Location of Employers	Geographic Source of Technicians			
	No Response	Oklahoma	Other States	Total
SMSA	1	33	2	36
Other	2	16	3	21
Total	3	49	5	57

df=2 Sign. .05=5.99 X^2=2.66 Not Significant

Estimated Present and Projected Need for Technicians

Employer representatives of the 57 Oklahoma organizations indicated the overall technician demand for these 57 organizations for the combined years of 1968-1972 was 4,483. Table XLI shows the demand for these technicians by program and year. The total estimated demand for technicians, according to the employer representatives, was 1,261 in 1968 and 849 in 1972. The largest demand for any one single year was indicated for 1968.

The largest estimated demand for the years 1968-1972 was for drafting and design technicians. There was an estimated demand for 1,114 drafting and design graduates, followed by 988 electronics, and 767 mechanical.

TABLE XLI

ESTIMATED DEMAND OF 57 OKLAHOMA EMPLOYERS FOR TWO-YEAR POST-HIGH SCHOOL TECHNICIAN GRADUATES FOR THE YEARS 1968-1972, BY PROGRAM TYPE

Technical Areas	1968	1969	1970	1971	1972	Total
Aeronautical	32	32	33	33	33	163
Chemical	31	35	0	38	43	147
Civil	9	7	12	11	13	52
Civil and Highway	22	27	25	29	26	129
Construction	5	7	5	6	5	28
Data Processing	40	36	33	41	37	187
Drafting and Design	287	190	204	212	221	1114
Electronics	244	180	185	184	195	988
Fire Protection	35	31	31	41	55	193
Instrumentation and Process Control	32	0	25	22	21	100
Mechanical	367	60	71	189	80	767
Metals	14	13	15	13	14	59
Petroleum	13	17	17	18	18	83
Radiation	1	2	0	0	1	4
Refrigeration and Heating	11	13	13	12	11	60
Other Programs	118	67	66	72	76	399
Total	1261	717	735	921	849	4483

Emerging Technician Manpower Requirements

Representatives of the 57 Oklahoma organizations perceived the largest demand in the area of new programs not provided by educational institutions in Oklahoma as being in Pipeline Automation and Instrumentation Technology. The demand by program and year for the graduates of new programs is presented in Table XLII. The employer representatives indicated a total of 150 pipeline automation and instrumentation technician graduates will be needed for the combined years 1968-1972. A total of 80 electrical and 76 gyroscopics technicians will be needed, according to the employer representatives by 1972.

TABLE XLII

ESTIMATED DEMAND FOR GRADUATES OF RECOMMENDED NEW TECHNICAL PROGRAMS BY 57 OKLAHOMA EMPLOYERS

Recommended Technical Programs	1968	1969	1970	1971	1972	Total
Electrical	11	11	19	19	20	80
Quality Control	1	3	0	1	2	7
Electro-Mechanical	2	2	3	2	2	11
Manufacturing	14	14	12	12	13	65
Paper Manufacturing	2	2	2	2	2	10
Pipeline Automation and Instrumentation	28	29	30	31	32	150
Gyroscopics	60	6	0	5	5	76
	118	67	66	72	76	399

Placement/Employment Communication Patterns Between Education Institutions and Employing Organizations

Employer representatives perceived the greatest number of communication contacts between schools and employing organizations to have been at Oklahoma State Tech at Okmulgee, followed by Oklahoma State University Technical Institute, Stillwater; Langston University; Oklahoma State University Technical Institute, Stillwater; Northeastern Oklahoma A&M College; and Northern Oklahoma College. The communication network between Oklahoma employers and institutions graduating technicians in 1967 is presented in Table XLIII.

The eleven school representatives perceived communication efforts of out-of-state employers as having been greater than the communication efforts of in-state employers. Table XLIV shows school representatives perceived in-state employers conducted the greatest number of interviews on campus and provided more opportunities for graduating technicians to visit employing organizations for interviews. In-state employers were rated the highest by school representatives in number of requests for technician classes to visit their organizations; however, six (or 54.6 percent) of the school representatives perceived of such requests as not being significant. The out-of-state efforts were perceived by the school representatives to have been greater in all other selected employer activities, such as: Providing literature giving information about employing organizations and technician job openings, requests to meet with technician groups on campus, and inquiries about graduating technicians.

TABLE XLIII

COMMUNICATION NETWORK OF 57 OKLAHOMA ORGANIZATIONS WITH ELEVEN OKLAHOMA INSTITUTIONS THAT GRADUATED TECHNICIANS IN THE SPRING, 1967

INSTITUTIONS / QUESTIONS	Received information about their technical programs	Received information about their graduating technicians	Conducted tours for technical students	Sent literature explaining benefits of working with your organization	Extended invitations to technical students to visit your organization	Sent a list of job openings	Placed technical students in part-time work during school year or summer	Sent a representative to interview and recruit graduating technicians	Made job offers to graduating technicians	Hired technical graduates
Cameron State College Lawton	1						1			
Connors State College Warner					1		1			1
Eastern Okla. A&M College Wilburton	1									
Langston University Langston	8	2	3	8	6	4	4	7	7	5
Murray State College Tishomingo										
Northern Okla. College Tonkawa	5	1	2	4	2		1	1	2	3
Northeastern Oklahoma A&M Miami	5	2	1	3		1	3	1	3	4
Oklahoma State Tech Okmulgee	31	18	11	12	12	11	6	14	21	19
OSU Technical Institute Stillwater	23	8	5	8	5	4	6	8	9	12
OSU Technical Institute Okla. City Branch	19	3	3	4	2	4	2	5	5	7
Sayre Junior College Sayre	2			2	1		1		1	

TABLE XLIV

IN-STATE/OUT-OF-STATE EMPLOYER COMMUNICATION EFFORTS WITH ELEVEN OKLAHOMA SCHOOLS

Employers Activities	In-State Employers	Out-of-State Employers	Not Significant
Number of inquiries about graduating technicians	3	6	2
Detailed literature giving information about employing organizations	3	5	3
Provides literature with regard to technician job openings	3	6	2
Number of requests to meet with technician groups on campus	3	5	3
Number of requests for technician classes to visit employing organizations	4	1	6
Number of interviews conducted on campus	5	4	2
Provide opportunities for individual graduates to visit employing organizations for interviews	4	3	4

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The problem with which this study was concerned was the lack of information relative to Oklahoma school-industry placement and employment practices of engineering and physical science related technicians. Oklahoma educational institutions are not presently supplying the number of technicians needed in the state and the considerable out-of-state migration of technicians recently trained in the state indicates that Oklahoma educators and employers of technicians may not presently engage in sufficient dialog relevent to this problem. The lack of sufficient data is particularly acute at the two year post-high school level. This chapter includes a summary of the study, conclusions, and recommendations.

