OKLAHOMA UNIVERSITIES' TEACHER EDUCATION INDUSTRIAL ARTS COURSE REQUIREMENTS COMPARED WITH PROPOSED MINIMUM STANDARDS FOR INDUSTRIAL ARTS PROGRAMS AT THE SECONDARY SCHOOL LEVEL

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CHAPTER I

INTRODUCTION

The processes for gaining knowledge in the materials and processes of industry has always been in a constant state of change. Even the very name for this type of education has changed over the years.

Manual Training was the first name applied to this type of education. It was first used at the public school level in the late 1800's. The development of this type of program was due to the increase in interest from labor unions for training schools for workers (Cochran, 1970).

Manual Arts first gained popularity at the turn of the century. Cochran (1970, p. 5) stated that this program "emphasized technical skills and sensitivity to form and function." This type of education gained popularity over Manual Training because Manual Arts dealt with more than learning a trade.

The manual arts movement lasted well into the 1930's. However, by the 1930's Industrial Arts was gaining more popularity. This type of education had evolved from many aspects of the previous programs.

Noting the change in name and content tends to affirm the fact that industrial arts is not a static but a dynamic form of education. During the past 25 years many new industrial arts curriculums have been developed. Some of these programs have proved successful while others have not.

In implementing new industrial arts programs it is important to have teachers that are qualified to teach them. To be assured of having qualified teachers it is necessary for the content of the industrial arts courses taken by future teachers at universities to match the content of the courses of new industrial arts programs.

Statement of the Problem

The problem of this study was the lack of information concerning the preparation of industrial arts teachers by Oklahoma universities for meeting a set of minimum standards for industrial arts programs in secondary schools. The set of minimum standards used for this study was a curriculum guide proposed by the Oklahoma State Department of Vocational Technical Education.

Statement of the Purpose

The purpose of this study was to compare the industrial arts courses required for industrial arts education majors from all of the Oklahoma universities that offer industrial arts teaching degrees with the course requirements of a set of minimum standards for industrial arts programs in secondary schools. The set of minimum standards were proposed by the Oklahoma State Department of Vocational Technical Education.

To accomplish this purpose the following questions were answered:

1. What are the subject areas and courses outlined in the set of minimum standards for industrial arts programs in secondary schools as proposed by the Oklahoma State Department of Vocational Technical Education?

2. What topics are included in the courses outlined in the set of minimum standards?

3. Which Oklahoma universities offer teaching degrees in Industrial Arts Education?

4. Which required industrial arts courses from these universities match the courses outlined by the curriculum of the set of minimum standards?

5. Are all of the courses and topics outlined by the curriculum of the set of minimum standards covered by the courses and topics of the required industrial arts courses for industrial arts teachers from Oklahoma universities?

Assumptions

In order for this study to be considered valid the following assumptions were made:

1. The respondents to the questionnaire answered the questions truthfully.

2. The respondents were able to determine which industrial arts courses offered at their university were required to be taken by industrial arts education majors.

3. Future teachers taking the required industrial arts courses learn the topics included in these courses.

4. Learning the content of a college course that covers the content included in a secondary school course would prepare that learner to teach the secondary school course.

Definition of Terms

The following terms were used throughout the study.

Avocational Education: An education of topics used for leisure time pursuits or hobbies.

Cluster: A number of similar topics gathered together.

Communications: A cluster area of industrial arts that covers the total aspect of communications in industry.

Comprehensive General Shop: A shop in which several basic industrial processes and materials are carried on simultaneously in one shop. This type of shop provides instructions in a wide range of areas of industry and crafts.

Construction: A cluster area of industrial arts that studies the materials, processes and types of construction involved in industry.

Curriculum: The whole body of courses offered in an educational institution, or by a department thereof.

General Education: A total education that helps a student to prepare for life.

General Shop: (See Comprehensive General Shop).

General Unit Shop: A shop concerned with a wider range of activities than the unit shop and covers the subject matter of one complete field of industry.

Industrial Arts: Phases of the general education programs which deal with contemporary American industry. This includes the study of industrial organizations and problems involving man and his technological society.

Industrial Education: A generic term used to encompass all types of education dealing with industry and technology in our society.

Manufacturing: A cluster area of industrial arts that involves the study of the nature and processes of manufacturing industries.

Postsecondary School: A school that is a college or university. These include both two and four year institutions for higher education.

Power and Transportation: A cluster area of industrial arts that involves the study of power and transportation involved in society.

Secondary School: The grade levels included at this school level are prescribed by state law. The grade levels normally include the ninth through twelfth grades.

Technical Education: Educational programs planned for those who desire to earn a living in an occupation in which success is largely dependent upon technical information and understanding of the laws of science and technology as applied to design, manufacturing production, distribution, and service. The program is generally post-high school and provides a background for employees called technicians.

Terminal Education: An education that formally ends at the junior college level or lower that enables a student to join the labor force as an unskilled, semi-skilled or skilled worker.

Unit Shop: A shop where one single activity of a division of an industry is taught. The unit shop is most appropriate for the senior high school where shops are provided.

Vocational Education: The broad field of study designed to develop skills, attitudes, understandings, abilities, work habits and appreciations, including information and knowledge needed by workers to enter and successfully progress in employment on a productive basis.

Scope

In determining a basis for the comparison purpose of this study a proposed curriculum guide from the Oklahoma State Department of

Vocational Technical Education was chosen. By no means does this researcher pretend to put forth this curriculum guide as the ideal curriculum or the goal to be reached for industrial arts. This curriculum guide was chosen because it represents a current approach to industrial arts curriculum development at the secondary school level in Oklahoma.

In determining the group to be surveyed the total population of that group was chosen due to its small size. The total population of Oklahoma universities that offer teaching degrees in industrial arts was represented by nine universities across the state. The total population was also chosen to gain a complete representation of the industrial arts courses required for teaching industrial arts.

This study was conducted to accomplish one major purpose. The purpose of the study was to determine if the courses and topics included in a set of minimum standards for industrial arts programs in secondary schools were covered in the content of the courses required to industrial arts teachers from Oklahoma universities. This study was not conducted to judge the quality of the programs from the Oklahoma universities nor the content of the proposed set of minimum standards used in this study.

CHAPTER II

REVIEW OF LITERATURE

Introduction

The introduction of new industrial arts programs has always been an ongoing process. As stated by Cochran (1970, p. 1) "the field of industrial education has been in a constant state of flux and reorientation since its early inception in the secondary schools." Many new and innovative programs have been developed but most find a short lived popularity.

In developing any new program, careful attention must be paid to the curriculum development. Many problems arise during the development process. Harrison (1957, p. 132) stated that "the greatest difficulty in considering curricular approaches, particularly as applied to industrial arts education, is definition." The problem in defining the curriculum for an industrial arts program played a significant role in the development of the purpose of this study. How curriculum designers at the university and secondary school levels define industrial arts can have a dramatic effect on the usefulness of an industrial arts program.

