A STUDY OF THE PLACEMENT OF GRADUATES FROM OKLAHOMA'S POST-HIGH SCHOOL PROGRAMS OF ELECTRONICS TECHNOLOGY

By

LLOYD DELANO BRIGGS

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Oklahoma State University

Stillwater, Oklahoma

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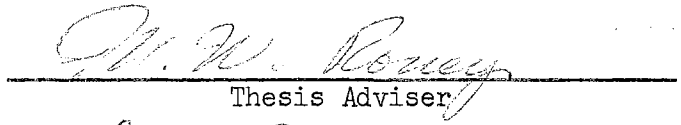

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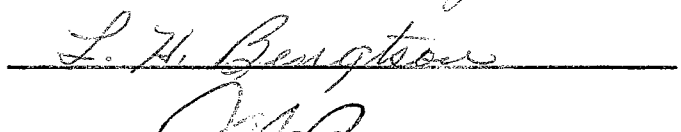

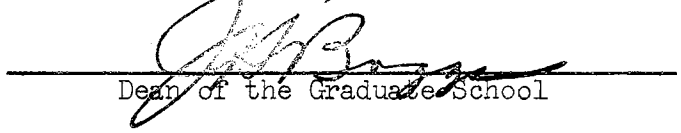

Dean of the Graduate School

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CHAPTER I

INTRODUCTION TO THE PROBLEM

Rapid advances in the development of scientific knowledge within recent decades has perpetuated an increase in the sophistication and complexity of technical occupations. For this reason, industry has been confronted with a shortage of qualified, scientific and technical manpower to carry on the endless search for new secrets of nature and to move forward the frontiers of knowledge and scientific and technological development. State and national surveys of industrial personnel have indicated that, although there is a shortage of scientists and engineers, the area in which the greatest shortage exists is that of personnel for supporting the activities of scientists and engineers (21).

The President's Committee on Scientists and Engineers (17) quoted President Eisenhower as saying,

> Although the Government has a responsibility for increasing the supply and improving the quality of our technological personnel, the basic responsibility for solution of the problem lies in the concerted action of citizens and citizens' groups organized to act effectively.

Since that time, many citizens and citizens' groups have acted effectively. Both private and public-supported educational institutions, sensing the problem at hand, began to provide more and better "technical education" facilities for the development of these supporting personnel who are so necessary for the effective and efficient utilization of the nation's scientific and engineering manpower.

Industries' repeated requests for technicians indicate the importance of technically educated personnel in a scientifically oriented society and of "technical education" in progressive and forward-looking institutions of learning at the post-high school level.

Although Technical Education is now a recognized and significant part of the nation's and of Oklahoma's educational structure, a great number of high school students in the nation and particularly in Oklahoma, apparently know little or nothing about the needs, qualifications, and opportunities in technical fields. As a result, many of the college freshmen who are best suited for technician preparatory programs and technician occupations select curricula leading to baccalaureate degrees although they may not have the scholastic and financial ability to complete it.

The lack of knowledge, among high school students, of the needs and opportunities in the technical fields appears to be due, in part, to the fact that counselors and high school teachers, in general, seem to have little or no knowledge of Technical Education needs, objectives, etc.

Within the post-high school institutions of Oklahoma, there are approximately forty technical curricula which are preparing youth and adults for employment in industry as highly skilled technicians. Ten of these are preparatory programs for electronics technicians.

Statement of the Problem

Educational administrators, counselors, and teachers are constantly in need of up-to-date information for advisement, placement, and program evaluation. This study was undertaken to obtain information which would be beneficial to:

1. High school teachers and counselors for providing vocational counseling and guidance for high school students.
2. Those persons in post-high school educational institutions who have the responsibility for recruiting new students.
3. Personnel in post-high school institutions for advising technical students in seeking and selecting jobs.
4. Administrators of post-high school institutions for further development and maintenance of effective placement services.
5. Local administrators for the continuing reassessment of their curricula.

Purpose of the Study

This study was conducted to determine the extent of graduate placement and the occupational achievements of students, both graduates and non-graduates, who have been actively enrolled in the post-high school electronics technology curricula of the state of Oklahoma.

Need for the Study

In one way or another, all faculty members of educational programs offering technical curricula are concerned, or should be concerned, with the occupational placement of their students--whether the students are graduates of the technical program or are individuals who, for some reason, are unable to complete the prescribed course of study. The individual faculty member must have a clear concept of the educational institution's role in student placement. He must be capable of supplying students with accurate and reliable information as to reasonable job and salary expectations.

High school counselors, also must have access to accurate information for the effective and proper guidance of youth who are planning their educational careers and their vocational futures.

The information obtained in this study should provide both groups with up-to-date advisement material in the area of electronics technology.

Limitations of the Study

The technicians selected for this study were from six of Oklahoma's ten tax supported, post-high school programs of electronics technology. Two of the schools were not included because they did not furnish the names and addresses soon enough to be included in the survey. Two other schools had not had electronics technology programs long enough to have graduates at this time.

Many of these programs were either initiated or reorganized in 1958 with the passage of the National Defense Education Act. It seems that a greater degree of uniformity developed among the various programs of the state at that time due, apparently, to the requirements for obtaining educational funds under that bill. Also, industrial needs change with time thus requiring curricula to be modified from time to time. College catalogs and bulletins of Oklahoma institutions indicate that during the period from 1958 to 1964, the electronics technology curricula for most of Oklahoma's various junior colleges and technical institutes were reorganized and updated to fit the modern trend for more mathematics and science. For these reasons, it was felt that this study, to be meaningful and significant, should be restricted to this period of time. Therefore, only students who were enrolled in 1958 and since that time were included in this study.

Students who had been enrolled in the technical program for as long as one year (between 1958 and 1964) but who did not graduate were also

included in the study, because counselors and student advisors occasionally are confronted with the student who feels that he needs to obtain full-time employment before he has completed the technical program. It was believed that placement records of others who had found themselves in this situation would be valuable to the counselor or adviser.

This was a descriptive study with all information being obtained by mailing questionnaires to the individuals who were to be included in the study.

Questions to be Answered

It was felt that the following questions would obtain information of particular significance for the administrators, counselors, and teachers of Oklahoma's high schools, technical institutes, and college technical education programs.

1. What is the extent to which students from Oklahoma's electronics technology programs obtain employment directly upon leaving the technical programs?

2. To what extent did the technical students obtain initial employment in the occupation for which they were educationally prepared?

3. What is the extent to which students from Oklahoma's electronics technology programs obtain employment in Oklahoma?

4. Into what geographic locations do the Oklahoma-educated electronics technicians tend to go?

5. Do the electronics technicians who go outside of the state of Oklahoma for employment tend to return eventually to their home state?

6. What is the median salary for the technicians' first job assignments?

7. What is the median salary for the technicians' present job assignments, and what is its relationship to the number of years of experience they have obtained?

8. Do the students, in general, feel that they have been adequately prepared for the jobs to which they have been assigned?

9. What is the median age at which individuals enter the technical programs?

10. What was the extent to which students transferred from other college programs to technical programs?

11. What proportion of the students have military experience before enrolling in technical programs?

12. To what extent do graduates from technical programs continue their education?

CHAPTER II

REVIEW OF THE LITERATURE

Much has been written and much has been said about scientific and technological developments in recent decades and about their impact on the occupational and educational structures of the nation. The tremendous increase in sophistication and complexity of occupations at all levels has elevated the needs of industry and business for semiprofessional ("middle level") manpower resulting in a shortage of both professional and semiprofessional personnel.

The Technician and Technical Education

The time lag between scientific discovery and engineering application has become so short that the engineer no longer has the time to perform both the theoretical and practical aspects of his assigned projects. He needs a helper or an assistant. The purpose of Technical Education in the technical institute or junior college is to educate and supply persons who are qualified to fill this position of "engineering assistant" or what is more commonly called engineering- or industrial-technician.

As early as 1931, the Society for the Promotion of Engineering Education (22) published a summary report of a study in which it said

> American industry in practically all of its branches, is understaffed with men of scientific and technical education. . . . With the rapid shift toward higher

> standardization and automatic processes, the total force requirements tend to diminish, but there is a striking rise in the proportion of staff experts and of highly trained technicians and supervisors. . . . Industry must therefore look increasingly to technical schools rather than to its rank and file for its technical and supervisory personnel.

In the original report of the same study, the author suggested a method for partially overcoming the technical manpower shortage (23).

> A need exists in our post-secondary scheme of education for a large number of technical schools giving a more intensive and practical training than that now provided by the engineering colleges. These schools should train principally for supervisory and technical positions in particular industries; . . .
>
> . . . . . .
>
> The name "technical institute" is proposed as the most suitable inclusive term for these schools. . . . A considerable part of the present demand on the engineering colleges could be filled by technical institute graduates, and often with greater satisfaction to both parties, if an adequate supply existed.

America has had Technical Education for some time, although it has not been nationally popular for very many years. The previous paragraphs indicate that certain people, since the beginning of the industrial expansion in the early part of the present century, have recognized the need for a "three-part scientific team" in industry. Modern day technological developments are products of the scientific team--the <u>engineer</u> and the <u>scientist</u> who formulate ideas to create new products and services, the <u>technician</u> who helps develop, test, and apply these ideas and creations, and the <u>craftsman</u> who makes the product and supervises the manufacturing and processing.

To properly maintain the three-part scientific team (engineer, technician, and skilled craftsman), a three-part educational program must be provided.

1. The university program for engineers and scientists.
2. The technical institute or the junior college technical educational program for the engineering- and scientific-technicians and the industrial technicians.
3. The vocational-trade program for craftsmen and apprenticeship training.

The technical institute and junior college technical programs, therefore, have the responsibility to produce qualified engineering and industrial technicians who are proficient in specific fields of technology.

A significant problem in the technician-training institutions and in the industries which utilize technician manpower is that of terminology for defining the technician. As one reviews the literature on industries' needs for technicians and on opportunities for graduate technicians, it is apparent that many people are uncertain as to the niche into which the technician ultimately fits. Schaefer and McCord (14) commented that at state and national meetings there is much talk about the importance of the technician and his role in modern technology, but audiences continue to be confused about the definition of technicians.