Summary

The primary purpose of this study was to investigate school-industry placement and employment practices with implications for the reduction of out-of-state migration of recently graduated two year post-high school engineering and physical science related technicians. The primary purpose of the study was further delineated by the following specific objectives:

A. To identify placement/employment practices of Oklahoma educational institutions and employing organizations graduating and employing two year post-high school

engineering and physical science related technicians.

B. To determine the present and projected needs of Oklahoma employers for two year post-high school engineering and physical science related technicians.

C. To discover emerging engineering and physical science related manpower requirements not presently being supplied by educational institutions in Oklahoma.

D. To determine the placement/employment communication patterns between Oklahoma educational institutions and Oklahoma organizations employing two year post-high school technician graduates.

A major goal of Oklahoma is to increase its rate of economic growth. The problem is to develop an overall plan which will accomplish this goal. A method frequently mentioned to accomplish this goal is to provide not only the kinds of resources needed to attract new industry and business to the state, but to supply the resources needed to retain expanding organizations already in the state. Trained manpower is one of the most important resources possessed by Oklahoma for new and expanding industries and efforts must now be made by Oklahoma to retain its trained manpower.

An attempt was made in this study to answer the primary question--what are the Oklahoma school-industry placement and employment practices relating to graduating technicians? Furthermore, what are the implications of these placement and employment practices for reducing the out-of-state migration of Oklahoma's graduating technicians?

The basic design of the study was ex post facto in nature in that school-industry placement and employment practices of graduating technicians during the spring of 1967 were studied. The study was undertaken in two phases: (1) The placement practice phase and (2) the employment practice phase. The placement practice phase was accomplished

by prepared interviews with administrators or staff members of technician programs at eleven Oklahoma educational institutions. The number and kinds of educational institutions included in the study were: Seven (7) junior colleges, two (2) technical institutes, one (1) university, and one (1) trade-technical school. These educational institutions included all of the Oklahoma schools that graduated engineering and physical science technicians in the spring, 1967. Data relating to the placement practices were collected during the spring, 1968. The employment practice phase was accomplished through seven employer conferences during the fall, 1967 where representatives from 77 organizations were briefed on the technician before asked to complete the information sheet. Employment information was obtained from 57 different employing organizations whose total employment ranged from 50 to over 23,000. The major activities of the 57 organizations studied were as follows: 30 manufacturing, 11 government, 5 public utilities, and 11 petroleum. Frequency and percentage analysis, the Chi-square technique, simple listings, and pertinent remarks were used throughout the study.

Limitations

Certain limitations should be kept in mind while interpreting the results of this study. Since this study is based upon an ex-post-facto design, the investigator was unable to control or manipulate the independent variables nor was he able to randomize all the populations. Thus, the major risk which is undertaken to conduct research of this type is improper interpretation.

Due to the lack of control pointed out in the preceding paragraph, another limitation is the risk of generalizing the findings. Though

the study involved two types of populations--Oklahoma schools graduating engineering and physical science related technicians and Oklahoma organizations employing engineering and physical science technicians during the spring, 1967--no statistical evidence is available to indicate that these populations are typical of any other schools or employing organizations at this time nor in the future.

Another limitation has to do with the interview and employer conference techniques of collecting data. Regardless of the care in designing and administering of the interview schedule with school representatives and the information sheet with employer representatives, no guarantee can be given that the respondent's interpretation of the questions asked will be the same as intended by the designer of the interview schedule and information sheet. Therefore, there is no absolute assurance the subjects gave valid responses. Thus, for an ex-post-facto design to be valid to the reader, he must accept the assumption that the investigator did not select subjects or make use of data that would intentionally bias results.

Conclusions

Answers to eight research questions were sought in this study. This section states each research question and conclusion based upon the findings.

First Research Question: How is the number of graduating technicians of an educational institution associated with the placement practices of its graduating technicians?

Summary and Conclusion: The data indicates technician placement resources tended to be more adequate as the number of graduating

technicians increased. All schools graduating over 15 technicians considered their technician placement resources as having been adequate; while six schools graduating less than 16 students indicated the technician placement resources were inadequate. The data further indicated, as the number of technician graduates increased the less frequently the instructors were considered primarily responsible for technician placement, and the responsibility was shifted more toward the head of the single technology program. Furthermore, the findings indicated schools experienced a greater number of placement and employment information contacts as the number of technician graduates increased. The most important method of disseminating placement/employment information indicated by the school representatives was "employing organizations representatives discussing technician needs and opportunities with students on campus." The data also indicated schools, with regard to the methods used to communicate placement/employment information to employing organizations, used an increasing number of methods to disseminate information as the number of graduating technicians increased. Also, representatives of the eleven schools perceived "sending a school representative to employing organizations" as being the most important method of disseminating information to prospective employers about technical programs and students. The investigator, therefore, concludes that the number of graduating technicians seemed to be related to technician placement resources, persons primarily responsible for technician placement, number of placement/employment information contacts, and number of methods used to disseminate placement/employment information.

Second Research Question: How is the total enrollment of an

educational institution associated with the placement practices of its graduating technicians?

Summary and Conclusion: The data indicates technician placement became more of a primary function of the total guidance program as the total enrollment of schools increased. Eighty six percent of the schools with a total enrollment of over 700 reported technician placement was a primary function of the total guidance program. This contrasts with 75 percent of the schools with a total enrollment of 700 or less where technician placement was not considered a primary function of the total guidance program. The data also indicates 75 percent of the schools with a total enrollment of 700 or less considered technician placement as being the responsibility of the student and/or other organizations. The investigator concludes that technician placement tends to become more of a primary function of the total guidance program as the total enrollment of a school increases and tends to shift more to the responsibility of the student and/or other organizations as the total enrollment decreases.

Third Research Question: How is the type of educational institution associated with the placement practices of its graduating technicians?

Summary and Conclusions: The data indicates that technician placement was a primary function of the total guidance program in trade-technical schools, technical institutes, and universities. Technician placement in junior colleges was primarily the responsibility of students and/or other organizations. The school representatives perceived of the technician placement resources as not being adequate in 71.4 percent of the junior colleges. The representatives perceived

of the technical institutes and trade-technical schools as having adequate technician placement resources. The data further indicates school representatives perceived of "school representatives visiting employers" as being the most important source of information for universities and junior colleges on technician job opportunities and "receiving employer lists of job openings" for trade-technical schools. Also, school representatives indicated they perceived of the total school-industry placement/employment effort as having been greater with out-of-state employers in technical institutes and junior colleges than with in-state employers, and the in-state effort as having been greater in trade-technical schools. The data further indicates school representatives perceived of trade-technical schools and universities as ranking in-state employers higher in selected employer activities and technical institutes and junior colleges as ranking out-of-state employers higher. The investigator concludes, therefore, the person and/or other organizations primarily responsible for technician placement, technician placement resources, total school industry/placement employment effort, and employer efforts in selected activities seemed to be related to the type of educational institution.