To be able to obtain a basis for industrial arts curriculum definition the literature from four different areas were reviewed. Literature on industrial arts curriculum development for secondary schools was studied to gain a basis for the definition of industrial arts

curriculum at the secondary school level. Literature on industrial arts curriculum development for postsecondary schools was studied to gain a basis for the definition of industrial arts curriculum at the post-secondary school level. Similar studies were examined for information dealing with the procedures and methods used in them which were useful to this study. And finally contemporary ideas on the future of industrial arts was reviewed to obtain a background on present feelings on the future of industrial arts.

Industrial Arts Curriculum Development at the Secondary School Level

A great quantity of material was available in the area of industrial arts curriculum development at the secondary school level. In choosing the literature for this study two main factors were taken into consideration to gain a variety of ideas about the definition of industrial arts and what courses should be offered in the program. The two factors were time and geographical location. A time span of work in curriculum development was chosen to gain an overview of contemporary ideas on industrial arts. This time span included works from 1950 to 1985. Geographical location was considered to gain a national rather than solely local feeling toward the ideas and courses involved in teaching industrial arts.

For this study six works on industrial arts curriculum development at the secondary school level were chosen. Two theses for partial fulfillment of the requirements for the degree of Master of Science from Oklahoma State University were chosen to gain a definition of industrial arts as viewed from Oklahoma's past programs. One 1985

curriculum guide proposed by the Oklahoma State Department of Vocational Technical Education was chosen for the comparison purposes of this study, and also to gain a current definition of how industrial arts is viewed by Oklahoma industrial arts educators. Three current curriculum guides from other states were chosen to gain a definition of industrial arts as viewed by different states.

To enable the researcher to easily compare the six different curriculums reviewed in this section, five important aspects of each were explained. These important aspects were: the purposes of writing the curriculum, the philosophy or definition of industrial arts of the curriculum, the course or course areas included in the curriculum, the age level of the students the curriculum was developed for, and the length of the courses developed in the curriculum.

The first study reviewed was written by Eades in 1950 and was titled "Industrial Arts in Oklahoma's Junior High Schools." This study was conducted to determine the status of Industrial Arts in Oklahoma junior high schools.

By defining industrial arts Eades (1950) developed a philosophy for industrial arts. First of all industrial arts should be a part of the general education every student should gain to have a well-rounded education. This type of education should foster the understanding of the operation, function and meaning of the things and events rising in rapid succession in an industrialized society. The courses involved in this education should have a wide variety because the students at this age have a short attention span and it is difficult to keep their interest. The courses should allow students to become familiar with the basic materials, processes and methods of industrial processes and

distribution through shops, laboratories, observations and first hand experiences. These courses should foster common learning not specialized training. Also the courses in industrial arts should stimulate the student's interests to help the student continue in education.

It was found by Eades (1950) that the majority of Oklahoma's junior high schools that offered industrial arts in 1950 offered only general shop. The topics that were taught in general shop were woodworking, metalworking, crafts, electricity, radio, drawing and others. Eades (1950) also stated that

> . . . woodworking and mechanical drawing are no longer thought of as constituting a complete industrial arts program, but rather as only two phases or areas which, along with others such as printing, metals, electricity, ceramics, automotives, and plastics, go to make up a total program (p. 14).

As it was shown in this study the junior high school in 1950 consisted of the seventh, eighth and ninth grades. The grades most often involved in general shop were seventh and eighth grades.

This study also showed that the course length was typical of most general education courses. The general shop course most often used was 36 weeks in length. This would translate into four nine week periods. The classes in this type of course was held five days a week for 50 to 60 minutes; however, an alternative plan could be substituted to create a program that lasted two years. In this program the classes were held three days a week for 50 to 60 minutes.

In moving on to a later view of curriculum development a study titled "Industrial Arts Subject Areas for the Secondary Schools as Listed in State Level Publications as of June 1957" was reviewed. This study was written by Jenkins in 1957. The purpose of this study was to sample state prepared curriculums for industrial arts programs to

see how well the published material was standardized and to determine which industrial arts courses were offered in the curriculum. This study did not develop a curriculum but it summarized the state industrial arts curriculum guides from 40 states.

Jenkins (1957) noted that industrial arts was an important part of a students general education. In developing a philosophy for industrial arts Jenkins listed eight basic objectives that all of the state publications agreed with. Also a more extensive list of objectives were given that were published by the Oklahoma State Advisory Committee for Industrial Arts.

The following eight objectives were generally used by all of the state curriculum guides that were involved in this study to describe an industrial arts education.

1. Should be used as means by which to explore industry and American industrial civilization in terms of its organization, raw materials, processes and operations, products, and occupations.

2. Should be used to develop recreational and avocational activities in the area of constructive work.

3. Should help a student to increase an appreciation for good craftsmanship and design in both modern and past products.

4. Should increase consumer knowledge to a point where students can select, buy, use, and maintain the products of industry intelligently.

5. Should provide a wide variety of exploratory experiences in many different industrial areas.

6. Should help to encourage creative expression in terms of industrial materials.

7. Should help to develop desirable social relationships.

8. Should be used to develop a certain amount of skill in a number of basic industrial processes.

Also in this study a more extensive list of objectives were included. These objectives were written by the Oklahoma State Advisory Committee for Industrial Arts (Oklahoma State Department of Education, 1951).

1. Complementary to other school subjects.

2. Helps to develop an appreciation of applied knowledge and skills.

3. Provides a knowledge of industrial drawing.

4. Contributes to later vocational efficiency.

5. Stimulates students' knowledge and appreciation of good design.

6. Instills a satisfaction in personal creative achievement.

7. Helps to develop the ability to analyze a job into its processes and organize them into correct procedures.

8. Trains in industrial and home safety.

9. Aquaints students with industrial information and induces a recognition of the standards of industrial attainment.

10. Helps to develop avocational interests.

11. Trains individuals in dealing with problems of life.

12. Stimulates correct attitudes towards an orderly shop, home and environment.

13. Aids students in making vocational choices.

14. Develops qualities of leadership and cooperative attitudes in work habits.

15. Develops an appreciation of the dignity and importance of the

the occupation of one's neighbors.

From the data of the curriculum guides received, Jenkins (1957) found that the comprehensive general shop had become the most popular industrial arts program. General unit shops and unit shops were still being used to teach industrial arts but the comprehensive general shop had become the most popular due to the way it was structured. The comprehensive general shop was ideal for smaller schools because it enabled a wide variety of course topics to be taught without the expense of duplicating the tools and equipment found in schools utilizing a unit shop program.

In noting the age level that the curriculum guides were designed for, this study found that most general shop programs were being used at the junior high school level. However, it was found that many small schools utilized the general shop format for a complete secondary school industrial arts program.

Jenkins (1957) did not report on the length of the industrial arts courses from the state curriculum guides in this study. This being the case no data was available from this study in this area.

After reviewing works from past industrial arts curriculums it was necessary to review more current works. The following four industrial arts curriculum guides were more current industrial arts curriculum guides from Oklahoma, Maryland, Connecticut, and Louisiana.