The 1964 Directory of Occupational Centered Curriculums in California gives the following description of jobs and responsibilities assigned to technicians (2).

> In general, technician jobs fall between those of the skilled craftsman and those of the professional engineer or scientist. The work is technical in nature but narrower in scope than that of the engineer or scientist and has a practical rather than a theoretical orientation.
>
> . . . . . .
>
> Technicians are utilized in virtually every activity where technical know-how is required. Research, development,

> and design work together constitute one of their largest and best-known areas of employment. Technicians in this type of activity, who have titles such as laboratory technicians, physical science aide, or engineering aide, generally serve as direct supporting personnel to engineers or scientists. They conduct laboratory experiments or tests; set up, calibrate, and operate instruments; and make calculations. They may work on the fabrication and assembly or experimental equipment and developmental models, do drafting and, in some instances, do design work.
>
> Technicians in jobs related to production usually follow a course laid out by the engineer or scientist, but they often work without close supervision. They may aid in the various phases of the production planning such as working out specifications regarding needed materials and methods of manufacture. Sometimes technicians serve as production supervisors or inspectors, devise tests to insure quality control of products, or make motion and time studies designed to improve the efficiency of operations. They also may perform liaison work between departments such as research or engineering and productions.
>
> In the installation, operation, and maintenance of complex machinery and equipment, technicians often handle or supervise work which might otherwise have to be done by engineers.

Direct from industry came an article by V. O. Henning (6), employment supervisor for Sandia Corporation of Albuquerque, New Mexico, in which he reported that originally Sandia hired graduate technicians only in the areas of electronics and mechanical technologies. More recently, however, interest has been extended to include technicians in fields such as computer, drafting, electrical, chemical, photographic, metallurgical, physical, industrial, and nuclear engineering technologies.

> Technicians [at Sandia] are now working in materials and process research; electromechanical and electronic component, product test equipment, and manufacturing development; programming; industrial hygiene; graphic arts; public relations; design services; physical, radiation, and mathematical research; systems development; field and environmental testing; and quality assurance. . . . Additional fields being considered at

> present are technical writing, programming, and others in which a college education in physics or mathematics has heretofore been required.

Norman C. Harris (3) attempted to arrive at a more specific set of definitions when he wrote,

> Many technicians work at quite a highly sophisticated level in research, design, and prototype production jobs. Satisfactory job performance requires a person whose theoretical knowledge approaches that of the engineer, but who has some measure of practical know-how with instruments, tools, and laboratory equipment. This kind of technician is coming to be called an "engineering technician."
>
> At the other end of the spectrum of technical jobs are those occupations that demand a great deal of manipulative skill and ingenuity with tools and equipment, but require only a modest background in science, mathematics, and engineering theory. Persons who hold jobs of this kind are commonly called "industrial technicians."

Schaefer and McCord (14), in their presentation, closely parallel Harris as they point out that some educators have recommended classifying technicians into two groups--engineering technicians and industrial technicians with the following general descriptions of each:

> Engineering technicians, whose jobs have relatively wide scope and call for a high level of mathematical, scientific, and applied technical ability, are, unfortunately, sometimes considered semiprofessionals. They are usually oriented toward one of the major fields or branches of engineering. They need a broad post-high school education, with emphasis on applied technology, to prepare them to assist engineers and scientists. They may generally be distinguished as being <u>field</u>-<u>oriented</u>.
>
> The industrial technician operates within a narrower range of activities and is usually <u>job</u>-<u>oriented</u>. His work centers on specific jobs--inspection, quality control, troubleshooting, and the like. He needs less knowledge of mathematics and science than the engineering technician, and more limited training in technology. On the other hand, he usually needs more training and development in manipulative skills.

Recent literature appears to indicate a gradual trend, among educators and industrial management personnel, toward more unified and

more clearly defined descriptions of the engineering- and industrial-technicians.

The Nation's Need for Technicians

Many studies have been made and several articles have been written about industries' needs for technicians and the salaries which are being paid to technicians.

William G. Torpey (19) recently wrote,

> The need for more and better-educated engineering technicians is as critical, perhaps more so, than is the need for manpower at various professional levels. It is also clear that the education and training of engineering technicians through all methods--including formal education programs, on-the-job training, and military training is not progressing at a pace sufficient to meet growing demands in particular specialized fields.

In a recent speech to the Illinois State Chamber of Commerce, Victor F. Spathelf (15) made the following comment:

> The larger problem upon which you must focus is meeting trained manpower needs in a work-a-day world which will change unbelieveably in the future. At the same time we must constructively preserve individual productivity and advance human betterment in a period of chaotic change.

M. D. Mobley (8), Executive Secretary of the American Vocational Association, stated,

> Advancing technology will continue at an accelerated rate which in the future will make many occupations of today obsolete. Never in the history of our nation has there been a greater need for making training available to prepare people for available jobs--and may I hasten to add--there are jobs available.

About Technical Education, Norman C. Harris (4), said,

> Where do we stand in Technical Education? At the threshold. We know the magnitude of the job before us. We have the buildings and the facilities to do the job which must be done. Let's get busy and do it.

The University of Illinois' College of Engineering (21), conducted a survey of industries in Vermilion County, Illinois, in February, 1963, to determine their present and predicted needs for technicians and the education required for the technicians whom they employ. Part of the conclusions gained from this study was as follows:

> The employing firms expressed definite preferences, and in many cases definite requirements, that technicians whom they consider hiring have post-high school education. These firms definitely did not wish to hire high school graduates and train them to be technicians, particularly in the case of the engineering technician. Many firms had no choice in this matter, however, because of a lack of qualified applicants.
>
> Educational requirements were not so stringent for industrial technicians and technical specialists, but in all classifications employers displayed a definite tendency to consider post-high school training a prerequisite for employment as a technician.
>
> The 80 firms interviewed in Vermilion County intended to follow a national trend (9) in altering their employment structure during the period between 1963 and 1968. The projected alteration consisted principally of a decrease in hiring rate of total employees and the maintenance of a fairly uniform increase in hiring rate for engineers and technicians. In general, it was the intention of the employing firms to increase the proportion of the professional and technical group within their total work force in order to achieve higher efficiency in production. They intended to maintain an approximate employment rate of three technicians to every engineer within this professional and technical group, with the result that the highest intended rate of increase in employment was for technicians.

The National Science Foundation (10) recently reported the results of a study completed by the U. S. Bureau of Labor Statistics. From this study, the following information was reported concerning predicted national needs for technicians. The need for additional technicians, due to the industrial growth, is expected to increase from 775,000 in 1960 to an estimated 1,297,000 by 1970 for a total additional need of

522,000 for the decade or 52,200 additional technicians annually. This is an increase of 67 per cent over the decade.

> These increased requirements are expected to result from continued economic growth, expanding research and development activities and exploitation of the resulting discoveries, growing complexity of new products and processes for civilian and military use, expected expansion of the space program, and the continued high level of defense expenditures.

The report went on to state that, due to deaths and retirements of technicians, there will be a need for 116,000 replacement technicians over the decade of 1960-1970 or 11,600 replacement technicians annually.

Transfers and promotions of technicians to positions outside of their particular specialities will create needs for 58,100 technicians over the ten year span or 5,810 annually.

National Placement Records and Salaries for Technicians

Salaries being paid to technicians have increased at a relatively constant rate from year to year, although they vary slightly with the particular section of the country in which the technician works. Salaries also vary with type of job in which the technician is engaged.

Robert Hays (5) made a study to determine the salaries being paid to technicians who had graduated from Southern Technical Institute. In this study, Hays found that the average starting salaries of their graduates have risen fairly consistently. From the first graduation, in 1949, until 1963, the mean starting salary rose from $223 per month to $424 per month which is an increase of 90.1 per cent. During this same period the U. S. Consummer Price Index rose by only 28.7 per cent.

The Technical Education Branch of the U. S. Office of Education (16) solicited placement data from approximately 1000 schools which had

stated that they offered programs in technical education. The collected data for fiscal years 1961, 1962, and 1963 were compiled and published in the 1964 report of the Technical Education Branch. The data are for fiscal years 1961, 1962, and 1963 (the technicians actually graduated in the calendar years 1962, 1963, and 1964, respectively). The published figures were only for graduates of technical education programs offered under Title VIII of the National Defense Education Act of 1958 and appear in Tables I, II, and III.

TABLE I

POST-SECONDARY SCHOOL PLACEMENT RECORDS (NATIONWIDE)
FOR FISCAL YEARS 1961, 1962, AND 1963

	Fiscal Years			Per Cent		
	1961	1962	1963	1961	1962	1963
Number of Graduates	5699	6431	8180			
Those Not Available for Placement						
Continuing Their Education	646	1327	794			
Entering Armed Forces	503	433	381			
Other Reasons	125	279	144			
Total	1274	2039	1319			
Those Available for Placement						
Placed in Field of Training	3385	3397	5394	76.6	77.4	78.5
Placed in Related Field	365	289	520	8.25	6.58	7.6
Placed in Non-Related Field	291	271	254	6.58	6.18	3.7
Unemployed	99	93	89	2.24	2.12	1.3
Status Unknown	285	342	546	6.45	7.8	7.95
Total	4425	4392	6861			

Oklahoma's Need for Technicians

Several studies have been made to determine the needs and opportunities for technicians in Oklahoma. For example, C. H. Thompson (18)

made a study in 1949 to determine the employment opportunities and training needs for draftsmen in Oklahoma, Hugh Lineback (7) made a study in 1949 of the employment opportunities for radio technicians in Oklahoma, and Maurice Roney (13) made a study in 1952 concerning the extent to which the technical institute meets the needs of its students.