Fourth Research Question: How is the geographic location of an educational institution associated with the placement practices of its graduating technicians?

Summary and Conclusions: The data indicates schools located the greatest distance from a Standard Metropolitan Statistical Area (SMSA) used results of "state surveys and/or state studies" while schools located closer or within an SMSA area were more likely to utilize "employer lists of job openings" as a source of information on

technician employer needs. School representatives perceived "school personnel visitations to employing organizations" as being the most important method of obtaining information on technician job opportunities. However, these schools using employer visitations did not seem to concentrate in any one distance from an SMSA. The investigator concludes that the sources of information schools used in determining technician manpower needs and employment opportunities for graduating technicians were related to the geographic location of the educational institution.

Fifth Research Question: How is the number of technicians employed by an organization associated with its technician employment practices?

Summary and Conclusion: The findings of the analysis indicates that organizations employing large and small numbers of technicians were more apt to provide well-defined paths for technicians to advance to positions of increased responsibility and pay than organizations employing from 10 to 19 technicians. The data indicates 83.3 percent of the organizations employing less than ten technicians had a well-defined path for technicians to advance to positions of increased responsibility and pay and 74 percent of the organizations employing over 19 technicians indicated they had a well defined path for technicians to advance. The data further indicates organizations employing larger numbers of technicians were more apt to hire technician graduates without military experience than organizations employing a smaller number of technicians. The findings indicate 90.9 percent of the organizations employing over 99 technicians hired technician graduates without military experience; whereas only 55.6 percent of the organizations employing less than ten technicians hired technician graduates without military experience.

Thus the investigator concludes that the variable, number of technicians employed by an organization, did tend to affect the technicians opportunities for advancement and initial employment with regard to military experience.

Sixth Research Question: How is the number of total employees of an organization associated with its technician employment practices?

Summary and Conclusion: The data indicates the greater the number of employees the greater the number of employment sources organizations used to fill technical positions. The findings indicate as the number of employees decreased the frequency of organizations "upgrading employed personnel" increased and other employment sources were used less frequently to fill semi-professional technical positions. An analysis of the data also tends to support the general conclusion the greater the number of employees the greater the emphasis was to obtain technicians from in-state. A Chi-square analysis suggested a statistically significant difference between number of employees and geographic source of technicians. This suggests the larger the number of employees the more apt employers were to obtain technicians from within the state. Even though the above statements are indicated by the data, a Chi-square analysis also suggests a statistically significant difference between geographic location of organizations and total number of employees. The investigator concludes, even though the data tends to indicate the geographic source of technicians and methods used to obtain technicians were affected by number of employees, the finding cannot be contributed solely to the number of employees since there was a statistically significant difference between geographic location of employers and number of employees.

Seventh Research Question: How is the major activity of an organization associated with its technician employment practices?

Summary and Conclusion: The data indicates manufacturing, public utilities, and government did not actively recruit graduating technicians, while petroleum organizations on the other hand appeared to have recruited technician graduates actively. Government organizations did not seem to have technical positions for which technician graduates were given preference. Even though manufacturing organizations indicated a preference for graduate technicians to fill technical positions, the data indicates manufacturing organizations did not actively recruit technician graduates. The major reason given by petroleum and manufacturing organizations as to why preference was given to technician graduates over others was because technicians became "productive with a minimum of training." A Chi-square analysis suggested a statistically significant difference between major activities and the employers' preference for technician graduates. Another Chi-square analysis suggested a statistically significant difference between the major activities and reasons for giving technician graduates employment preference. Therefore, the investigator concluded, whether an employer prefers a graduate technician over another to fill a technical position, depended upon the major activity of the employing organization. It is further concluded, the reasons given by employers for giving preference to technicians also depended upon the major activity of the employing organization.

Eighth Research Question: How is the geographic location of an organization associated with its technician employment practices?

Summary and Conclusion: The data tends to support the conclusion

that employers within the Standard Metropolitan Statistical Areas were more apt to fill technical positions with experienced technicians than organizations outside the SMSAs. The employer representatives indicated 77.8 percent of the organizations studied in the SMSAs used experienced technicians to fill semi-professional jobs; whereas, only 42.9 percent of the organizations outside the SMSAs used experienced technicians to fill technical positions. A Chi-square analysis suggested a statistically significant difference between the geographic location of employers and the kinds of technicians used to fill technical positions. The findings further indicate the organizations studied within the SMSAs were more apt to employ a greater percentage of their technicians from in-state than the organizations studied outside the SMSAs. Although the above statements are indicated by the data, a Chi-square analysis suggests a statistically significant difference between geographic location of employers and the total number of employees. Thus, the investigator concludes, even though the data tends to indicate the kinds of technicians used to fill technical positions and geographic source of technicians seemed to depend upon the geographic location of the employers, the findings cannot be contributed solely to the geographic location of the employers since there was a statistically significant difference between geographic location of employers and number of employees.

Four objectives were set forth in this study. The first objective was accomplished through answers to the above eight research questions. Objective Number One was stated as follows: To identify placement/ employment practices of Oklahoma educational institutions and employing organizations graduating and employing two year post-high school

engineering and physical science related technicians.

This section states the remaining three objectives and conclusions based upon the findings. They are:

Objective Number Two: To determine the present and projected needs of Oklahoma employers for two year post-high school engineering and physical science related technicians.

Summary and Conclusion: The total estimated demand for technicians was 1,261 in 1968 and 849 in 1972. The overall demand for the combined years of 1968-1972 was 4,483. The largest demand for any one single year was indicated for 1968. The greatest increase in demand for technician graduates during the year 1968 was primarily in the areas of mechanical, electronics, and "new technologies." The largest estimated demand for the years 1968-1972 was for drafting and design technicians. There was a demand for 1,114 drafting and design graduates, followed by 988 electronics, and 767 mechanical. It should be noted that this information pertains to only 57 Oklahoma organizations and therefore represents only 60 percent of the total demand for technicians. The fact that the largest estimated demand of technicians for any one single year was indicated for 1968 might be related to the rather sudden exposure of Oklahoma employers at the industrial conferences to certain additional information, e.g., location of educational institutions, types of graduates available, and the potential productivity of the technician with a minimum of on-the-job training.

Objective Number Three: To discover emerging engineering and physical science related manpower requirements not presently being supplied by educational institutions in Oklahoma.