The next work in industrial arts curriculum development that was reviewed was a 1985 proposal for minimum standards in industrial arts programs at the secondary school level. This curriculum guide was prepared by a committee of teachers and teacher educators from Oklahoma schools and universities in cooperation with the Oklahoma State

Department of Vocational Technical Education. The data from this program was obtained through an interview with Osborn, who also made available other material on the curriculum guide content. Osborn was a committee member working on the development of the communications cluster of the curriculum guide. This particular curriculum guide was chosen for the comparison purposes of this researcher's study. A more detailed description of the actual curriculum guide content is found in the third chapter of this study.

In determining the purpose for developing this curriculum guide two main factors were given. In reviewing previous curriculum guides developed in the 1970's from the Curriculum Materials Center of the Oklahoma State Department of Vocational Technical Education, the committee determined that those curriculum guides were incomplete and outdated (Osborn, 1985).

Osborn also related that the philosophy of industrial arts used to develop this curriculum guide followed the general objectives previously written. The main ideas of this philosophy were to develop an industrial arts program that would cater to the pre-vocational and avocational needs of the student by using an exploratory program.

This curriculum guide used four clusters to generalize the topics to be covered in the program. The cluster areas were manufacturing, power and transportation, construction, and communications. In each of these clusters more traditional industrial arts topics were found. The individual topics are discussed in the third chapter of this study.

In developing the curriculum guide a degree of flexibility was included for determining at which grade level the program should be implemented. The sixth through tenth grades were chosen as a range for

the implementation of the curriculum guide. This was done to give each school the choice to determine when this type of program could best meet the school's needs. The tenth grade was chosen as the high limit because this curriculum guide was not designed to replace the higher level unit shops of the eleventh and twelfth grades. This guide was designed to produce an exploratory program which could not meet the needs of the vocational or avocational interest of a student beyond the tenth grade.

Flexibility was also considered in determining the length of the program developed in the curriculum guide. Basicly the program would be either a one or two year program. This was to be decided by each school individually. As a one year program each of the four clusters would continue for nine weeks, five days a week for one hour a day. As a two year program each of the four clusters would continue for 18 weeks, five days a week for one hour a day (Osborn, 1985).

Another industrial arts curriculum guide that was reviewed was from the state of Maryland. The purpose for developing this curriculum was to gather the information needed to teach a required industrial arts course for all students in Maryland schools. The author Barnes designed the curriculum to be implemented at the seventh and eighth grade levels. This curriculum was designed to handle the problems that arose with most required courses. This curriculum was published in 1981.

The career values of industrial arts and the mission of industrial arts at the middle school level defined the philosophy of industrial arts in this curriculum. Barnes (1981) viewed the mission of industrial arts at the middle school level as an introduction to four broad

cluster areas taught at the high school level. Besides a mission, industrial arts plays an important part in gaining career values. Industrial arts helps the student to discover interests and abilities in many technical areas and it makes no difference whether the student is male or female.

As mentioned in the philosophy this curriculum was divided into four broad cluster areas. These cluster areas are: Graphic Communications, Manufacturing, Energy and Transportation, and Construction. With these four cluster areas two courses were developed. These courses were Industrial Arts Exploration 7 and Industrial Arts Exploration 8. Industrial Arts Exploration 7, which included Graphic Communications and Manufacturing, was developed for the seventh grade level. Industrial Arts Exploration 8, which included Energy and Transportation, and Construction, was developed for the eighth grade level.

The course length designed by this industrial arts curriculum is different from most general education courses. The state of Maryland required all students to complete a nine weeks course in industrial arts during both the seventh and eighth grades. During the course the class met every other day during the week for 84 minutes.

The next curriculum from another state besides Oklahoma was from Louisiana. In 1981 the Division of Vocational Education of the Louisiana State Department of Education developed an industrial arts curriculum for the sixth, seventh and eighth grades. They developed this curriculum to help local administrators, teacher educators and industrial arts teachers of the state of Louisiana to improve instruction in industrial arts and to help meet the needs of the state's youth.

A philosophy or definition of industrial arts was not included in this curriculum. However, objectives for course clusters were given. In essence industrial arts in this curriculum was defined with three main ideas. An industrial arts education at the sixth, seventh and eighth grade level should give students an exploratory knowledge of a variety of industries. It should give a hands on experience with the tools and materials associated with the industries. Also it should help students to recognize vocational opportunities (Louisiana State Department of Education, 1981).

Much like the previous curriculums from Oklahoma and Maryland, this curriculum was divided into cluster areas. Five separate clusters were included in it. These cluster areas were Manufacturing, Construction, Communications, Transportation, and Craftwork. The topics covered in each cluster dealt with the exploration of the structure, tools and materials from each industry covered. Also the Craftwork cluster enabled the student to explore more avocational interests.

An amount of flexibility was added to this curriculum. No course lengths or specific grade levels were included in this curriculum. This would allow each individual school system to decide at what level this curriculum could be implemented as long as it was within the three grade levels specified. Also each school was made responsible for deciding how long the industrial arts courses should be.

The final industrial arts curriculum for secondary schools was one developed in Connecticut. The curriculum was developed by Hubachek in 1982. The purpose for developing it was to create guidelines for general shop to be used in the industrial arts curriculum of the state

of Connecticut. The curriculum covers topics in general shop for both secondary school and also adult vocational education courses in general shop.

In defining industrial arts this curriculum gave a philosophy for industrial arts and general shop. As stated by Hubachek (1982),

> . . . Industrial Arts learning experiences are sequential, beginning in the lowest grades and continuing through adult and higher education. As an integral part of the total educational program, industrial arts is designed to meet the students needs as they relate to a modern technogical society. Through manipulative and research experiences, with a variety of tools, machines, processes and products of industry, students develop an awareness of how industry and its many components function (p. 8).

Also included in the curriculum was a definition of industrial arts programs.

> A comprehensive industrial arts program will provide for a sequence of courses in industrial arts areas. These include but are not limited to: drafting, electricity/electronics, general lab, graphic arts, industrial arts, industrial ceramics, metal technology, plastics technology, power technology, and wood technology (p. 8).

To make complete the definition of industrial arts a philosophy for general shop was given.

> General shop as a part of industrial arts is the study of technology. Technology is the accumulated knowledge of what man knows and does with materials. Man's technological knowhow provides him with better living conditions than that of his ancestors (p. 18).

After stating the philosophy the course areas were reviewed. Basicly nine course areas were included in this curriculum. These were Drafting, Electricity, Power/Energy, Graphic Arts/Photography, Leather, Metal, Plastics, Safety, and Woodworking. As reviewed in the philosophy each of these courses could be sequentially taught from kindergarten through adult education.