TABLE II

RANGE OF ANNUAL SALARY OF THE NATION'S POST-SECONDARY GRADUATE TECHNICIANS FOR FISCAL YEARS 1961, 1962, AND 1963 (MEAN OF ALL FIELDS)

Fiscal Year	Average	High	Low
1961	$4600	$7200	$3200
1962	4935	7300	2700
1963	4860	7000	2308

TABLE III

PLACEMENT RECORD AND SALARY RANGE FOR THE NATION'S GRADUATE ELECTRONICS TECHNICIANS

Fiscal Year	Number Placed	Average	High	Low
1961	1667	$4400	$5500	$3300
1962	2412	4840	6230	2995
1963	2841	4690	7000	3000

In December 1964, the Oklahoma Employment Security Commission (12) published the results of a study of manpower in Oklahoma. This study was concerned with all types and levels of present manpower and with the manpower needs in Oklahoma. The results of those parts of the study

which dealt only with technical occupations (including all technical fields) are reviewed here.

In October 1963, employment in technical occupations in Oklahoma numbered 35,003 persons. The predicted future requirements for additional technicians in all technologies is 3,747 by 1965, 11,662 by 1970, and 18,830 by 1975.

The number of in-plant technician trainees in October of 1963 was 468. It was predicted that by 1965, there will be 532 in-plant technician trainees, and that by 1975, there will be 918 in-plant technician trainees.

The number of technician positions vacant in Oklahoma in October of 1963 was 184.

Recently, Donald Phillips (11) conducted a follow-up study of drafting and design graduates from the Technical Institute of Oklahoma State University to determine the types of jobs, the job locations, and the salaries earned by these graduates. Phillips found from the questionnaires, which he mailed to the graduates, that since 1955 there has been an annual increase in the number of the drafting and design graduates who go outside Oklahoma for employment even though there has been an increase in industrial growth within Oklahoma during these years. At the time of his study, less than fifty per cent of the total number of graduates who participated in the study were employed in the state of Oklahoma. Phillips' data did show, however, that ninety per cent of the graduates obtained initial employment in technical areas and, at the time of the study, that eighty-three per cent of the graduates were still working in technical areas. He also reports that the graduates who participated in his study tend to reach their maximum salary in about six years after graduation.

Hal Buchanan (1), Director of Student Placement at Oklahoma State University, made a study of all 1964 graduates from the university and reported the following information concerning the starting salaries of their technical institute graduates:

> Recipients of the Technical Institute's two year Associate degree in the College of Engineering again demonstrated the favorable salary position of the Oklahoma State University trained technician. The $466.17 median salary of the Associates exceeded the bachelor degree medians in all campus colleges except Business, who received $472.00, and Engineering, who received $617.92. The Associate median salary was also larger than the median salaries of graduates receiving masters degrees in the colleges of Education, who received $462.00, and Home Economics, who received $424.00.

The salaries being paid to graduate technicians indicate the need for persons with this type of education.

Oklahoma's Need for Electronics Technicians

In October 1963, according to the Oklahoma Employment Security Commission (12), there were 1809 electronics technicians employed in Oklahoma. It was predicted that there will be a need for 242 additional electronics technicians in Oklahoma by October 1965; 699 additional electronics technicians by 1970; and 1,162 additional personnel of this type by 1975. The report also says that these figures will be grossly understated if Oklahoma continues to attract space-age industry.

The number of in-plant electronics technician trainees in October of 1963 was four. It was predicted that by 1965, there will be seven in-plant electronics technician trainees; by 1970, there will be fourteen in-plant electronics technician trainees; and by 1975, the number of in-plant electronics technician trainees will still be fourteen.

Of the twenty-seven major companies in Oklahoma employing electronics technicians, three companies had not established minimum education

requirements for their electronics technicians; four companies require a minimum of a high school graduation; seventeen companies require completion of a post-high school technician training program; and three companies require only "some" college work.

Of the major companies in Oklahoma hiring electronics technicians, six companies stated that they normally require no previous experience, thirteen companies normally require previous experience in electronics, and five companies stated that they normally require previous experience at least as a skilled craftsman.

Summary of the Literature

It appears, from the literature, that two general levels of technicians are emerging who have normally completed an educational program of about two years at the post-high school level but whose objectives have differed somewhat. The one group has been educated for the purpose of assisting engineers and scientists in such jobs as research, design, design modifications, etc., and are called engineering technicians. The other group has been educated with the objective of filling positions in such areas as inspection, quality control, troubleshooting, etc., and are called industrial technicians.

Both types of technicians require specialized education. The primary difference between the two is that the engineering technician's education has been more theoretical and more oriented toward mathematics and science. The industrial technician has had a more modest background in mathematics and science and has developed, to a greater degree, his manipulative skills.

It appears that both types of technicians are in great demand throughout the country. They are filling responsible positions and are receiving salaries which justify the time used for their education.

It was reported by the National Science Foundation that over the 1960-1970 decade there will be a need for approximately 700,000 new technicians. This represents a need for 70,000 technicians annually.

Figures show that a high degree of placement is being recorded by technical education programs throughout the country. Records indicate that in 1964, of those technician graduates available for jobs, approximately ninety per cent were placed in jobs. Over seventy-eight per cent of these were placed in the occupation for which they were trained with an average beginning salary of approximately $5,000 annually.

Studies made in Oklahoma indicate a need for approximately 19,000 additional technicians by 1975 with 1,172 of this number being electronics technicians.

A majority of the companies participating in the Oklahoma study who utilize electronics technicians stated that their educational requirement for hiring electronics technicians is the completion of a post-high school technician training program.

Jobs are presently available in Oklahoma for electronics technicians and apparently will continue to be available in the future.

CHAPTER III

METHOD AND PROCEDURE

Instrumentation

During the original planning of this study, it was expected that information would be requested from several hundred persons. For this reason, it was deemed advisable to survey those persons concerned by mailing questionnaires to them.

Recently a study, similar to this, was conducted in which a mailed questionnaire was used as the method for collecting data (11). The author limited the length of his questionnaire to three pages and designed the questions so that they could be answered by check marks. Because a high degree of returns was obtained in that study, it was decided to follow the same pattern in the present study.

After much study and consideration of information needs, twenty-one questions were formulated in such a manner that most of them could be answered by check marks. These questions were incorporated into a three-page questionnaire, a sample of which appears in Appendix A.

Selection of the Participants and Questionnaire Distribution

In order to obtain data representative of all of the electronics technicians who received their training in Oklahoma's educational institutions, letters were sent to all technical institutes and to all junior

colleges in Oklahoma which offer technician preparatory programs requesting names and addresses of their electronics technician graduates and those who had spent at least one year in the technical program. A total of 471 names and addresses of graduates were received from the schools, and a total of 321 names and addresses were received for persons who had been enrolled in the program but who had dropped out before graduating. One school did not supply names of their non-graduates.

A letter to the technicians, explaining the purpose of the survey, was written and reproduced in quantity on stationery bearing the letterhead of the Oklahoma State Board for Vocational Education, Division of Technical Education. The names and addresses were individually typed on each letter, and each letter was individually signed. A copy of this letter appears in Appendix A. The letter, questionnaire, and a stamped, self-addressed return envelope were mailed on March 25, 1965, to all persons for whom addresses were obtained.

Four weeks were allowed for the questionnaires to be returned, and April 26, 1965, was set as the final date for accepting questionnaires to be included in the study. This allowed one month for completing and returning the questionnaire.

Questionnaire Response

When surveying a large number of people who are separated by considerable distances, the questionnaire offers the advantage of savings in both time and expense. On the other hand, a significant disadvantage common to most survey questionnaires is that the percentage of returns is usually small. Robert Travers (20) states that if the questionnaire is of interest to the recipient and if other conditions are favorable,

one may expect a twenty per cent return. He states further that if non-respondents are contacted as many as three times with follow-up letters, the returns may sometimes be increased to thirty per cent; and only rarely do the returns reach forty per cent. In this study, no follow-up letters were used.

Table IV shows the percentage of returns for graduates of the individual schools participating in this study. Although a relatively high response was obtained from graduates of some schools, the low response from others caused the total percentage to be rather low.

TABLE IV

GRADUATE RESPONSE BY INDIVIDUAL SCHOOLS

Sch.	No. Graduates	No. Available Addresses	No. Current Addresses*	Questionnaires Returned: No.	Questionnaires Returned: Per Cent of Total Graduates	Questionnaires Returned: Per Cent of Current Addresses
A	122	113	93	35	28.7	37.7
B	295	291	265	57	19.3	21.5
C	18	18	17	4	22.2	23.6
D	5	5	5	2	40.0	40.0
E	8	8	8	1	12.5	12.5
F	23	22	22	1	4.4	4.6
Total	471	457	410	100	**21.2	**24.4

*This denotes the addresses available after the return of undeliverable letters.

**Per cent of the total numbers--not the sum of the percentages

In Table V is recorded the percentage of questionnaires returned by year of graduation. As this table indicates, the response in this study was typically low. Of the 176 associate degree graduates for the period

TABLE V

GRADUATES PARTICIPATING IN THE STUDY

Year	No. Graduates	No. Available Addresses	No. Current Addresses*	Questionnaires Returned: No.	Questionnaires Returned: Per Cent of Total Graduates	Questionnaires Returned: Per Cent of Current Addresses
Associate Degree Graduates						
1959	21	19	11	3	14.3	27.3
1960	23	22	21	5	21.8	23.8
1961	26	25	21	8	30.8	38.0
1962	25	24	18	5	20.0	27.8
1963	36	32	32	16	45.5	50.0
1964	45	44	42	6	13.3	14.3
Total	176	166	145	43	**24.5	**29.7
Certificate of Completion Graduates						
1959	35	35	34	7	20.0	20.4
1960	81	80	64	12	14.8	18.8
1961	46	45	44	11	24.0	25.0
1962	55	55	50	11	20.0	22.0
1963	49	48	46	7	14.3	15.2
1964	29	28	27	9	31.0	33.3
Total	295	291	265	57	**19.3	**21.5

*This denotes the addresses available after the return of undeliverable letters.