Summary and Conclusion: The overall demand for graduates of

recommended new technical programs by the 57 Oklahoma employers was 399. The largest demand in the area of "new technician programs" was for 150 pipeline automation and instrumentation technicians followed by 80 electrical and 76 gyroscopics technicians. The investigator concludes that the overall demand for technicians of "new programs" may represent one of the single most important communications from Oklahoma employers. The data obtained from this communication provides information about technician manpower requirements not presently being supplied by educational institutions in Oklahoma which may be useful in long range educational planning.

Objective Number Four: To determine the placement/employment communication patterns between Oklahoma educational institutions and Oklahoma organizations employing two year post-high school technician graduates.

Summary and Conclusion: The communications network between Oklahoma employers and institutions providing technician graduates indicates the greatest number of communication contacts have been at Oklahoma State Tech at Okmulgee, followed by Oklahoma State University Technical Institute, Oklahoma City; Langston University; and Oklahoma State University Technical Institute, Stillwater, Less communication contacts were made at the seven junior colleges according to the 57 employers. School representatives perceived communication efforts of out-of-state employers as having been greater than the communication efforts of in-state employers. The data shows in-state employers conducted the greatest number of interviews on campus and provided more opportunities for graduating technicians to visit employing organizations for interviews. Out-of-state efforts on the other hand were indicated to have been

greater in selected employer activities, such as: Providing literature that gives information about employing organizations and technical job openings, requests to meet with technician groups on campus, and inquiries about graduating technicians. The investigator concludes that little dialog exists between Oklahoma educational institutions graduating technicians and Oklahoma employers. The communication contacts that do exist are restricted to select kinds of schools and only then to a limited degree. The communication efforts of out-of-state employers appear to be greater than in-state employer efforts, particularly in employer activities judged the most significant by school representatives.

In Conclusion

Oklahoma educational institutions graduating technicians in 1967 that considered technician placement a primary function of the school's total guidance program were the schools indicating adequate placement resources, a person responsible for placement above the instructor level, using a greater number of methods to disseminate placement/employment information to students and employers, and having the greatest number of communication contacts with Oklahoma employers. Schools indicating inadequate technician placement resources were the ones that considered placement the responsibility of the student and/or other organizations, utilizing few methods to disseminate placement/employment information to students and employers, and involved in a small number of employer communication contacts. Although the eleven schools did not use the methods most frequently, the school representatives considered the most important source of information in determining technician

manpower needs and employment opportunities was "school representatives visiting with employers" and the most important method of communicating placement/employment information to technician students was "representatives of organizations employing technicians discussing technician needs and opportunities with students in group sessions on campus."

A great majority of the Oklahoma employers stated they not only had positions for which two year post-high school technician graduates were given employment preference over those with other educational backgrounds but the technicians had a well defined path for advancing to positions of increased responsibility and pay. However, when the representatives of the 57 organizations were asked if they actively recruited graduates of two year post-high school technician programs, a majority said "no." Furthermore, when the employer representatives were asked from what sources did their organization fill semi-professional technical positions, the most frequently given response was "up graded employed personnel." When representatives of the organizations that did not have positions for technician graduates were asked to reflect their reasons for not giving preference to technician graduates the most frequent responses in order of importance was: (1) Organizational policy is to upgrade present employees rather than to employ new technical personnel, and (2) we are unfamiliar with the ability level and potential of technical school graduates. Furthermore, a great majority of the Oklahoma employers seemed to show definite desire for experienced technicians. Although Oklahoma employers have positions for technician graduates but do not actively recruit graduates from technician programs and emphasize the hiring of experienced technicians, the graduating technician might well be forced to leave the state for employment and

to gain experience. The desire for experienced technicians appears to be more dominant in organizations with low utilization of technicians and which do not have an active recruitment policy. Oklahoma employers who have an active recruitment policy are most likely to recognize that the recent technician graduates are productive with a minimum of on-the-job training.

Recommendations

In light of the data presented, the summary statements, conclusions, and additional impressions gained in personal interviews and employer conferences, the following recommendations were made:

1. Not all educational institutions providing semi-professional technician programs considered technician placement a primary function of the school's total guidance program. It is recommended, however, that school administrators give careful attention to the placement needs of graduating technicians.

2. Adequate resources were not devoted to technician placement activities. Therefore, school administrators and state officials responsible for operating technician programs should provide adequate resources for technician placement.

3. Various levels of school personnel were found to be primarily responsible for technician placement. School administrators should give serious consideration to a full time placement officer.

4. Schools obtained information on technician manpower needs and employment opportunities through a number of sources. It is recommended that administrators provide school representatives with sufficient finances and time to visit with employers.

5. Placement/employment information was communicated to students through various ways. It is recommended the person primarily responsible for technician placement invite representatives of organizations employing technicians to discuss technician needs and opportunities with students in group sessions on campus.

6. Schools disseminated technician placement/employment information to Oklahoma employing organizations through different methods. It is recommended that school administrators send representatives from the technology departments to inform prospective employers about the school's technology programs and graduating technicians.

7. Employers filled semi-professional technical positions with persons having various experiences. It is recommended that boards, executive officers, and personnel directors give careful attention to the ability level and potential of technician graduates.

8. Not all organizations had well defined paths for technicians to advance to positions of increased responsibility and pay. Boards and administrative officers, therefore, should provide well defined paths for technicians to advance to positions of increased responsibility and pay.

9. The communication between Oklahoma employers and institutions graduating technicians varied greatly. It is recommended, therefore, that school administrators, state officials, and employers develop a centralized system of collecting and disseminating placement/employment information to schools, employers, and other agencies.

10. School-industry practices in the placement and employment of technician graduates have been investigated in this study. The investigator recommends that the data from this study be used along with the

findings of Wilfred M. Bates (8) in the design of future studies of technician graduate behavior, and placement and employment practices. It is further recommended that the interview and employer conference techniques utilized in this study be used in other such studies. Research is needed to investigate the employment practices of organizations in-state and out-of-state actually employing Oklahoma's graduating technicians with implications for the reduction of technician migration to other states. Research is also needed to provide the data needed in the design and development of the centralized system for collecting and disseminating technician placement/employment information to schools, employers, and other agencies which has been recommended in this study.

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APPENDIX A

INTERVIEW SCHEDULE ON PLACEMENT PRACTICES

OKLAHOMA STATE UNIVERSITY • STILLWATER

Department of Technical Education
Industrial Building Room 104
FRontier 2-6211, Ext. 7261

74074

Date

PLACEMENT PRACTICES CONCERNING TECHNICAL PERSONNEL IN OKLAHOMA

The following information is needed to assist Oklahoma educational institutions and employing organizations in the placement and employment of graduating engineering and physical science related technicians and to assist in the coordination of occupational education beyond the high school in Oklahoma. For the purpose of this study placement practices and employment practices will be those procedures followed by educational institutions and employing organizations which materially affect the quality and quantity of job opportunities for technician graduates.