In dealing with grade levels Hubachek (1982) divided the learning process for industrial arts into five different stages. In the first stage, Self-Awareness, the student is made familiar with the different types of work in industry. This level would be taught from kindergarten through the sixth grade. The second stage, Industrial Arts Exploration, helps to develop a strong foundation in the concepts, skills, knowledge, and attitudes of the industrial world. This level would be taught at the seventh and eighth grade levels. At the third stage, Industrial Arts Occupational Orientation, a transition from exploratory to specialization would be made. At this level the students experience at a greater depth a wide variety of fields to help them formulate career plans. This level would be taught at the ninth and tenth grade levels. The fourth stage, Industrial Arts Specialization, would guide a student into one or more areas to help that student develop pre-vocational skills. This level would also be a preparation for advanced training. This level would be taught during the eleventh and twelfth grades. The fifth and final stage, Adult, Continuing and Higher Industrial Arts Education, was designed for adults and/or out of school youths. This level would be incorporated into a program to teach avocational, pre-vocational or vocational courses depending on the needs of industry and society.

After reviewing the grade levels set fourth in this curriculum guide the course lengths were examined. For level one 60 hours a year was the minimum alloted for the level. Also the individual clusters were designed to be a minimum of 40 minutes long and a maximum of 60 minutes long. At level two, 225 minutes per week per semester was the minimum time allotment. At this level the classes were designed

to have a 45 minute minimum length and a 60 minute maximum length. At levels three and four, 456 minutes per week per semester was the minimum time allotment. The length of the classes at this level were set at 90 minutes each. The course and class lengths of the curriculum were based on a standard school year. The standard school year was considered 18 days long with two 90 day semesters. For level five no course or class lengths were given. These were to be decided by each individual school who could gain input from the community concerning course and class length.

This concludes the review of literature dealing with industrial arts curriculum development at the secondary school level. The next section deals with industrial arts curriculums at the postsecondary school level.

Industrial Arts Curriculum at Post-secondary School Levels

After reviewing the literature involved in industrial arts curriculum development at the secondary school level it was important to review literature dealing with industrial arts curriculums used at the postsecondary school level. After doing this the researcher was able to draw conclusions on similarity and differences in the definition of industrial arts.

In searching for material to review the researcher made several findings. One finding was that very little material was available on the current curriculum development at the postsecondary school level. Most of the literature found on the topic was relatively old. Most studies were from before the mid-sixties. The most recent study found for this study was published in 1974.

For this study six works on postsecondary school curriculums were reviewed. Two theses for partial fulfillment of the requirement for the degree of Master of Science from Oklahoma State University were chosen to gain a definition of industrial arts as viewed from Oklahoma past programs. Another thesis from Oklahoma State University for the same purpose of the two previously mentioned was reviewed to gain a definition of industrial arts from past programs in many states.

To enable the researcher to easily compare the three masters theses reviewed in this section, five important aspects of each were explained. These aspects were the purpose of the study; when was it written; the philosophy or definition of industrial arts given in the study; the main course offerings; and recommendations.

In reviewing literature from the other sources, two different approaches were used. Two studies from other states were chosen to obtain a more current view of industrial arts in postsecondary schools. An abbreviated summary of these studies were included. They were reviewed to discover the purpose of the study and findings relevant to the status of industrial arts at the time of publication. To finish this section a work on the development of industrial arts in colleges was taken from the tenth yearbook of the American Council On Industrial Arts Teacher Education. This work was selected to gain an overview of industrial arts at the collegiate level in 1961.

The first study reviewed in this section was a masters thesis from Oklahoma State University and was written in 1947. It was written by Ables and was titled "A Recommended Program of Industrial Education for Northeastern A & M College". Ables (1947) wrote this study for the following reasons. During the time of this study wide

spread interest was being taken in junior colleges throughout the nation; however, there was a lack of understanding of its functions and of its present growth. This study reviewed the courses of the junior colleges offering industrial education in Oklahoma and then made a recommendation for the Industrial Education program for junior colleges.

In dealing with the philosophy of Industrial Education, Ables (1947) noted a distinction between industrial education and industrial arts education. The Industrial Education at the junior college is a terminal education. It offers an education that is deeper and broader than most to be able to cope with the complexity of the industrial technologies. This education was designed to develop semi-professional skills to allow employment in industry after completion of the course. This type of program was not designed with industrial arts teaching in mind.

To be able to obtain a terminal education in Industrial Education at junior colleges many courses were offered. After reviewing the offerings of Oklahoma's junior colleges the study concluded that 13 courses in industrial education were offered.

The following is a list of those course offerings:

Woodworking	Machine Shop
Industrial Drawing	Electricity
Auto Mechanics	Radio
Welding	Refrigeration/Air Conitioning
Forge/Foundry	Farm Shop
Metal Work	Sheet Metal
Printing	(p. 64)

After reviewing the course offerings and status of Oklahoma Junior Colleges, a curriculum was prepared. In this proposal light industrial education courses were recommended. These were determined to be the most beneficial for a terminal education at this level. Following is a list of those courses (Ables, 1947):

Industrial Arts	Refrigeration/Air Conditioning
General Woodwork	Welding
Maintenance Mechanics	Radio Construction/Repair
Automobile Mechanics	Electric (p. 124)

As noted in the previous list the prepared curriculum added a course in industrial arts. That step showed a change in philosophy. It would suggest that a junior college education not only be terminal but also college preparatory.

The next study reviewed was also dealing with junior colleges. This masters thesis from Oklahoma State University was written in 1967 by Taylor. The title of the study was "A Survey of Course Offerings in Industrial Arts in Oklahoma Junior Colleges During 1966-67". The purpose of this study was to survey course offerings in industrial arts with the intent of describing conditions and practices that exist and compare them with recommended objectives.

To help determine a philosophy of industrial arts the study included a definition of industrial arts. Taylor (1967) stated the following definition:

> Industrial arts is that aspect of education concerned with industrial materials, and the tools and machines of industry used to adapt them to useful products. It shares the responsibility with other curriculum areas of transmitting the social culture which is becoming increasingly technical (p. 7).

Following the lines of the philosophy this study determined that nine courses were offered by industrial arts departments of Oklahoma junior colleges in 1966-67. The list of those courses are as follows:

Auto Mechanics	Metals
Carpentry	Printing
Crafts	Welding
Drawing	Woodworking
Machine Shop	(p. 47)

After reviewing the material found from the different junior colleges in Oklahoma this study made the following recommendations. Taylor (1967) stated that if industrial arts was to become a significant influence in the curriculums of Oklahoma junior colleges it would have to improve its present program. Also a new curriculum with new structures should be developed which would rearrange the instructional content to reflect new industrial technologies.

The final study reviewed from Oklahoma was also a masters thesis from Oklahoma State University. It was written in 1949 by Tate. The title of the study was "An Analysis of Industrial Arts Education Curriculums in Fifty-One Selected Colleges and Universities in the United States". Tate (1949) stated the purpose of this study was to determine the requirements of the representative colleges and universities in other states and the factors which influence those requirements in order to devise a curriculum of Industrial Arts teacher education for the preparation of industrial arts subjects in the junior and senior high schools.