**Per cent of the total numbers--not the sum of the percentages.

of 1959 to 1964, completed questionnaires were returned for forty-three. This is twenty-five per cent of the total number of graduates and thirty per cent of the graduates for whom proper addresses were available. Completed questionnaires were returned for fifty-seven of the 295 certificate of completion graduates which was nineteen per cent of the total graduates and twenty-two per cent of those for whom proper addresses were available. Of the total number of letters and questionnaires mailed, forty-seven were returned indicating that the person had moved and had left no forwarding address.

A low percentage of responses in a study such as this definitely affects the validity of the measurement; however, much of the data obtained does appear to indicate certain trends in some areas which correlate very favorably with similar studies by other researchers. These will be pointed out as they appear in the tables which follow.

Treatment of the Data

Oklahoma's post-high school institutions offering electronics technician education recognize the students' graduation from the program by awarding one of two general types of diplomas--the Associate Degree or the Certificate of Completion.

Possession of an associate degree or a certificate of completion does not necessarily determine whether a technician is classified as an engineering technician or as an industrial technician; however, post-high school institutions in Oklahoma which award the associate degree for technicians generally state that their curricula are designed for preparing engineering technicians. Schools which award a certificate of completion generally are concerned with preparing industrial technicians.

In the original planning of this study, it was felt that the information sought by the questionnaires was of such a nature that the responses from the two types of graduates could be combined for statistical purposes. Examination of the returned questionnaires revealed, however, that the data appeared to cluster into two general groups representative of the graduates from the two types of educational programs. For this reason, it was decided to separate the returned questionnaires and group them according to the type of program from which the technicians graduated--an associate degree program or a program offering a certificate of completion.

One of the objectives of this study was to obtain information from persons who had spent as much as one year in a technician education program but who had dropped out before completing the full course of study. The schools which supplied names and addresses of their graduates were asked to send a list of these "drop outs" also. When the questionnaires were returned, it was discovered that some schools had sent names of persons who had enrolled with the intention of taking only a few courses for their own benefit. These persons were not drop outs in the true sense; but no accurate record was available for determining the exact number of persons involved for each of the two cases. Also, one school stated that they could not supply a list of drop outs for a specific technology. For these reasons, statistical data are not included from questionnaires returned by the non-graduates.

CHAPTER IV

RESULTS

Backgrounds of Graduates

The technicians' reported ages, military status, and educational histories at the time of their enrollment in the technician education program were generally similar to those reported in other studies of this nature (11). A few differences were apparent in the data of Table VI for the two types of graduates. For example, the mean age at which the technicians entered the associate degree programs for the period included in this study was twenty years and, in addition, twenty-six per cent of these persons were veterans of military service. The mean age at which the technicians entered the certificate of completion program, for the same period, was twenty-three years with thirty-seven per cent of these having served in the Armed Services.

As indicated in Table VII, a remarkably large number of the graduates reporting had matriculated in some type of college work prior to entering the technician education program. Of the associate degree people reporting, sixty-one per cent had previous college credits in six different areas of study. Seventy per cent of these total combined credits were in some area of engineering. The next largest percentage was in business. The data further indicated that over nineteen per cent of the certificate of completion graduates had prior college credits, and seventy-nine per cent of these total combined credits were also in

TABLE VI

AGE AND MILITARY STATUS OF GRADUATES AT THE TIME OF ENROLLMENT

Year	No. Reporting	Age			Military Status	
		Range	Mean	Median	Veteran	Non-Veteran
Associate Degree Graduates						
1959	3	23-26	27	25	3	0
1960	5	17-25	20	19	2	3
1961	8	17-22	20	20	2	6
1962	5	18-26	20	19	1	4
1963	16	17-25	19	18	2	14
1964	*6	18-25	21	20	1	4
Total	43				11--26%	31--74%
Certificate of Completion Graduates						
1959	7	17-27	23	24	5	2
1960	12	17-35	23	22	6	6
1961	11	19-48	26	26	6	5
1962	11	17-22	19	18	1	10
1963	**7	18-38	22	19	1	6
1964	9	17-44	25	22	2	7
Total	57				21--37%	36--63%

*one did not give age or military status

**one did not give age

TABLE VII

GRADUATES WHO HAD COLLEGE WORK PRIOR TO TECHNICIAN EDUCATION PROGRAM

Year	No.	Hours Completed: Range	Mean	Median	Areas And No. Hours Completed: Engr.	Bus.	Agri.	A&S	Vet Med.	Ind. Arts	Educ.
Associate Degree Graduates											
1959	3	17-50	32	30	67	30					
1960	2	35-50	43		85						
1961	5	30-96	52	45	80	85	96				
1962	3	33-61	46	50	144						
1963	8	8-68	43	46	222	68		8	45		
1964	5	16-130	54	30	242					30	
	26--61%				840	183	96	8	45	30	
Certificate of Completion Graduates											
1959	0										
1960	0										
1961	4	15-31	21	19	52	31					
1962	2	6-30	18		6						30
1963	2	14-30	22		30				14		
1964	3	12-127	65	55	194						
	11--19%				282	31			14		30

some area of engineering. The next largest percentage for this group, too, was in business.

Combining the data for the two groups resulted in a figure of thirty-seven per cent of the reporting graduates from all post-high school electronics technology programs in Oklahoma who had earned college credits prior to entering the technician education program. Of their total combined college work, seventy-one per cent was in some branch of engineering.

Placement of Graduates

The degree of success which the schools concerned in this study are having in placing students is indicated by Table VIII. Of those available for placement (those who did not continue in school or enter military service), eighty-eight per cent of the associate degree graduates obtained employment immediately upon graduation with all of the remaining number finding employment in an average of three months. The certificate of completion graduates reported that sixty-five per cent had obtained employment by the time of graduation with all of those remaining obtaining jobs in an average of less than two months.

Of all the graduates reporting, twenty-five per cent of each group stated that they were not adequately advised with regard to job interests and employment possibilities. It is not surprising to note that the majority of those who failed to obtain immediate employment upon graduation were among the ones who expressed dissatisfaction with the advisement and counseling which they received.

In the questionnaires, the students were asked to check one of nine general job areas in which they first worked or to check the one which

TABLE VIII

JOB COMMITTMENT AND ADEQUACY OF ADVISEMENT AT THE TIME OF GRADUATION

Year	No. Reporting	Properly Advised: Yes	Properly Advised: No	*Job Committment: Yes	*Job Committment: No	*Job Committment: Ave. No. Months Wait
Associate Degree Graduates						
1959	3	3	0	3	0	
1960	5	5	0	3	0	
1961	8	6	2	6	1	5
1962	5	5	0	4	0	
1963	16	**9	5	9	3	3
1964	6	***4	1	5	0	
Total	43	32	8	30	4	
Certificate of Completion Graduates						
1959	7	7	0	5	2	1.5
1960	12	10	2	***8	3	1.5
1961	11	8	3	8	3	1
1962	11	6	5	4	7	2
1963	7	6	1	3	2	1
1964	9	***8	0	7	2	2
Total	57	45	11	35	19	

*does not include those who continued in school or went into the military service

**two did not answer

***one did not answer

most clearly described their first job classification. The results of this question are recorded in Table IX. Of those entering the labor market, sixty-one per cent of the associate degree graduates and sixty-three per cent of the certificate of completion graduates obtained beginning jobs which they classified in the category of maintenance. For the associate degree graduates, production was next in line with fourteen per cent checking this category. For the certificate of completion graduates, development was next in line with seventeen per cent checking this category.

An unusually large percentage of the reporting graduates obtained employment in the occupation for which they had prepared themselves. Of the associate degree graduates reporting who were available for employment, ninety-two per cent obtained initial employment either in the occupation for which they were trained or in an occupation related to that for which they were trained. At the time of this study, this number had increased to ninety-five per cent for this same group. The data of Table X indicate that the certificate of completion graduates had a record almost as good as the other group. Of the certificate of completion graduates, eighty-eight per cent obtained initial employment either in the occupation for which they were educationally prepared or in a related occupation, and at the time of this study, they had maintained this same percentage.

The electronics graduates who were working in jobs not related to the occupation for which they were trained listed the following jobs:

1. Grocery distributor salesman
2. Supermarket produce clerk
3. Highway construction employee

TABLE IX

TYPE OF JOB AND SALARY OBTAINED BY TECHNICIANS
IN THEIR FIRST EMPLOYMENT

Type of Job:	*No. Reporting	Less	$3500-4000	$4000-4500	$4500-5000	$5000-5500	$5500-6000	$6000-6500	$6500-7000	$7000-7500	$7500-8000	Above $8000
Associate Degree Graduates												
Research	2				2							
Design	2				1	1						
Development	2			1			1					
Production	5			2		2	1					
Operation	1				1							
Control	0											
Installation	0											
Maintenance	22		2	3	7	6	2	2				
Sales	0											
Teaching	2					2						
Total	36											
Certificate of Completion Graduates												
Research	4				1	3						
Design	0											
Development	8	1		2	2	3						
Production	**3			1		1						
Operation	0											
Control	1				1							
Installation	1		1									
Maintenance	**30	1	6	10	4	3	2	3				
Sales	1	1										
Total	48											

*persons employed in fields not related to their training are excluded

**one did not give salary

TABLE X

RELATIONSHIP OF OCCUPATION TO TECHNICIAN EDUCATION

Year	*No. Reporting	**First Employment Trained	Rel.	Not Rel.	*No. Reporting	**Present Employment Trained	Rel.	Not Rel.
Associate Degree Graduates								
1959	3	3			3	1	2	
1960	5	2	3		5	2	3	
1961	8	4	3	1	8	4	3	1
1962	5	3	2		4	3	1	
1963	13	3	8	2	11	4	6	1
1964	5	3	2		5	2	3	
Total	39	36--92%			36	34--95%		
Certificate of Completion Graduates								
1959	7	4	3		7	2	2	3
1960	12	5	6	1	11	6	4	1
1961	11	6	3	2	11	6	4	1
1962	11	3	6	2	8	4	4	
1963	6	3	2	1	6	2	3	1
1964	9	3	5	1	8	1	7	
Total	56	49--88%				45--88%		

*does not include unemployed, those in military service, or full-time students

**Trained--occupation for which trained
Rel.--occupation related to that for which trained
Not Rel.--occupation not related to that for which trained

4. Air conditioning maintenance man
5. Service station attendant
6. Trailer repairman
7. Soap company salesman
8. Creamery company employee
9. Mechanical equipment maintenance man

None of the total number of graduates reporting, who accepted out-of-state jobs were working in occupations which were not related to that for which they were trained. The only graduates working in jobs which were not related to the occupation of their training were working within the state of Oklahoma.