The following questions refer to your two year post-high school engineering and physical science related technology programs during the 1966-1967 school year. Responses will not be identified with individuals or organizations in any published materials or reports.

Educational Institution

Representative's Title

Representative Completing Information Form

Phone Number and Extension

A. POLICIES AND PROCEDURES--GENERAL

1. Which of the following statements best represents your institution's practices with regard to the placement of your 1967 technician graduates? (please check one)

   a. ( ) Placement was considered a primary function of our total guidance program.

   b. ( ) Placement was the primary responsibility of the students and/or other organizations.

   c. ( ) Placement was the total responsibility of the students and/or other organizations.

2. Please check the response below which most closely indicates your school's practices relating to placement of graduating technicians.

   a. ( ) Adequate resources were devoted to technician placement activities.

   b. ( ) Adequate resources were not devoted to technician placement activities.

      If checked, please check major resources needed for effective technician placement.

      ( ) Personnel

      ( ) Space (for records, job interviews, etc.)

      ( ) Other (please specify)_____

      _____

3. Who at your school had the primary responsibility for technician placement? (please check one)

   a. ( ) School's placement officer

   b. ( ) Dean of students

   c. ( ) Director of all technology programs

   d. ( ) Heads of single technology programs

   e. ( ) Instructors in technology programs

   f. ( ) Other (please specify)_____

      _____

B. SOURCES OF INFORMATION ON TECHNICIAN JOB OPPORTUNITIES

1. What sources of information did your school use in determining technician manpower needs and employment opportunities for graduating technicians? (check as many as apply)

   a. ( ) Results of surveys and/or studies of technician manpower needs.

      If checked, please indicate the scope of the surveys and/or studies. (check as many as apply)

      ( ) National ( ) Local

      ( ) State

b. ( ) Employers sent lists of technician job openings from employing organizations.

c. ( ) School representatives visited with employers.

d. ( ) Advisory committee referrals.

e. ( ) Others (please specify)_____

_____

2. Of the above, which do you consider to be the most important?

(a - b - c - d - e) Circle selected letter

C. GETTING INFORMATION TO STUDENTS

1. How did your school communicate placement/employment information to technician students? (check as many as apply)

a. ( ) Representatives of organizations employing technicians discussed technician needs and opportunities with students in group sessions on campus.

b. ( ) School initiated technician class trips to employing organizations which resulted in students getting employing information.

c. ( ) Industry initiated technician class trips to employing organizations which resulted in students getting employment information.

d. ( ) Made available to students a current list of employers desiring to employ technicians.

e. ( ) Provided informational case histories of former graduates from follow-up studies of technician graduates.

f. ( ) Other methods were used to communicate technician placement/employment information to technician students. (please specify)_____

_____

2. Of the above, which do you consider to be the most important?

(a - b - c - d - e - f) Circle selected letter

D. GETTING INFORMATION TO EMPLOYERS

1. How did your school disseminate technician placement/employment information to Oklahoma employing organizations? (check as many as apply)

a. ( ) Sent printed material to prospective employers which gave information about your technology programs.

b. ( ) Sent printed materials to prospective employers which gave information about your prospective technician graduates.

c. ( ) Sent representatives from your technology departments to inform prospective employers about your technology programs and technician students.

d. ( ) Other methods were used to disseminate technician placement/employment information to employing organizations. (please specify)_____

_____

2. Of the above, which do you consider to be the most important?

(a - b - c - d) Circle selected letter

E. IN-STATE/OUT OF STATE DIFFERENCES IN SCHOOL-INDUSTRY RELATIONSHIPS

1. What is the approximate distribution of the total school-industry placement/employment effort between in-state employers and out-of-state employers?

_____ percent	_____ percent
In-State Effort	Out-of-State Effort

2. Who in your judgment rated the highest, in-state employers or out-of-state employers, in the following employment activities? (please check)

Check the not significant column if the sum of the in-state and out-of-state employer efforts were insignificant.

In-State Employers	Out-of-state Employers	Not Significant	Employers Activities
			Number of inquiries about graduating technicians
			Detailed literature giving information about employing organizations
			Provides literature with regard to technician job openings
			Number of requests to meet with technician groups on campus

In-State Employers	Out-of-state Employers	Not Significant	Employers Activities
			Number of requests for technician classes to visit employing organizations
			Provides well-defined paths for technicians to advance to positions of increased responsibility and pay
			Number of interviews conducted on campus
			Provide opportunities for individual graduates to visit employing organizations for interviews
			Pay for interview trip to employing organizations
			Attractiveness of job title
			Offers the highest level of entry positions commensurate with ability level
			Provides opportunity for additional formal education (education expenses, time-off, etc.)
			Other fringe benefits (moving expenses, temporary housing, etc.)

APPENDIX B

SAMPLE OF CORRESPONDENCE

OKLAHOMA STATE UNIVERSITY • STILLWATER

Department of Technical Education
Industrial Building Room 104
FRontier 2-6211, Ext. 7261

74074

March 21, 1968

Dear Dr. (Name of President or Director):

An attempt is being made to determine the placement practices of all schools in Oklahoma graduating two year post-high school engineering and physical science related technicians. Data about school placement practices are needed to supplement information already obtained about Oklahoma industry's employment practices as published in the statewide study Occupational Education Beyond the High School in Oklahoma by Drs. Maurice Roney and Paul Braden.

I would like to visit on your campus late Tuesday morning or early afternoon April 2 and obtain the kind of technician placement information indicated on the enclosed information sheet from one of your deans or technology faculty members.

While on your campus I will be happy to visit with your technology instructors and technician students regarding any questions they might have regarding our B.S. and M.S. degree programs in Technical Education.

Yours truly,

Cecil W. Dugger
Assistant Professor

CWD:cj

Enclosure

APPENDIX C

PLANNING CONFERENCE AGENDA

Meeting of Oklahoma Industrial Representatives

on Technician Need Study

Case Study Room A
Student Union
Thursday, October 5, 1967

AGENDA

9:30 a.m.	Coffee	
10:00 a.m.	Introductions	
10:15 a.m.	Purpose of Statewide Study of Post-High School Occupational Education	M. W. Roney Oklahoma State University
10:30 a.m.	Scope of Statewide Study	M. W. Roney Oklahoma State University
11:00 a.m.	Summary of First Report released in September, 1967	Paul V. Braden Oklahoma State University
11:30 a.m.	Information needed for final report	M. W. Roney Oklahoma State University
12:00 noon	Lunch	
1:15 p.m.	Industry's Role in Technical Education Planning	Clarence McNeil IBM Corporation Armounk, New York
2:00 p.m.	Presentation of a proposed system for collecting information on technical personnel needs in Oklahoma	Cecil Dugger Oklahoma State University
3:30 p.m.	Summary of conference	

APPENDIX D

LIST OF PARTICIPANTS IN PLANNING CONFERENCE

Industrial Conference on Post-High School Occupational Education

October 5, 1967
Oklahoma State University
Case Study Room A
9:30 a.m. to 4:00 p.m.