This study also gave a basic philosophy of industrial arts. Industrial arts is a phase of general education. It deals with industry, its organization, materials, occupations, processes, and products. It also deals with the problems resulting from the industrial and technological nature of society.

After reviewing the materials from 51 selected colleges and universities the study prepared a program for industrial arts teacher education. The program listed 13 industrial arts courses to fulfill the technical requirements. Following is a list of those courses:

Drawing, Mechanical I	Metalwork, General I
General Shop I	Machine Shop I
General Shop II	Woodworking, General
Drawing, Freehand I	Electricity I
Shop Planning I	Care of Shop Equipment I
Design, Industrial Arts I	Finishing, Industrial I
Welding, Gas & Arc I	(p. 72)

This study made several basic recommendations on the preparation of industrial arts teachers. These recommendations were built into the curriculum that was developed in this study. The curriculum, besides preparing a teacher to teach industrial arts, made provisions for the preparations needed to teach on academic subjects. The technical requirements in the curriculum were designed to help a teacher specialize in one subject or phase of industrial arts with sufficient work in all of the shop subjects to enable him to understand the principles and methods employed in the use of all industrial arts materials. And finally general electives were included to enable the student to study subjects which are necessary or desireable in his preparation for teaching.

This concluded the topic on postsecondary school curriculums. The next topic was on the purpose and findings of studies done outside Oklahoma.

As stated in the introduction of this section the following studies were reviewed to obtain a summarization of the purposes and relevant findings from more recent studies completed from other states.

The first study that was summarized was a dissertation from the University of Missouri. It was written by Edwards in 1971. The title of the study was "An Evaluation of the Industrial Arts Teacher Education Program at Black Hills College by the Graduates". Edwards (1971) stated that the purpose of the study was to evaluate the

importance of the basic elements of the courses taught in the industrial arts teacher education program at Black Hills College. The study was also conducted to gather data on the status and location of the graduates from 1960 to 1969.

In examining the findings of the study a majority of the graduates surveyed agreed on several main topics. The program was deficient in terms of facility, equipment and program offerings. They also agreed that more emphasis on modern industrial processes should be applied in all areas. The graduates found that after graduation that they lacked adequate preparation in six subject areas; however, the preparation in drafting, woodworking and plastics was adequate.

The next and final study from out of state that was summarized was also a dissertation. This study was conducted at the University of Northern Colorado by Weiner in 1971. The title of the study was "Evaluation of the Industrial Arts Teacher Education Curriculum at Peru State College". The title of this study defines the purpose; therefore, it will not be repeated here. The method used to evaluate the program was a questionnaire sent to 103 graduates of that program.

The following findings were made by a consensus of the graduates questioned. A longer period of student teaching should be required. A high rating was given to the industrial arts objectives, goals and courses. Finally, a need for more general education courses including Math, English Composition I & II and Health was communicated (Weiner, 1971).

The last work on postsecondary school curriculums reviewed in this section was written by Seefeld (1961). This work was included in the review of literature to give a broad overview of what collegiate industrial arts was at that time period.

It was found that at this time several factors were involved in the objectives of industrial arts at the collegiate level. The main objective given by Seefeld (1961, p. 68) was to "aquire an appreciation and understanding of industry". Three other responsibilities of a collegiate program were given. It was noted that these were first developed as early as 1917 but were still applicable in 1961. These three responsibilities were teacher preparation, director and supervisor preparation, and liberal studies for non-industrial arts majors.

Seefeld did find a serious problem in planning curriculums for collegiate industrial arts programs. Since an industrial arts teacher must have a balanced education, balanced among liberal, professional and technical education, a time factor became evident as to when a teacher was adequately prepared to teach. Many educators proposed a five year plan to be able to have enough time for a balanced education. Others suggested a masters program be completed before proceeding to the teaching field. The last option would benefit the teacher in salary, but no real solution to the problem was given.

Faculties for industrial arts at the collegiate level were discussed. Seefeld (1961) suggested that all professors at the college level should have a doctorate degree in industrial arts. This would help to assure that the professor was specialized in that field. However, it was stated that to keep the best faculty salaries must be increased. This was supported by the fact that the pay in industry far outpaces the pay at schools and colleges.

At the time this work was written it was noted most colleges had done well in securing facilities. However, that statement was not made to cover all instances. It was found that many schools were

still having difficulty obtaining enough laboratories and classrooms to accomplish their goals. It was also suggested here that industrial arts should follow the example of science and engineering and offer open laboratories. This would permit the student to accomplish more in a shorter amount of time. To offset the thought of tool loss, safety responsibility and machine maintenance Seefeld (1961) used the rationale that students who are studying to be teachers must learn to take responsibility sometime and this would be the ideal situation to accomplish it.

And finally the topic of prestige was discussed. Three reasons were given for the feeling that industrial arts teachers suffer a loss of prestige that other occupations, such as engineers and attorneys, receive. The reasons given were that: industrial arts teachers were not felt to be academic purists, the industrial arts field was relatively young, and the programs involved were victimized by limited research.

The previous review was given to gain a background for the definition of industrial arts at the postsecondary school level.

Similar Studies

Due to the fact that one half of the material for this study was new in 1985 no studies with exactly the same topics have been conducted. Also during the research no studies were found that compared the industrial arts curriculums of secondary schools to postsecondary schools. However, three comparison studies were found for post-secondary school industrial arts curriculum.

Tate (1949) made an analysis of 51 selected curriculums from colleges and universities in the United States. In this study the curriculums were compared to help develop a proposed industrial arts curriculum for industrial arts teacher preparation. The study was reviewed in detail in the previous section. Also the methods for gathering data from this study were reviewed for use in the researcher's study.

Taylor (1967) made a survey of the course offerings in Oklahoma junior colleges during 1966-67. This study compared the industrial arts objectives of Oklahoma junior colleges with recommended objectives. This study has also been reviewed in more detail in the previous section.

Ables (1947) conducted a study to develop a program of industrial education for Northeastern Oklahoma A & M College. This study compared the industrial education offerings of the Oklahoma junior colleges to each other to determine a basis for the development of a new industrial education curriculum. This study, too, is reviewed in detail in the previous section.

This section was written to identify studies that basicly conducted the same kind of research performed in this study. Valuable information is in the development of the methods for gathering data were obtained. This information was helpful in developing the instrument developed in this researcher's study.

Contemporary Ideas on the Future of Industrial Arts

After reviewing past and current industrial arts curriculum

development at the secondary and postsecondary school level. It was necessary to review literature on the current perspectives on the future of industrial arts to obtain complete basis for defining industrial arts. In reviewing these perspectives a great deal of confusion on the purpose of industrial arts at the public school level was found. The literature revealed a decisive difference of opinion on the purpose of industrial arts.

Luethemeyer (1983) found that the difference of opinion was created by a back to the basics philosophy contrasting with a technical education philosophy set down by educators. The basis for these differences were given in this article.

Luethemeyer (1983) noted that the proponents of the back to the basics philosophy pleaded that an industrial arts education should be used to round out the general education of students. This education would be more avocational than vocational in nature. The objectives of the program would be focused on the project rather than on industry.