Table XI indicates the number of those reporting who accepted initial employment in Oklahoma and those who accepted out-of-state jobs. Fifty-seven per cent of the associate degree graduates and seventy-seven per cent of the certificate of completion graduates obtained their first employment in Oklahoma. The responses recorded in Table XII show that, of those employed at the time of the study, forty-nine per cent of the associate degree graduates and seventy-three per cent of the certificate of completion graduates were employed in Oklahoma.

Continued Education of Graduates

Table XIII indicates the extent to which the graduate electronics technicians who returned questionnaires for this study have continued their education. Of the associate degree graduates who reported, forty-seven per cent have participated in further education beyond their technician education either part-time or full-time. Twenty-one per cent of these reporting graduates continued full-time for a B. S. degree.

TABLE XI

FIRST JOB LOCATION OF GRADUATES

Year	*No. Reporting	Okla.	Tex.	Kan.	Fla.	N.M.	Mo.	Ark.	Ky.	Calif.	N.C.	Tenn.
Associate Degree Graduates												
1959	3		2	1								
1960	5	4			1							
1961	8	8										
1962	5	3	1			1						
1963	13	4	6	1		1	1					
1964	5	3	1				1					
Total	39	22--57%										
Certificate of Completion Graduates												
1959	7	5						1	1			
1960	12	9	2							1		
1961	11	8	1								1	1
1962	11	9	2									
1963	6	5	1									
1964	9	7	1	1								
Total	56	43--77%										

*does not include those continuing education or those who went into the military service

TABLE XII

PRESENT JOB LOCATION OF GRADUATES

Year	*No. Reporting	Okla.	Tex.	Ark.	Fla.	Calif.	N. M.	Mo.	N. C.	Tenn.	Kan.
Associate Degree Graduates											
1959	3		2	1							
1960	5	4			1						
1961	8	6				1	1				
1962	5	2	1			1	1				
1963	11	3	6				1	1			
1964	5	3	1					1			
Total	37	18--49%									
Certificate of Completion Graduates											
1959	7	5		2							
1960	11	7	3				1				
1961	11	7	2						1	1	
1962	8	6	2								
1963	6	5	1								
1964	8	7									1
	51	37--73%									

*does not include those who are continuing education, in military service, or are unemployed

TABLE XIII

CONTINUED EDUCATION OF GRADUATES

Year	No. Reporting	No. Continuing	Part Time: College	Part Time: Non-College	Full Time
Associate Degree Graduates					
1959	3	1	1		
1960	5	2		1	1
1961	8	3	1	1	1
1962	5	4	2	1	1
1963	16	7	1	1	5
1964	6	3	2		1
Total	43	20--47%			9--21%
Certificate of Completion Graduates					
1959	7	1	(did not list school)		
1960	12	4	2	2	
1961	11	4	2	2	
1962	11	1	1		
1963	7	2	1	1	
1964	9	0			
Total	57	12--21%			

Of the certificate of completion graduates reporting, twenty-one per cent continued in further part-time education, but none continued for a B. S. degree.

Salaries of Graduates

The starting salaries obtained by the technicians who responded in this study compare very favorably with those recorded for the national averages (see Table III). The starting salaries for both the associate degree graduates and for the certificate of completion graduates are essentially the same; however, as the graduates obtain more experience, the salaries for the associate degree graduates tend to rise at a greater rate than they do for the other group (see Table XIV). For example, the median starting salary for the employed associate degree graduates in 1964 was $5250. For the employed certificate of completion graduates, of the same year, the median starting salary was also $5250. For the 1960 graduates who are presently employed, the median salaries are $7750 for the associate degree graduates and $6000 for the certificate of completion graduates.

A comparison of starting salaries for beginning jobs in Oklahoma and out-of-state is recorded in Table XV. Of the certificate of completion graduates reporting, the mean starting salary in Oklahoma over all years included in the study was $4384. Over the same period of time, the technicians from this group who accepted initial employment out-of-state began at a mean salary of $5058 which was $654 greater than the Oklahoma starting salary. The same was not true for the other group. Of the associate degree graduates reporting, the mean starting salary in Oklahoma over all years included in the study was $4904.

TABLE XIV

BEGINNING AND PRESENT SALARIES OF GRADUATES

Year	*No. Reporting	Beginning Salary Range	Beginning Salary Mean	Beginning Salary Median	Present Salary Range	Present Salary Mean	Present Salary Median
Associate Degree Graduates							
1959	3	$4250-4750	$4583	$4750		$7750	$7750
1960	5	3750-5250	4450	4250	$6250-9250	7450	7750
1961	7	4250-5750	4893	4740	6250-8250	7393	7250
1962	4	4750-5750	5250	5250	5750-7250	6250	6000
1963	9	4250-6250	5250	5250	4750-7250	6028	5750
1964	5	3750-5750	4950	5250	3750-6250	5050	5250
Total	33						
Certificate of Completion Graduates							
1959	4	4250-5750	4875	4750	4750-6250	5625	5750
1960	10	3750-5250	4500	4500	5250-8750	6500	6000
1961	9	3120-5250	4402	4750	5250-8750	6306	6250
1962	7	3120-6250	4517	4250	5250-8750	5179	5750
1963	5	3750-6250	4750	4250	4250-7250	5650	5750
1964	7	3750-6250	5036	5250	3750-6250	5393	5750
Total	42						

*persons employed in fields not related to their training were excluded

TABLE XV

COMPARISON OF BEGINNING SALARIES OF GRADUATES EMPLOYED IN OKLAHOMA WITH BEGINNING SALARIES OF GRADUATES EMPLOYED OUT-OF-OKLAHOMA

	*No. Reporting		Oklahoma			Out-of-Oklahoma		
Year	Okla.	Out-of-Okla.	Range	Mean	Median	Range	Mean	Median
Associate Degree Graduates								
1959	0	3				$4250-4750	$4583	$4750
1960	4	1	$4250-5250	$4625	$4500		3750	
1961	7	0	4250-5750	4893	4750			
1962	3	2		5250	5250	4750-5750	5250	
1963	2	9	4750-5250	5000		4250-6250	5250	5250
1964	3	2	3750-5250	4750	5250	4750-4750	5250	
	19--53%	17--47%						
Certificate of Completion Graduates								
1959	5	2	2000-5250	4100	4250	4250-5750	5000	
1960	8	3	3750-5250	4375	4250	3750-4750	4183	4750
1961	6	3	3120-5250	4228	4250	4250-5250	4917	
1962	**7	2	3120-6250	4228	4000		5250	
1963	4	1	3750-6250	4625	4250		5250	
1964	**6	2	3750-5750	4750	4750	5250-6250	5750	
	36--74%	13--26%						

*persons who were working in fields not related to their training were excluded

**one did not give salary

Over the same period of time, the technicians from this group who accepted initial employment out-of-state began at a mean salary of $4817 which was $87 less than the Oklahoma starting salary.

From Table IX it may be noted that the technicians from each group who obtained the highest beginning salaries were employed in maintenance jobs. Calculations show, however, that for the associate degree graduates reporting in this study, the types of jobs or job categories for which the mean beginning salary was highest were those of design and of development, each of which was $5000. These were followed by maintenance which had a mean beginning salary of $4955. For the certificate of completion graduates reporting in this study, the job category for which the mean beginning salary was highest was that of research followed by production whose mean beginning salaries were $5125 and $4750, respectively. The mean salary for the certificate of completion graduates working in maintenance was $4590.

Table XVI lists present salaries of those who had college credit before enrolling in the technician education program and present salaries of those who did not have previous college credit before enrolling in the technician education program. As may be noted, the data do not tend to establish any type of pattern of higher or lower salaries for either case.

Table XVII compares salaries of those who continued in education beyond the technician education program with salaries of those who did not. Responses are included for those who participated in company schools, correspondence studies, or regular college work on either a part-time or a full-time basis. In this table, as in the previous table, no definite pattern is established by the data.

TABLE XVI

PREVIOUS EDUCATION AND ITS EFFECT ON PRESENT SALARY

Year	*No. Reporting	Previous College Range	Mean	Median	*No. Reporting	No College Range	Mean	Median
Associate Degree Graduates								
1959	3		$7750	$7750	0			
1960	2		7750		3	$6250-9250	$7250	$6250
1961	5	$6250-7750	7050	7250	3	6750-8250	7417	7250
1962	2	5750-6250	6000		2	5750-7250	6500	
1963	5	5250-7250	6250	6250	6	3750-6750	5750	5500
1964	4	4750-6250	5375	5250	1		3750	
Certificate of Completion Graduates								
1959	0				7	4250-7250	5536	5750
1960	0				11	5250-8750	6386	5750
1961	4	5250-8750	6500	6000	7	5250-7250	6179	6250
1962	2	4250-5750	5000		6	3750-6750	5250	5500
1963	2	2700-5250	3975		4	4250-7250	5750	5750
1964	3	3750-6250	5083	5250	5	4250-6250	5550	5750

*does not include those who were presently in school, in military service or unemployed

TABLE XVII

*CONTINUED EDUCATION AND ITS EFFECT ON PRESENT SALARY

Year	**No. Reporting	Continued Range	Mean	Median	**No. Reporting	Did Not Continue Range	Mean	Median
Associate Degree Graduates								
1959	1		$7750		2		$7750	
1960	2	$6250-9250	7750		3	$6250-7750	7250	$7750
1961	3	6250-8250	7250	$7250	5	6250-8250	7250	7250
1962	3	5750-7250	6250	5750	1		6250	
1963	3	3750-7250	5583	5750	8	4750-6750	5938	6000
1964	2	4750-5250	5000		3	3750-6250	5083	5250
Certificate of Completion Graduates								
1959	1		4750		6	4250-7250	5667	5750
1960	4	5250-7750	6750	7000	7	5250-8750	6179	5750
1961	4	5250-7250	6000	5750	7	5250-8750	6464	6250
1962	0				8	3750-6750	5188	5500
1963	1		5750		5	2700-7250	5040	5250
1964	0				8	4250-6250	5438	5750

*includes company schools and correspondence studies as well as classes in public institutions (attended either full-time or part-time)

**does not include those who were presently in school, in military service or unemployed

Was Course Work Adequate for the Job?