List of Participants

H. P. Adams
Professor Emeritus
Oklahoma State University
Stillwater, Oklahoma

Paul V. Braden, Associate Professor
Industrial Education
Oklahoma State University
Stillwater, Oklahoma

M. H. Brady
Employment - Administration
North American Rockwell
2000 N. Memorial, Tulsa, Oklahoma

C. E. Buffum
Lab. Services Superintendent
Pan American Petroleum Corp.
Box 591, Tulsa, Oklahoma

Phillip Chandler
OSU Technical Institute
Oklahoma City Branch
1900 N.W. 10th, Oklahoma City

B. J. Cook
Supervisor of Employment
O G & E
Box 321, Oklahoma City

Richard Cox
Employee Placement Training
Kerr-McGee Corp.
Oklahoma City, Oklahoma

Cecil W. Dugger, Assistant Prof.
Technical Education
Oklahoma State University
Stillwater, Oklahoma

J. C. Fishburn
Personnel Manager
University Sound
9500 W. Reno, Oklahoma City

B. E. Forrest
Chief of Personnel
OCAMA
Tinker Air Force Base

I. E. Ganbee
Engineer Administration Supervisor
National Tank Co.
Box 1710, Tulsa, Oklahoma

B. J. Hamilton
Director of Engineering
Flint Steel Corp.
Box 1289, Tulsa, Oklahoma

R. C. Hickey
Manager - Personnel
G. E. Co.
4000 N.W. 39th, Oklahoma City

C. E. McNeil
Education Programs Consultant
IBM Corp.
Armounk, New York

G. H. Orcutt
Personnel Development Supervisor
Southwestern Bell Telephone
707 N. Robinson, Oklahoma City

M. E. Orelup
Engineer
Oklahoma Natural Gas Co.
Box 871, Tulsa, Oklahoma

S. E. Robb, Director
Oklahoma Economic Dev. Ed., Inc.
1808 Newton Drive
Norman, Oklahoma

M. W. Roney, Director
School of Industrial Education
Oklahoma State University
Stillwater, Oklahoma

Robert E. Scott
Department Chief, Industrial Relations
Western Electric Co.
6655 W. Reno, Oklahoma City

W. Shelton, Jr.
Chief, Placement Branch
Federal Aviation Administration
P. O. Box 25082, Oklahoma City

C. G. Wells
Consultant
National Tank Co.
Box 1710, Tulsa, Oklahoma

C. W. Wilson
Supervisor, Employment Service
Sunray DX Oil
Box 2039, Tulsa, Oklahoma

Jerry Wilson
Director of Industrial Relations
Crane Carrier Co.
Box 5008, Tulsa, Oklahoma

APPENDIX E

INFORMATION SHEET ON EMPLOYMENT PRACTICES

OKLAHOMA STATE UNIVERSITY • STILLWATER

Department of Technical Education
Industrial Building Room 104
FRontier 2-6211, Ext. 7261

74074

_____
Date

EMPLOYMENT PRACTICES CONCERNING TECHNICAL PERSONNEL IN OKLAHOMA

The following information is needed to assist in planning a statewide program of occupational education beyond high school. In general, the kind of programs under consideration are on the post-high school level, two years in length, with a concentration in a field of specialization which normally requires a base of mathematics and science.

Responses to these questions should refer only to your organization or division. Responses will not be identified with individuals or organizations in any published materials or reports.

_____
Name of Organization

_____
If a division of an organization, specify division and report only for that division

What is the approximate number of personnel (all types) presently employed in Oklahoma by your organization (or division)? _____ Number of Employees

_____ Department or Office	_____ Representative Completing this Form
_____ Number and Street	_____ Representative's Title
_____ City or Town	_____ Representative's Phone & Extension

Check major activity or organization (or division)

_____ Manufacturing	_____ Trade (wholesale or retail)
_____ Construction	_____ Finance-Insurance-Real Estate
_____ Mining	_____ Service
_____ Public Utilities	_____ Government
_____ Other (please specify) _____	

1. Engineering and Scientific Personnel

A. What is the approximate number of personnel presently employed in engineering and physical scientist job classifications?

_____ No. of Engineers	____ None
_____ No. of Physical Scientists	____ None

B. Of those presently employed in engineering and physical scientist job classifications, what number have

Engineering Degrees	Physical Science Degrees	Other Education
(1) Ph.D._____	(4) Ph.D._____	(7) Non-Technical ____ Bachelor's Degree
(2) M.S. _____	(5) M.S. _____	
(3) B.S. _____	(6) B.S. _____	(8) No Bachelor's Degree ____

2. Technical Personnel (Semi-professional)

A. What is the approximate number of personnel presently employed in your organization in semi-professional technical positions (engineering or physical science related)?

_____ Number ____ None

B. Of the above number, how many have

(1) Bachelor's degrees _____ Number

(2) Two years of specialized post-high school technical training (for example, electronics, design, metallurgy) _____ Number

(3) One to three years of general college education (such as a liberal arts program in a junior college) _____ Number

(4) No formal post-high school education _____ Number

(5) Less than high school completion _____ Number

3. Current Technician Employment Practices

A. From what sources does your organization fill semi-professional technical positions? (Rank 1 through 5, from most to least important)

( ) State Employment Office

( ) Private employment agencies

( ) Junior colleges

( ) Technical institutes

( ) Four-year colleges or universities

( ) Upgrading presently employed personnel

( ) Walk-ins

( ) Advertisements in newspapers, trade journals, etc.

( ) Employee referrals (recommendations from employees)

( ) Other sources (please specify)_____

_____

B. Do you primarily fill semi-professional technical positions

( ) With recent graduates of 2-year post-high school technical programs?

( ) With experienced technicians?