In contrast the proponents of a technical education viewed the study of new technologies as the most important aspect of an industrial arts education. This type of education would profess the use of systems analysis rather than traditional industrial arts courses such as woodworking, crafts and metals. Less hands on or project orientated courses would be offered in this type of program.

DuVall (1980) in predicting the future in industrial arts in the year 2000 found the same difference of opinion as Luethemeyer. Four scenarios were developed by using current-day indicators. Three of the scenarios were technology based and one was traditionally based.

The scenario for traditionally based industrial arts programs

supported the previously mentioned literature by Luethemeyer on traditional industrial arts. This type of program would be offered in large prosperous school systems. The program would be general education courses concentrating on the historical and avocational aspects of industrial arts.

The three other scenarios were industrial arts programs based on technical education. These three names were given to the programs, Industrial Technology, Industrial Technology 2000, and Technology Education.

Industrial Technology would be focused more on the needs of industry and technolgoy. It would be used as a feeder program, at the junior high and middle school levels, for vocational education. It would be pre-vocational in nature and would study occupationally orientated clusters such as power and energy, manufacturing and construction, and graphic communications.

Industrial Technology 2000 and Technology Education were termed as a general education in technology. These programs were totally based on the theoretical aspects of industry and technology. Systems analysis would be the main function of this program. No provisions for the use of hands on experiences were made in these programs.

In discussing the feasibility of the four scenarios developed in this article the first two were concluded to be the most likely to be utilized before the year 2000. By the year 2000 the article concluded that few industrial arts courses would exist and that the technology education programs will have gained the popularity.

Summary

To be able to compare the industrial arts courses required for industrial arts teachers of Oklahoma universities that offer teaching degrees in industrial arts with a proposed industrial arts curriculum for secondary schools it was necessary to review literature dealing with curriculum and curriculum development in the two areas for three reasons. First, by reviewing other curriculum development at different grade levels and time spans, a solid foundation for the definition of industrial arts curriculum was obtained. Second, the possibility of duplicating another similar study was eliminated by reviewing literature in these areas. And finally by reviewing literature in this subject area similar studies could be gathered to help design the procedures used in this study.

Several generalities can be concluded from the material that was reviewed. Similarities in the areas of philosophy and course content were found to exist.

Agreement on the philosophy of industrial arts was found to exist at all levels and time periods. Industrial arts was found to basicly be a part of general education. It was designed to be pre-vocational, avocational and exploratory in nature. Industrial arts was designed to allow students a first hand experience in the materials and procedures of industry. It was also concluded that an industrial arts education helps prepare a student for life.

Course content was another area where many similarities were noted. The literature reviewed generally agreed that the basic traditional industrial arts courses, such as woodworking, metals, drafting, were still the basis for all industrial arts programs. However, a shift

was noted in how the courses were taught. In recent years a cluster method of teaching industrial arts was noted. These basic clusters were taught at generally the lower levels of secondary schools and the more traditional unit shops remained for higher levels.

In conclusion, after reviewing literature on contemporary perspectives on the future of industrial arts, a difference of opinion was found. One opinion stated that industrial arts should go back to the basics and stay with a traditional industrial arts philosophy. The other opinion stated that industrial arts should become an education in technology that would analyze the processes involved in new industries.

CHAPTER III

METHODOLOGY

Introduction

This chapter deals with the methodology used in developing the instrument used in this study. The main aspect of this chapter was the research design. After developing the research design four main aspects of the methodology were defined. The four main aspects of the methodology were Population, Development of Instrument, Collection of Data, and Analysis of Data.

Research Design

The research design was stated in the purpose of this study. The purpose of this study was to compare the courses and topics from a state level industrial arts curriculum for secondary school with required industrial arts courses for teachers. This was done to determine if the topics included in the required industrial arts courses covered the same topics included in the courses from the state level industrial arts curriculum. In making this comparison conclusions were made about the preparation of industrial arts teachers for teaching state level industrial arts curriculums.

Population

In choosing a group to survey a total population was chosen. Two

factors determined this decision. The total number of Oklahoma universities offering industrial arts teaching degrees was nine. This fact made the use of the total population feasible. Also by using the total population a complete representation was obtained which helped to qualify the validity of this study.

The population chosen for use in this study were the Oklahoma universities who offered degrees in Industrial Arts Education. A total list of nine universities were taken from the Industrial Teacher Education Directory (1984). The following is the list of those universities:

1. Central State University
2. East Central Oklahoma State University
3. Langston University
4. Northeastern Oklahoma State University
5. Northwestern Oklahoma State University
6. Oklahoma State University
7. Panhandle State University
8. Southeastern Oklahoma State University
9. Southwestern Oklahoma State University

The instrument was sent to the head or the chairman of the industrial arts department of the nine universities. The names of the head or the chairman of the department were also taken from the Industrial Teacher Education Directory (1984). A list of the names and addresses of those people were included in the appendix of the study.

Development of Instrument

An industrial arts curriculum guide, developed at the state level, was used as the basis for the questions developed in the instrument.

This curriculum guide was prepared as a set of minimum standards for industrial arts programs in secondary schools by the Oklahoma State Department of Vocational Technical Education (Osborn, 1985). It was discussed in detail in Chapter II of this study.

The material taken from the curriculum guide was in the form of cluster areas, course titles and topics. The following cluster areas were used in the curriculum guide:

1. Communications
2. Power and Transportation
3. Construction
4. Manufacturing Processes

The following course titles were given in the Communications cluster area: Drafting, Printing, Photography, Computer Graphics, Electronic Communications, Communications.

The following course titles were given in the Power and Transportation cluster area: Power and Transportation, Electricity and Electronics, Internal Combustion Engines.

The only course titles used in the Construction and Manufacturing Processes cluster areas were the same as the cluster titles. Provisions were made to apply course titles in these areas in the instrument.

The topics covered by each cluster were also given in the curriculum guide. The major topics from each cluster area used in this study are as follows.

Communications

1) Historical Development, 2) Freehand Technical Drawing,

3) Lettering, 4) Multiview Drawing, 5) Dimensioning, 6) Pictorial Drawing, 7) Design Principals, 8) Reproduction Equipment, 9) Paper Binding and Finishing, 10) Printing Methods, 11) Photographic Equipment, 12) Film Developing, 13) Computer Software, 14) Electronic Communications and 15) Career Opportunities.

Power and Transportation

1) Safety Practices, 2) Shop Management, 3) Practical Applications of Math and Science, 4) Occupations, 5) Mans Early Use of Power, 6) Simple Machines, 7) Sources of Electrical Energy, 8) Principles of Electricity, 9) Direct and Alternating Current, 10) Application of Ohm's Law, 11) Types and Uses of Internal Combustion Engines, 12) Name and Function of Engine Parts, 13) Ignition Systems of Small Engines, 14) Fuel Systems and Carburetion, 15) Kinds of Lubricants, 16) Engine Lubrication, 17) Cooling Principles of Engines, 18) Heat Generated by Compression, 19) Trouble Shooting and Tune-up Procedures for Small Engines, 20) History of Jet and Rocket Engines, 21) Principles of Rockets and Jet Engines, 22) Jet Engine Identification, 23) Liquid and Solid Rocket Fuels, 24) Principles of Diesel Engines, 25) Types of Steam Engines, 26) Nuclear Power, and 27) Power Transmission.