The technicians participating in the survey were asked to indicate if their education was adequate in the areas of technical speciality, mathematics, science, communications, and social science. The responses from this question are listed in Table XVIII.

Of the associate degree graduates, eighty-four per cent reported that their courses were adequate in the technical speciality, fifty-eight per cent were satisfied with the mathematics, sixty per cent were satisfied with the science, seventy-four per cent checked the communications courses as being adequate, and ninety-three per cent stated that social science was adequate.

Of the certificate of completion graduates, seventy-nine per cent reported that their courses were adequate in the technical speciality, seventy-nine per cent were satisfied with the mathematics, eighteen per cent thought their science was adequate, eighty-three per cent checked the communications courses as being adequate, and seventy-seven per cent were satisfied with the social science.

Non-graduate Information

In addition to the information solicited from graduates of electronic technology programs, questionnaires were also sent to non-graduates who had spent as much as one year in the program during the period of 1959-1964 before dropping out. It was found that the average enrollment age of these people was twenty-one years. Of the fifteen who reported, four (twenty-five per cent) had earned previous college credits. Only two of the fifteen people reporting were employed in the occupation for which they had started to prepare themselves.

TABLE XVIII

ADEQUACY OF PREPARATION IN TECHNICAL SPECIALITY COURSES, MATHEMATICS, SCIENCE, COMMUNICATIONS AND SOCIAL SCIENCE

Year	No. Reporting	Technical Y	Technical N		Math Y	Math N		Science Y	Science N		Com. Y	Com. N		Soc. Sci. Y	Soc. Sci. N	
Associate Degree Graduates																
1959	3	2	1	0	1	2	0	2	1	0	1	2	0	2	1	0
1960	5	5	0	0	3	2	0	3	2	0	3	2	0	5	0	0
1961	8	7	1	0	4	4	0	3	5	0	6	2	0	8	0	0
1962	5	4	1	0	4	1	0	4	1	0	3	2	0	4	1	0
1963	16	13	2	1	10	5	1	9	5	2	14	1	1	15	0	1
1964	6	5	1	0	3	3	0	5	1	0	5	1	0	6	0	0
Total	43	36	6	1	25	17	1	26	15	2	32	10	1	40	2	1
Per Cent		84	14		58	39		60	35		74	23		93	5	
Certificate of Completion Graduates																
1959	7	6	1	0	7	0	0	1	3	3	6	1	0	5	1	1
1960	12	7	4	1	8	3	1	1	7	4	10	2	0	10	1	1
1961	11	7	4	0	6	5	0	0	8	3	8	3	0	8	2	1
1962	11	11	0	0	11	0	0	1	7	3	11	0	0	8	2	1
1963	7	6	1	0	4	3	0	1	6	0	3	4	0	4	2	1
1964	9	8	1	0	9	0	0	6	1	2	9	0	0	9	0	0
Total	57	45	11	1	45	11	1	10	32	15	47	10	0	44	8	5
Per Cent		79	19		79	19		18	56	26	83	18		77	14	9

It is not known when these people discontinued their educational program; therefore, no figures were available regarding the number of years of work experience which they had had. Those reporting, though, indicated an average salary of $4833.

Several of those reporting gave descriptions of their present jobs. Some of these are listed below.

1. Do research and development of transistorized broadcase console
2. Repair television sets
3. Assemble airplane parts
4. Maintain water and sewer systems
5. Sell oil products and by-products
6. Make cast iron molds
7. Maintain state parks
8. Check tools out to machinists
9. Engaged in farming

CHAPTER V

INTERPRETATION OF RESULTS

Summary

The primary objective of this study was to determine the extent of graduate placement and the occupational achievements of students, both graduates and non-graduates, who have been actively enrolled in one or more of Oklahoma's post-high school electronics technology curricula. Information was sought which would be beneficial to high school and post-high school teachers and counselors for student advisement.

For collecting the desired information, a three-page, closed form questionnaire was designed with twenty-one questions and mailed to the 1959 to 1964 graduates of Oklahoma's post-high school electronics technology programs. The questionnaire was also mailed to non-graduates, who had been in the program for as long as one year, to obtain occupational information for advising potential future "drop outs."

The questionnaire was designed to cover the following areas:

1. Backgrounds of graduates
2. Placement of graduates
3. Continued education of graduates
4. Salaries of graduates
5. Non-graduate information

To facilitate reporting the collected information, the data were organized into five groups corresponding to these five areas.

Conclusions

Because the percentage of returned questionnaires was low, it cannot be assumed that the sample obtained in this study was highly representative of all electronics technology graduates for the years 1959-1964. The response was great enough, however, that there was some degree of validity for the study. The high degree of correlation of data obtained in this study with data obtained in other studies described in the review of the literature bears this out more strongly.

Based on the analysis of the data obtained in this study and with due consideration of the limited validity of the measurement, the following conclusions were drawn:

1. There tend to be more veterans of military service in the certificate of completion programs than there are in associate degree programs. This probably accounts for the fact that the average student of the certificate of completion programs was three years older than the average student of the associate degree programs.

2. Students entering the associate degree program generally tend to have more previous college credit than those entering the certificate of completion program. This was indicated by the fact that sixty-one per cent of the associate degree graduates had prior college credit and only nineteen per cent of the certificate of completion graduates had prior college credit.

3. The majority of the previous college work of students in technician education programs is in the field of engineering. Of the

previous college work completed by Oklahoma's graduate electronics technicians, seventy-one per cent was in engineering.

4. Job placement at the time of graduation is higher for associate degree graduates (eighty-eight per cent) than for certificate of completion graduates (sixty-five per cent).

5. The majority of graduates from both types of programs enter jobs which they classify as maintenance (sixty-one per cent of the associate degree graduates and sixty-three per cent of the certificate of completion graduates).

6. A relatively high number of the electronics technician graduates from both types of programs enter the occupation for which they are educated or an occupation related to that for which they are educated (ninety-two per cent of the associate degree graduates and eighty-eight per cent of the certificate of completion graduates).

7. Over half of the graduates accept jobs in Oklahoma (fifty-seven per cent of the associate degree graduates and seventy-seven per cent of the certificate of completion graduates).

8. Many of the electronics technicians continue their education after graduation from the technician education program (forty-seven per cent of the associate degree graduates and twenty-one per cent of the certificate of completion graduates).

9. The median starting salary has increased by $500 for both groups of technicians since 1959. (The median salary for both associate degree graduates and certificate of completion graduates was $4750 in 1959, and it was $5250 for both groups in 1964.)

10. For the last three years, starting salaries for Oklahoma-educated electronics technicians have been above the national average.

(National average for 1962, 1963, and 1964 was $4400, $4840, and $4690, respectively. Oklahoma's average for the same years was $5250, $5250, and $4950, respectively, for the associate degree graduates; and it was $4517, $4750, and $5036, respectively, for the certificate of completion graduates.)

Recommendations for Future Study

It is recommended that consideration be given to further study in the following areas:

1. Of the associate degree graduates reporting in this study, sixty-one per cent had previous college credits and of these credits, seventy per cent were in the field of engineering. It would be advantageous to determine why these persons transferred to technician education programs and to examine the occupational achievements of these particular people much more closely than was done in this study. Also, it would be beneficial to determine the effect of previous education on the type of job and the salary obtained for first and successive employments.

2. More accurate information than was obtained in this study is needed in regard to students who failed to complete technician education programs. All drop-out students do not do so because they are not academically capable of completing the program. Many young people and adults could probably be helped to develop into more useful members of society if sufficient information were available in this area.

3. The data obtained in this study indicates that the average associate degree graduate who goes outside Oklahoma for employment obtains a slightly lower salary than the average associate degree

graduate who accepts employment in Oklahoma. Also, according to a study of Oklahoma jobs and manpower which was described in the review of the literature, there are presently electronics technician jobs unfilled and available in Oklahoma. A study would be in order to determine why Oklahoma graduates left the state to accept employment for a lower salary than they could have obtained in Oklahoma.

BIBLIOGRAPHY

1. Buchanan, Hal N. Report of Activities and Services, University Placement Services, IV Stillwater: Oklahoma State University, 1964, p. 5.

2. California State Department of Education. Directory of Occupation Centered Curriculums in California. Sacremento: California State Department of Education, 1964, pp. 240-241.

3. Harris, Norman C. "Major Issues in Junior College Technical Education." Educational Record, Vol. 45 (Spring, 1964), p. 128.

4. _____. "Where Do We Stand in Technical Education?" Technical Education News, XVII (May, 1959), p. 5.

5. Hays, Robert, and others. "How Much Does the Graduate Engineering Technician Make?" Journal of Engineering Education, Vol. 54 (July-August, 1964), p. 391.

6. Henning, V. O. "Technicians in Research, Development, and Testing." Technical Education News, XXIV (March, 1965), p. 12.

7. Lineback, Hugh. "Employment Opportunities for Radio Technicians in Oklahoma." Unpublished Master's Thesis, Oklahoma A and M College, Stillwater, 1949.

8. Mobley, M. D. "Manpower: A Serious National Problem." American Vocational Journal, (May, 1963), p. 8.

9. National Science Foundation. Profiles of Manpower in Science and Technology. Washington: National Science Foundation, 1963.

10. _____. Scientists, Engineers, and Technicians in the 1960's. Washington: National Science Foundation, 1963.

11. Phillips, Donald S. "A Follow-up Study of the Graduates of a Two-Year Program of Drafting and Design Technology." Unpublished Master's Thesis, Oklahoma State University, Stillwater, 1964.