C. What geographic location is your primary source of technicians?

( ) Oklahoma

( ) Other states

D. Do you actively recruit graduates of 2-year specialized post-high school technical programs? ____ Yes ____ No

E. Do you have positions for which a 2-year post-high school technical graduate is given employment preference over those with other educational backgrounds (including non-technical B.S. degrees)? ____ Yes ____ No

F. For those who answered question 3E YES, rank the following items which reflect your reasons for giving employment preference to 2-year post-high school graduate technicians. (Rank 1 through 4, from most to least important)

( ) He is productive with a minimum of on-the-job training

( ) Has potential to move up to positions of increased responsibility

( ) Has broad technical background which permits flexibility in job assignment

( ) Has educational background to keep current in his technical field

( ) Feels responsible for proving himself on the job

( ) Other (please specify)_____

( ) Other (please specify)_____

G. For those who answered question 3E NO, please rank the following items which reflect your reasons for not giving preference to 2-year post-high school technical graduates. (Rank 1 through 4, from most to least important)

( ) Our organization does not have technical jobs

( ) Organization does not have job classifications between engineers and skilled trades or crafts which call for technicians

( ) A union bargaining unit covers technician jobs

( ) We are unfamiliar with the ability level and potential of technical school graduates

( ) Organizational policy is to upgrade present employees rather than to employ new technical personnel

( ) Organizational policy gives preference to B.S. Degree holders

( ) Going rates for 2-year post-high school technician graduates are above our present pay scales

( ) All technical jobs are performed by engineers.

( ) Other (please specify)_____

( ) Other (please specify)_____

H. Does your organization hire 2-year post-high school technical graduates who have not fulfilled their military requirements? ____ Yes ____ No

I. Do technicians in your organization have a well-defined path for advancing to positions of increased responsibility and pay? ____ Yes ____ No

If yes, is path as a technician _____ (please check) and/or

some other path_____ (please specify)

J. Indicate in the appropriate space below the relations (if any) your organization had with the institutions listed during the 1966-67 school year.

INSTITUTIONS	Received information about their technical programs	Received information about their graduating technicians	Conducted tours for technical students	Sent literature explaining benefits of working with your organization	Extended invitations to technical students to visit your organization	Sent a list of job openings	Placed technical students in part-time work during school year or summer	Sent a representative to interview and recruit graduating technicians	Made job offers to graduating technicians	Hired technical graduates
Altus Junior College Altus										
Cameron State College Lawton										
Connors State College Warner										
Eastern Okla. A&M College Wilburton										
Langston University Langston										
Murray State College Tishomingo										
Northern Oklahoma College Tonkawa										
Northeastern Oklahoma A&M Miami										
Oklahoma State Tech Okmulgee										
OSU Technical Institute Stillwater										
OSU Technical Institute Oklahoma City Branch										
Sayre Junior College Sayre										

4. Projected Technician Employment Practices

A. During the next 5 years do you anticipate

( ) An increase in the employment of 2-year post-high school technical graduates?

( ) No change in the employment of 2-year post-high school technical graduates?

( ) A decrease in the employment of 2-year post-high school technical graduates?

B. If you anticipate increasing the number of 2-year technically trained personnel in your organization during the next 5 years, which of the following factors will influence this increase?

( ) Growth of the organization's present activities

( ) Re-structuring of tasks which were formerly assigned to engineers

( ) Work becoming more technical

( ) Organization engaging in new activities

( ) Other (please specify)_____

_____

C. If you anticipate a decrease, why?

( ) Decrease in organization's present activities

( ) Use of automated equipment

( ) Re-structuring of tasks so that they can be done by persons with less training

( ) Other (please specify)_____

_____

D. How many 2-year post-high school technical graduates, including additional positions and replacements, do you anticipate hiring over the next five years?

Technical Areas	Number Presently Employed	1968	1969	1970	1971	1972
Aeronautical						
Chemical						
Civil						
Civil and Highway						
Construction						
Data Processing						
Drafting and Design						
Electronics						
Fire Protection						
Instrumentation and Process Control						
Mechanical						
Metals						
Petroleum						
Radiation						
Refrigeration and Heating						
Other_____ (specify)						
Other_____ (specify)						
Other_____ (specify)						

If your organization has other divisions in Oklahoma, please list the name and location below

Division	Location
Division	Location
Division	Location

If you desire to make any additional remarks, please do so in the space provided below.

APPENDIX F

EMPLOYER CONFERENCE AGENDA

INDUSTRIAL CONFERENCE ON EMPLOYMENT PRACTICES OF TECHNICAL PERSONNEL IN OKLAHOMA

Circus Room, 5th Floor
Student Union
Oklahoma State University
Tuesday, November 14, 1967

AGENDA

9:30 a.m.	Coffee	Circus Room, 5th Floor Student Union
10:00 a.m.	Introductions	
10:15 a.m.	Purpose of Statewide Study of Post-High School Occupational Education	M. W. Roney Oklahoma State University
10:30 a.m.	Scope of Statewide Study	M. W. Roney Oklahoma State University
11:00 a.m.	Summary of First Report Released in September, 1967	Paul V. Braden Oklahoma State University
11:30 a.m.	General Comments on Information Needed for Final Report	Representative of Employer Steering Committee and M. W. Roney, Oklahoma State University
12:00 noon	Lunch	Regency Room
1:15 p.m.	Industry's Role in Technical Education Planning	Representative of Employer Steering Committee
1:45 p.m.	Detailed Presentation of a System for Collecting Information on Technical Personnel Needs in Oklahoma	Cecil W. Dugger Oklahoma State University
3:00 p.m.	Summary of Conference	
3:30 p.m.	Adjourn	

APPENDIX G

LIST OF ORGANIZATIONS REPRESENTED

AT EMPLOYER CONFERENCES

ORGANIZATIONS REPRESENTED AT INDUSTRIAL EMPLOYMENT CONFERENCES IN NOVEMBER AND DECEMBER OF 1967

A.S.T.M.E.
1427 North Tacoma Avenue
Tulsa, Oklahoma

AVCO
10700 East Independence
Tulsa, Oklahoma 74115

Aero Commander
5001 North Rockwell
P. O. Box 118
Bethany, Oklahoma 73008

American Airlines
3800 North Mingo Road
Tulsa, Oklahoma 74116

Bell Oil and Gas
P. O. Box 188
Northeast of City
Ardmore, Oklahoma 73401

Black, Sivalls and Bryson, Inc.
P. O. Box 1714
2131 Westwood Boulevard
Oklahoma City, Oklahoma 73101

Blue Bell, Inc.
Harvey Road at Strothers
Seminole, Oklahoma 74868

Braden-Aermotor
800 West Dallas
Broken Arrow, Oklahoma

Brockway Glass Company
Northeast of City
Muskogee, Oklahoma 74401

Capitol Steel and Iron
1726 South Agnew Avenue
P. O. Box 26487
Oklahoma City, Oklahoma 73119

Carson Machine and Supply Company
202 Southeast 29th Street
Oklahoma City, Oklahoma 74129