Construction

1) Design Process, 2) Preparation for Building, 3) Site Clearing and Excavation, 4) Concrete Composition, 5) Concrete Form Construction, 6) Concrete Reinformcement, 7) Concrete Finishing, 8) Masonry, 9) Occupations, 10) Wood Frame Construction, 11) Electrical Systems, 12) Plumbing Systems, and 13) Safety Practices.

Manufacturing Processes

1) Major Processes for Changing Raw Material into Usable Products, 2) Relationships Between Manufacturing, Technology, Industry, and Society, 3) Design Activities in Manufacturing, 4) Material Properties, 5) Primary and Secondary Material Processing Activities, 6) Applications of Material Processing Activities, 7) Safety Practices, 8) Activities in Tool Design and Construction, 9) Research and Development in Manufacturing, 10) Material Specifications in Manufacturing, 11) Operation Sequences in Manufacturing, and 12) Activities in Manufacturing Supervision.

The instrument used in this study was in the form of a questionnaire. To be able to make the questionnaire as simple as possible the majority of the questions were of the closed type. A questionnaire was chosen over a phone interview because some questions were of the open type and required the respondent to write in information that is not normally part of one's memory. This type of information included the course titles, course number and department under which specific courses were offered.

The cluster areas from the curriculum guide, used as the basis for the questions, were used to divide the questionnaire into four different cluster areas. Under these cluster areas the courses included in the cluster areas were arranged. Spaces were provided for respondents to check the courses from those clusters that were taught as required industrial arts courses for industrial arts teachers from their programs. Included with the courses were spaces for writing in the university course name, number and department. Also a space was provided for the respondents to write in courses from their programs

that were used to cover topics in the cluster areas that were not included in the questionnaire. Each space provided for filling in the course information from the university was consecutively numbered for later use. For the two cluster areas of the curriculum guide that did not list specific courses space was provided for the respondents to submit the course name, number and department of those courses used to cover those cluster areas.

Included in each of the four sections were lists of the major topics listed in the curriculum guide. The respondents were to indicate which they had written in. This was accomplished by writing a number assigned to the course next to the topic. Space was provided to write in four numbers in case more than one course covered a topic.

A letter introducing the study and asking for the respondents' cooperation was included with the questionnaire. Also detailed instructions, and a stamped, addressed envelope for return of the questionnaire were included. A copy of the letter and questionnaire were included in Appendix B and Appendix C of this study.

Collection of Data

Time was the most important consideration in determining when the questionnaire packet was sent to the nine different universities. Two main considerations of time were made, the earliest it could be sent and what time during the week it should be sent.

It was determined that the first part of April was the earliest and best time to send the instrument. That time was decided on because time was needed to refine and prepare the instrument for use and the first part of April was viewed as the earliest possible time

this could be achieved. Also this time was chosen because that the work-load of most professors would be less at this time of the month as opposed to closer to the end of the semester.

Tuesday was viewed as the most suitable time during the week to mail the instrument. Mailing at this time allowed for the postal workers to get through the heavy work load on Monday but still made the mailing early enough in the week for most deliveries to be made that week.

Time was another consideration made when determining when a follow-up was made. At the end of a three week period after the instrument was mailed a follow-up phone call was placed to the non-respondents. This was done to determine if the instrument had been received and to give the respondents a chance to ask any questions that may have developed in answering the questionnaire. If the instrument had not been received another one was sent at this time.

Analysis of Data

The small size of the population used in this study made possible the use of the actual number of responses obtained. However, for clarity both the actual number and the percentage representation of the data was used.

The names of the Oklahoma universities that participated in this study were not necessary to solve the problem. In reporting the findings only the numbers or percentages of the Oklahoma universities were given. This was done to assure that no individual university industrial arts program could be judged alone. The researcher was only concerned with Oklahoma as a whole.

The data was analyzed in three ways. For the Communications and Power and Transportation sections the data was analyzed to obtain the number of universities offering courses from these sections, and the most and least offered number of courses. For the Construction and Manufacturing Processes sections the most often listed courses and the number of times they were listed were given. Second, the topic coverage was analyzed for all four sections to determine which topics were not covered by university courses and at what frequency this occurred. Third, the data was summarized to obtain averages and percentages of the courses offered, and the overall percentage of topic coverage.

Along with reporting the exact findings from the instrument, bar graphs were included to serve as a quick method of reviewing the findings. Ten bar graphs were used.

For the Communications and Power and Transportation sections one graph each was used to represent the number of universities offering courses in each section. For the Construction and Manufacturing Processes sections one graph each was used to represent how many times the most often occurring courses in these sections were listed. Four graphs were used to represent the number of universiites having courses covering specific topics from the four sections. One graph was used to represent the average number of total courses offered in the four sections of the questionnaire. Also one graph was used to represent the average percentage of the topics covered by the surveyed universities for all four sections.

After reporting and analyzing the data in this method, statements answering the questions from the objectives of the study were made and conclusions and recommendations were stated.

CHAPTER IV

FINDINGS

Introduction

The purpose of this study was to determine by comparison if the courses and topics included in a curriculum guide for a proposed set of minimum standards for industrial arts programs at the secondary school level were covered in the content of the courses required for industrial arts teachers from Oklahoma universities. It was found that nine Oklahoma universities offered degrees in industrial arts education. For this study the names of the universities were not necessary. Only the overall status of industrial arts education in Oklahoma at the university level was desired. This study was not conducted to judge industrial arts curriculums or programs.

The results of the study were determined by the data received from a questionnaire sent to the head or chairman of the industrial arts department of the nine universities. The results are presented and analyzed in this chapter. The following five sections present and analyze the data from the questionnaire concerning Return Rates, Course Analysis By Section, Topic Analysis By Section, Data Analysis, and Summary.

Return Rates

The initial introductory letter, questionnaire, and self addressed

return envelope were mailed to the nine Oklahoma universities offering degrees in industrial arts education on April 16, 1985. A three week time limit was set for the initial mailing of the questionnaire. At the end of the three week time limit, eight of the nine questionnaires had been received.

Due to the small number of universities surveyed in this study, it was necessary that all of the questionnaires were needed to obtain a complete representation of course offerings. At the end of the three week time period a phone call was placed to the university that had not responded. During a one week period of unsuccessful attempts at reaching the chairman of the industrial arts department a second questionnaire and letter urging response was mailed. One week later the final questionnaire was received.

Five weeks after the initial mailing all nine questionnaires had been received. All had been filled out correctly and contained usable information.