12. Research and Planning Division of the Oklahoma Employment Security Commission. Manpower in Oklahoma. Oklahoma City: Employment Security Commission, 1964.

13. Roney, Maurice W. "How the Technical Institute Meets the Needs of its Students." Unpublished Master's Thesis, Oklahoma A and M College, Stillwater, 1952.

14. Schaefer, Carl J. and Robert E. McCord. "Needed: A Definition of the Technician." Technical Education News, XXII (June, 1963), p. 23.

15. Spathelf, Victor F. "Some Plain Talk About Higher Education." Vital Speeches of the Day, XXXI (November 1, 1964), p. 40.

16. Technical Education Branch, U. S. Office of Education. Progress in Title VIII Programs. Washington: U. S. Office of Education, 1964, p. 6.

17. The President's Committee on Scientists and Engineers. Answer Your Engineering Manpower Problems. Washington: Allied Printing Office.

18. Thompson, C. H. "Employment Opportunities and Training Needs for Draftsmen in Oklahoma." Unpublished Master's Thesis, Oklahoma A and M College, Stillwater, 1949.

19. Torpey, William G. "Needs for Technicians." Journal of Engineering Education, Vol. 54 (July-August, 1964), p. 386.

20. Travers, Robert M. W. An Introduction to Educational Research. New York: The Macmillan Company, 1958, p. 248.

21. University of Illinois. Technician Need Study: Vermilion County, Illinois. Urbana: University of Illinois Press, 1954. p. 72.

22. Wickenden, William E. and Robert H. Spahr. A Study of Technical Institutes, Summary Report. Society for the Promotion of Engineering Education. Lancaster, Pa., 1931, p. 3.

23. _____. A Study of Technical Institutes. Society for the Promotion of Engineering Education. Lancaster, Pa., 1931, p. 1.

APPENDIXES

APPENDIX A

DATA COLLECTION INSTRUMENTS

March 5, 1965

Mr. John Doe, Director
The Oklahoma Technical Institute
Electro, Oklahoma

Dear Mr. Doe:

The State Office for Technical Education is conducting a follow-up study of graduates for the past five years from all post high school technical programs throughout the State of Oklahoma. The enclosed questionnaire will indicate the type of information which we are seeking.

Will you please send to us the names and permanent addresses of all the graduates which you have had in all the fields of technology since the spring of 1959. Also, we would appreciate a list of names and permanent addresses of those who spent at least one year in the technical program during this period but who did not graduate.

The information which we obtain will be considered confidential. You will receive a copy of the data obtained from your particular students but no school will receive direct information on the students of other schools.

We feel that this information will be very beneficial to the State Office and U. S. Office and also to you as you continue to develop your placement program. The statistical results of the completed study will be sent to you as soon as they are organized and analyzed.

Thank you for your cooperation.

Sincerely,

/s/ Lloyd D. Briggs
Lloyd D. Briggs
Assistant State Supervisor

LDB:jjk

Enclosure

TECHNICAL TRAINING SERVICES
OKLAHOMA STATE BOARD FOR VOCATIONAL EDUCATION
J. B. PERKY, DIRECTOR -:- 1515 WEST SIXTH AVENUE -:- STILLWATER, OKLAHOMA 74074

March 24, 1965

Mr. Henry O. Farad
1965 West 10th Avenue
Lincoln, Oklahoma

Dear Sir:

The Division of Technical Education of Oklahoma's State Board for Vocational Education is conducting a survey of those who have attended the various post-high school technology programs in Oklahoma.

We are sending a questionnaire to you for the purpose of obtaining information vital to the State Department as well as to the United States Office of Education for the planning of future educational opportunities for the citizens of Oklahoma and of the nation. The information which we are seeking is of great importance to the State Office even if you did not graduate from the particular program in which you were enrolled.

Will you please help in this effort by completing as accurately as possible the enclosed questionnaire. The information will be considered as confidential and will leave this office only in the form of statistical data with no names attached.

Will you please complete and return the questionnaire in the stamped envelope at your earliest convenience.

Thank you for helping to make this study complete.

Sincerely,

/s/ Lloyd D. Briggs
Lloyd D. Briggs
Assistant State Supervisor

LDB:jjk

Enclosures

SURVEY OF TECHNICIANS EDUCATED IN OKLAHOMA

1. Mr., Mrs., Miss _____ Present Address _____
   (Last Name First)
2. School _____ Major Technical Subject _____
3. Date of graduation _____ A.S. Degree ( ) Certificate of Completion ( )
4. What was your age at the time of enrolling in the technical program? _____
5. What was your military status at the time of enrolling in the technical program?
   Veteran ( ) Non-veteran ( )
6. Had you completed any college work before entering the technical program? Yes ( ) No ( )
7. If the answer to question No. 6 was yes, how many hours? _____ in what field? _____
   (Business, Education, Engineering. If other, please specify _____)
8. Had you obtained a job committment by the time of graduation? Yes ( ) No ( )
   If not, how many months after graduation did you obtain employment? _____
9. If you did not graduate, approximately what percent of the program did you complete? ___
   Did you obtain a job immediately upon leaving the technical program? Yes ( ) No ( )
   If so, was it in (check one):
   Occupation for which you were being trained ( )
   Field related to training ( )
   Field not related to training ( )
10. If you accepted employment upon graduation from the technical program, did you continue your education on a part-time basis? Yes ( ) No ( )
    If so, list school, major, and degree sought. _____
    _____
11. If you continued full time in school, list school, major, and degree sought.
    _____
12. Name and location of company for whom you were first employed. (If military, state branch) _____
    Company's main product or function. _____

Type of job (check one):

Research ( )	Production ( )	Installation ( )
Design ( )	Operation ( )	Maintenance ( )
Development ( )	Control ( )	Sales ( )

Was your work (check one) full time ( ) part time ( )?

13. Do you feel that you were properly advised and counseled upon graduation with regard to job interests and employment possibilities? Yes ( ) No ( )

14. Name and location of company for whom you are presently employed.

_____

Company's main product or function. _____

Type of job (check one):

Research ( )	Production ( )	Installation ( )
Design ( )	Operation ( )	Maintenance ( )
Development ( )	Control ( )	Sales ( )

Is this a full-time job? Yes ( ) No ( )

15. First job assignment was in (check one):

Occupation for which trained ( )

Field related to training ( )

Field <u>not</u> related to training ( )

16. Present job assignment is in (check one):

Occupation for which trained ( )

Field related to training ( )

Field <u>not</u> related to training ( )

17. Beginning annual salary (circle one):

A. $3500-$4000 B. $4000-$4500 C. $4500-$5000 D. $5000-$5500 E. $5500-$6000

F. $6000-$6500 G. $6500-$7000 H. $7000-$7500 I. $7500-$8000 J. Above $8000

18. Present annual salary (circle one):

A. $3500-$4000 B. $4000-$4500 C. $4500-$5000 D. $5000-$5500 E. $5500-$6000

F. $6000-$6500 G. $6500-$7000 H. $7000-$7500 I. $7500-$8000 J. $8000-$8500

K. $8500-$9000 L. $9000-$9500 M. Above $9500

19. Do you feel that your education was adequate in:

A. Technical specialty courses? Yes ( ) No ( )

(Basic and advanced courses in your technology such as Electronic Circuit Analysis)

B. Mathematics courses? Yes ( ) No ( )

(Algebra, trigonometry, analytic geometry, and calculus)

C. Science courses? Yes ( ) No ( )

(Physics, chemistry, thermodynamics, hydraulics, etc.)

D. Communications? Yes ( ) No ( )

(English, report writing, effective speaking, etc.)

E. Social Sciences? Yes ( ) No ( )

(Economics, history and Government, human relations, etc.)

20. Please give a brief description of your present job.

21. If any of the "yes" or "no" answers were not sufficient in your case, please enter any additional comments you would care to make on these or any other items in the space below.

APPENDIX B

SUPPLEMENTARY INFORMATION CONCERNING THE GRADUATES

PARTICIPATING SCHOOLS

Cameron State Agricultural College
Lawton, Oklahoma

Langston University
Langston, Oklahoma

Oklahoma State Tech
Okmulgee, Oklahoma

Oklahoma State University Technical Institute
Oklahoma City, Oklahoma

Oklahoma State University Technical Institute
Stillwater, Oklahoma

Sayre Junior College
Sayre, Oklahoma

SELECTED JOB DESCRIPTIONS FROM THE GRADUATES WHO WERE SURVEYED

General circuit design and system development. Responsibilities are the same as for graduate engineers.

Assigning jobs to project engineers. Coordinating between project engineers, assistant project directors and project directors.

Watch supervisor in a radar tower.

Maintain microwave telemetering and relay carrier apparatus.

Install, maintain, and service all the cable switch gear and transformers on the underground network of _____. This consists of both primary and secondary voltages.

Maintenance of electronic navigational aids and communication equipment.

I have been employed by _____ as a customer engineer for the past five years. My jobs consist of installation, maintenance, and repair of data processing equipment from keypunch to computer and some teleprocessing equipment.

I install and check out the electronic equipment aboard FAA flight check aircraft. This electronic gear is used for flight inspection of ground navigation facilities.

Maintenance and modification of semi-automatic flight inspection system.

I maintain the various types of electronic equipment used in training technicians at the _____.

Maintenance of radar simulators, teletype equipment, communication equipment (receivers, transmitters, remote control, etc.) P. A. systems, training aids, and supervision of four other technicians.

Watchstander at a search radar site.

Maintain _____ equipment for the U. S. Army. Includes periodical preventive maintenance and repair of malfunctions.

My job consists of installation and maintenance of data processing machines.

I am a customer engineer, servicing _____ machines of great variety. Responsibility is to prevent and/or correct machine failures.

I am the only technician working with four engineers on a device known as _____. It employs several methods of converting speech to digital information and back again. My job concerns much breadboarding and some design of the circuits involved--all of which are transistorized.

I work for _____ as an electronics technician. I work in antenna research with an engineer who has a M. S. degree. I check out and try the ideas of the engineer to see if a working model does as he expected.