Champlin Petroleum Company
Northeast Edge of City
P. O. Box 552
Enid, Oklahoma 73701

Cities Service Oil Company
P. O. Box 300
Tulsa, Oklahoma

Office of City Manager
City of Bartlesville
Bartlesville, Oklahoma

Office of City Manager
City of Enid
P. O. Box 1768
Enid, Oklahoma

Office of City Manager
City of Midwest City
300 Mid-American Building
Midwest City, Oklahoma

Office of City Manager
City of Muskogee
Muskogee, Oklahoma

Office of City Manager
City of Oklahoma City
200 North Walker
Oklahoma City, Oklahoma

Office of City Manager
City of Shawnee
P. O. Box 1448
Shawnee, Oklahoma

Office of City Manager
City of Stillwater
723 South Lewis
Stillwater, Oklahoma

Office of City Government
City of Tulsa
Tulsa, Oklahoma

Civil Service Commission
210 Northwest 6th Street
Oklahoma City, Oklahoma

Continental Oil Company
100 South Pine Street
P. O. Box 1267
Ponca City, Oklahoma 74602

Dover Corporation
Norris Division
Tulsa, Oklahoma

Dowell Division of Dow Chemical Company
1579 East 21st Street
Tulsa, Oklahoma 74110

Georgia-Pacific Corporation
P. O. Box 579
Pryor, Oklahoma 74361

B. F. Goodrich
1000 Goodrich Boulevard
Miami, Oklahoma 74354

KVOO-TV News
P. O. Box 1349
Tulsa, Oklahoma

LSI Service Corporation
3100 North Interstate 35
Oklahoma City, Oklahoma

Lockheed-California Company
Plant 09, Box 800
McAlester, Oklahoma

McDonnell Douglas Corporation
200 North Memorial Drive
P. O. Box 1119
Tulsa, Oklahoma

Macklanburg Duncan Company
4041 North Santa Fe Avenue
P. O. Box 1197
Oklahoma City, Oklahoma

Manpower, Inc.
801 South Detroit
Tulsa, Oklahoma

Midwestern Instruments, Inc.
41st and South Sheridan Road
P. O. Box 7509
Tulsa, Oklahoma 74105

Mobil Oil Corporation
120 Robert S. Kerr Avenue
Oklahoma City, Oklahoma

Lee C. Moore Corporation
1105 North Peoria Avenue
P. O. Box 216
Tulsa, Oklahoma 74104

Muskogee Iron Works
Frankfort Avenue and Spaulding Boulevard
P. O. Box 188
Muskogee, Oklahoma 74401

North American Rockwell Corporation
Route 69 Bypass, Northeast
McAlester, Oklahoma 74501

Oklahoma Aerotronics
632 Pennsylvania Avenue
Hartshorne, Oklahoma 74547

Oklahoma City Chamber of Commerce
Skirvin Towers
Oklahoma City, Oklahoma

The Oklahoma Publishing Company
500 North Broadway
P. O. Box 25125
Oklahoma City, Oklahoma 73102

Pittsburg Plate Glass Company
East Edge of City, Works No. 10
Henryetta, Oklahoma 74437

Phillips Petroleum Company
432 Frank Phillips Building
Bartlesville, Oklahoma

Republic Supply Company
P. O. Box 640
Oklahoma City, Oklahoma

John Roberts, Inc.
2500 South McGee Drive
Norman, Oklahoma 73069

Robberson Steel Company
1401 Northwest 3rd Street
P. O. Box 25855
Oklahoma City, Oklahoma 73101

Seismograph Service Corporation
6200 East 41st Street
P. O. Box 1590
Tulsa, Oklahoma

Sequoyah Refining Corporation
P. O. Box 1300
Ponca City, Oklahoma 74602

Shawnee Steel Company
700 East Santa Fe Shop Road
P. O. Box 1344
Shawnee, Oklahoma 74801

Skelly Oil Company
P. O. Box 1650
Tulsa, Oklahoma

State Highway Department
The Jim Thorpe Building
Capitol Complex
Oklahoma City, Oklahoma

Sylvania Electric Company
P. O. Box 1809
Shawnee, Oklahoma

The Tulsa Tribune
P. O. Box 1770
Tulsa, Oklahoma

Tulsa Chamber of Commerce
616 South Boston
Tulsa, Oklahoma

U. S. Army Corps of Engineers
P. O. Box 61
Tulsa, Oklahoma

U. S. Bureau of Mines
P. O. Box 1398
Bartlesville, Oklahoma

U. S. Gypsum
Southeast Edge of City
P. O. Box 187
Southard, Oklahoma 73770

Unit Parts Company
4600 Southwest 59th Street
P. O. Box 1921
Oklahoma City, Oklahoma 73135

Vickers Tulsa Products Division
731 East 1st Street
Tulsa, Oklahoma

W. and W. Steel Company
1730 West Reno Avenue
Oklahoma City, Oklahoma 73101

WABCO Drilling Equipment Division
2215 S. VanBuren
Enid, Oklahoma 73701

Yuba Heat Transfer
3519 Dawson Road
Box 3158
Tulsa, Oklahoma 74150

VITA

Cecil Walker Dugger

Candidate for the Degree of

Doctor of Education

Thesis: AN ANALYSIS OF OKLAHOMA SCHOOL-INDUSTRY PRACTICES IN THE PLACEMENT AND EMPLOYMENT OF TECHNICIAN GRADUATES

Biographical:

Personal Data: Born near Farmersville, Texas, March 2, 1930, the son of William Warren and Arra Mae Dugger.

Education: Attended grade school in Midway and Farmersville, Texas; graduated from Farmersville High School in 1947; received the Bachelor of Science and the Master of Education degrees from Texas A&M University, with a major in agricultural education in August, 1957 and May, 1958 respectively; attended East Texas State University, University of Illinois, University of Houston, and Colorado State University; completed requirements for the Doctor of Education degree in July, 1968, at Oklahoma State University.

Professional Experience: Teacher of Physical and Biological Sciences, Mineral Wells High School, Mineral Wells, Texas, 1958-1960; Teacher of Biology, Mt. Pleasant High School, Mt. Pleasant, Texas, 1960-1961; Instructor of Electronics and Chairman of Technology Department, Cameron State College, Lawton, Oklahoma, 1961-1965; and Assistant Professor, Tehnical Education Department, Oklahoma State University, Stillwater, Oklahoma, 1965-1968.

Professional Organizations: American Technical Education Association, American Society of Engineering Education, American Society of Certified Engineering Technicians, American Vocational Association, Oklahoma Education Association, Oklahoma Society of Certified Engineering Technicians, National Education Association, Oklahoma Technical Society, and Phi Delta Kappa.