My work in general is with electronic pulse circuits worked in conjunction with high explosives. We study metal particles being accelerated at tremendous velocities by high explosives by means of X-ray and other means.

Align, test, and troubleshoot forward-looking radars.

My job is to maintain and operate a truck costing $100,000 which contains some 40 sq. ft. of electronic surface equipment averaging 3 to 5 knobs or dials/sq. ft. I must be able to maintain and operate this equipment and supervise all operations.

Installation and maintenance of supervisory control equipment for the electric company. This equipment gives automatic operation of circuit breakers at distant sub-stations thus eliminating the need of a man stationed at these stations. This equipment also includes some telemetering at these stations. Also included is maintenance and installation of metering devices.

In the Division Standards Lab of _____, I calibrate and repair many types of test instruments, electrical and electronic.

Maintenance and installation of audio-visual equipment such as motion picture projectors (all kinds), tape recorders, record players, sound systems, etc.

Maintenance of production final test equipment.

Instrumentation technician. Set up and conduct structural dynamics tests in support of F-4 aircraft, F-111 crew module, Gemini spacecraft and Asset re-entry vehicle.

Supervisor of electronic technicians. Am in charge of the communications section and flight line maintenance. Oversee and maintain all airborne avionic equipment in the flight check aircraft based in LAX and western region. Also, oversee the maintenance and calibration of the communications equipment used in FAA aircraft such as VHF, HF, and UHF, tape recorders, digital tapes, transports, etc. Also work on guidance systems (auto-pilot), pulse equipment, and navigational aids.

Employed as an engineering assistant in charge of building fm/fm payload support packages under contract.

Teach Electronics Technology in high school

Maintenance of data reduction equipment at White Sands Missile Range. (small engineering tasks) Work is mostly with digital equipment.

General maintenance and installation of translator TV equipment which includes many fields of electronics.

Maintenance and installation of electronic equipment and wiring aboard aircraft.

Build, check, install, and maintain equipment to control and calculate the flow of products (usually oil).

Repair and maintain electric typewriters and dictation equipment and maintain proper customer relations.

Maintenance of ILS testing equipment, signal generators, and various pieces of testing equipment for aligning electronic gear used by various commands of the U. S. Air Force.

Maintenance of navigational aids such as instrument landing system, TACAN, VOR, and all types of communication equipment.

Construction of breadboard circuits. Assembly of engineering models. Troubleshooting and testing of final units.

Repair and maintain recording machines, reproducing machines, and remote control systems.

Technical support for the research and development of electronic communications equipment.

Laboratory technician in microwave research and development.

Calibration, repair and maintenance of electronic equipment.

Aircraft overhaul.

Install, calibrate, troubleshoot, overhaul, and repair television equipment associated with a multiple closed circuit television system and other electrical and electronic equipment used in the automatic material handling systems throughout the company's supply and transportation division.

Flight control mechanic. Operating and repairing of missile systems.

Insuring continuous operation of navigational aids and communications equipment. The navigational aids consist of VOR, TACAN, and UHF-VHF direction finders, and the communications equipment consists of VHF and UHF radio transmitters and receivers and teletype transmitting and receiving equipment.

Maintain and evaluate the operation of a VHF omnidirectional range and microwave link for _____.

Assist engineer in developing new instruments. Design, build, and test units. Troubleshoot existing equipment.

Assist engineer in design of various transistorized equipment.

Electronics technician. Test and calibrate telemetering equipment.

I install and do maintenance work on flow-meters and read-out equipment. These are meters used in pipelines to measure the flow of fluids.

Repair and calibrate microwave, missile flight control, and guidance systems.

In charge of all oceanographic equipment. Recorders, clocks, amplifiers, hydrophones, sono-buoys, communications and all related equipment and supplies to complete all projects.

Electronics maintenance technician. Maintain and check for accuracy in radar and communication systems used for positive control of aircraft.

Maintain solid state digital control equipment and related pipeline automation equipment.

Acting supervisor for computer project.

A SELECTED LIST OF COMPANIES FOR WHOM GRADUATES WERE EMPLOYED

Aero Commander
Oklahoma City, Oklahoma

Airtronics
McAlester, Oklahoma

Alko Industries
Midwest City, Oklahoma

Armour's Creameries
Chickasha, Oklahoma

Bell Telephone
Burlington, North Carolina

Civil Service
Holloman Air Force Base
New Mexico

Collins Radio
Dallas, Texas

Continental Oil Company
Ardmore, Oklahoma

Continental Oil Company
Ponca City, Oklahoma

Dictaphone Corporation
Tulsa, Oklahoma

Dorate TV
Sayre, Oklahoma

Dorsett Electronics
Purcell, Oklahoma

Dynalectron Corporation
Holloman Air Force Base
New Mexico

Federal Aviation Agency
Albuquerque, New Mexico

Federal Aviation Agency
Fort Worth, Texas

Federal Aviation Agency
Gage, Oklahoma

Federal Aviation Agency
Jacksonville, Florida

Federal Aviation Agency
Los Angeles, California

Federal Aviation Agency
Memphis, Tennessee

Federal Aviation Agency
Oklahoma City, Oklahoma

Federal Aviation Agency
Stilwell, Oklahoma

Federal Aviation Agency
Wichita Falls, Texas

Federal Corporation
Oklahoma City, Oklahoma

Fleming Company
Oklahoma City, Oklahoma

General Dynamics
Fort Worth, Texas

General Electric Company
Oklahoma City, Oklahoma

Graduate Research Center
Dallas, Texas

C. H. Guernsey
Oklahoma City, Oklahoma

Haliburton
Duncan, Oklahoma

Hall Radio and TV
Whitefield, Oklahoma

H and H Electric
Hot Springs, Arkansas

International Business Machines
Oklahoma City, Oklahoma

International Business Machines
Raleigh, North Carolina

Kansas Gas and Electric
Wichita, Kansas

Labko Scientific
Stillwater, Oklahoma

McDonald Aircraft Corporation
St. Louis, Missouri

Midwestern Instruments
Tulsa, Oklahoma

Oklahoma Gas and Electric
Oklahoma City, Oklahoma

Oklahoma State University
Research Foundation
Stillwater, Oklahoma

Phillips Petroleum Company
Bartlesville, Oklahoma

Proctor and Gamble
Tulsa, Oklahoma

Public Service Company
Tulsa, Oklahoma

Telecomputing Services, Inc.
Holloman Air Force Base
New Mexico

Texas Instruments
Dallas, Texas

Tinker Air Force Base
Oklahoma City, Oklahoma

Transalator TV Company
Canadian, Texas

Tri-State Communications
Liberal, Kansas

Union Carbide
Paducah, Kentucky

University of California
Los Alamos, New Mexico

U. S. Naval Depot
McAlester, Oklahoma

Welex
Houston, Texas

SELECTED COMMENTS FROM GRADUATES WHO WERE SURVEYED

"During my technical training the courses offered and the depth of study was quite far behind the state of the art and, in my estimation, not difficult enough to adequately challenge the entire average class."

"Higher math, more science, and more report writing are needed."

"In my opinion, today's graduating technicians are faced with filling jobs in a modern industry that demands 'specialization.' Today's training of technicians can only pursue a broad training program that will permit him to adapt into a modern industry."

"In regard to adequate education in mathematics courses, it was not that the courses that I took were poor, it was that there were not enough mathematics courses offered."

"Much more time should be given to the courses in transistor theory and practical applications of all other solid state devices. Not only analog devices but also the digital techniques involved with basic logic circuits should be of great help at _____."

"I believe there should have been a deeper study in solid state circuitry. Also, the calculus and physics were very much inadequate."

"More courses of transistor circuitry would be advantageous."

"I believe that the social science course could be dropped from the program and a higher math course added."

"Emphasis should be placed on new ideas, systems and products as they appear in industry (i.e., new semiconductor devices, circuits, etc.)"

"The school at _____ was good, but due to business and technical demands, it was not adequate then--not enough math or science courses such as physics, etc."

"Need a more advanced math course plus the use of a slide rule."

"I needed quite a bit more human relations and effective speaking."

"Need more math and slide rule courses."

"Courses were adequate for my job, but would have liked to learned more."

"It would be to my advantage to have had calculus and physics."

"Need more transistor courses. Programs in Oklahoma schools are weak in math and science courses. Digital and logarithmic circuits are needed in addition to chemistry and physics if one expects to do successful design work. Again I say, more math, science, physics, chemistry, and transistors will produce better qualified all-around technicians."

"A person never acquires all of the education needed."

"My education in math, science, communications, and social science is adequate for the job I was trained for, but not adequate enough to satisfy my desire to learn more in these fields."

VITA

Lloyd Delano Briggs

Candidate for the Degree of

Master of Science

Thesis: A STUDY OF THE PLACEMENT OF GRADUATES FROM OKLAHOMA'S POST-HIGH SCHOOL PROGRAMS OF ELECTRONICS TECHNOLOGY

Major Field: Technical Education

Biographical:

Personal Data: Born near Ada, Oklahoma, December 21, 1933, the son of Marvin Utah and Beulah Grace Briggs.

Education: Graduated from Vanoss High School in 1951; attended East Central State College in 1952; received the Associate of Science Degree from the Oklahoma State University, with a major in Electronics Technology, in May, 1957; attended the University of New Mexico in 1957-58; received the Bachelor of Science degree from the Oklahoma State University, with a major in Physics, in August, 1960; completed the requirements for the Master of Science degree, with a major in Technical Education, in May, 1965.

Professional experience: Electronics Technician, Sandia Corporation, Albuquerque, New Mexico, from 1957-58; Electronics Instructor, U. S. Grant High School, Oklahoma City, 1961-63; Instructor and Head of Electronics Technology Department, Oklahoma State University, Oklahoma City, 1963-65; Assistant State Supervisor of Technical Education, Stillwater.

Professional organizations: Oklahoma Technical Society, American Technical Education Association, American Society for Engineering Education; Oklahoma Vocational Association, American Vocational Association.