Course Analysis By Section

In dealing with the course offerings for each section of the questionnaire two methods of gathering data were used. The first method was used for the Communications section and the Power and Transportation section. The second method was used for the Construction section and the Manufacturing Processes section.

For the Communications and Power and Transportation sections, general course titles were included as separate areas to help narrow the questionnaire. This was done to help verify which areas of the sections were not covered and also because the curriculum guide, used

as the basis for the questionnaire, included these names. The general course titles used in the communications section were Drafting, Printing, Photography, Computer, and Electronic Communications. The general course titles used in the Power and Transportation section were Power and Transportation, Electricity/Electronics, and Internal Combustion Engines. Also in both sections a space was provided for the placement of courses which did not fit the other general names but were used to cover topics in that section.

For the Construction and Manufacturing Processes sections, the curriculum guide used as the basis for the questionnaire contained no general course titles. The questionnaire was designed to direct the respondent to fill in the courses their department used to cover the topics obtained from the curriculum guide for these two sections.

For the first two sections the data was tabulated by using the number of universities offering courses in these sections, the highest number of courses, and the lowest number of courses per university from each area. Because the last two sections had no course titles the most often listed courses and the number of times they were listed in the questionnaire were reported on.

Communications

The data on the number of universities offering courses in Communications is represented in Figure 1. The Communications section was divided into six areas by using five general course titles and one area for courses not related to the general course titles. The following names were used for these areas: Drafting, Printing, Photography, Computer, Electronic Communications, and Others.

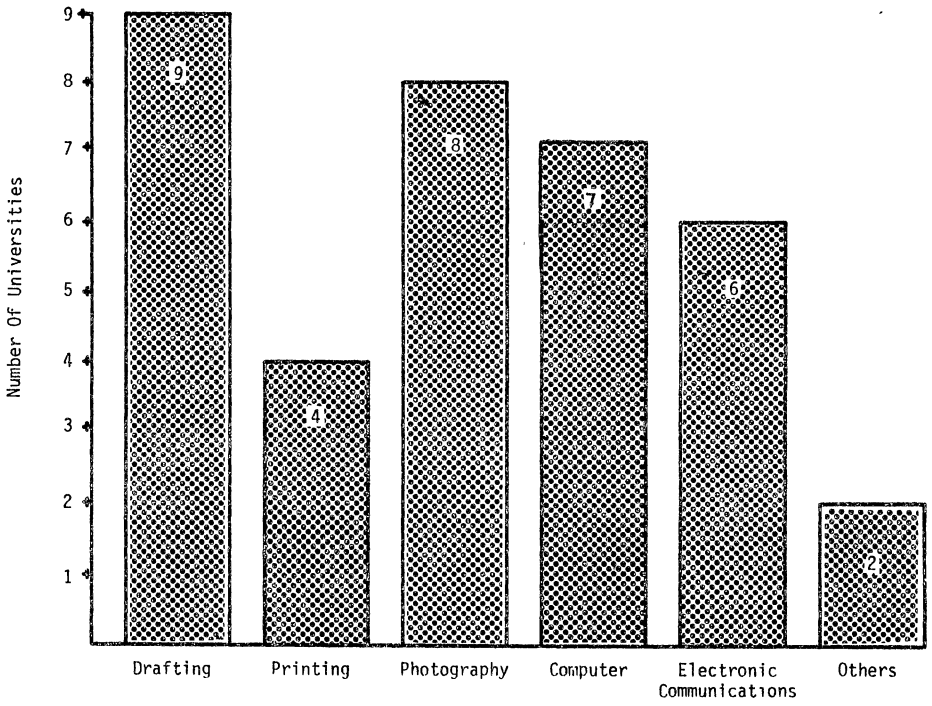


Figure 1. Number of Universities Offering the Listed Communications Courses

All of the universities surveyed offered courses in drafting. Two universities offered the high number of five courses, and one university offered the low number of one course.

For Printing four universities offered courses in this area. One university offered the high number of two courses and four universities offered no printing courses.

For Photography eight universities offered courses in this area. Four universities offered the high number of two courses and one university offered no photography courses.

Of the nine universities surveyed seven offered courses in computer. Two universities offered the high number of two courses and two universities offered no computer courses.

In the Electronic Communications area six universities offered courses. Four universities offer the high of two courses and three universities offered no courses.

Only one university listed a course in the Other category. This course was listed as Graphic Communications.

Power and Transportation

The data on the number of universities offering courses in the Power and Transportation section is represented in Figure 2. The Power and Transportation section was divided into four areas by using three general course titles and one area for courses that were not related to the general course titles. The following names were used for these areas: Power and Transportation, Electricity/Electronics, Internal Combustion Engines, and Others.

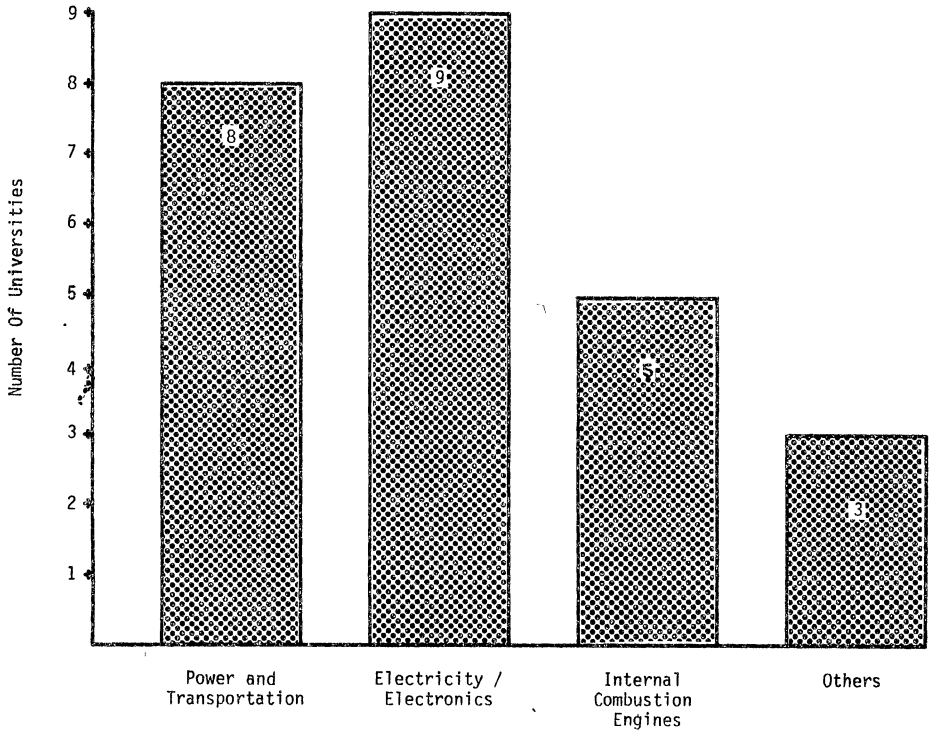


Figure 2. Number of Universities Offering the Listed Power and Transportation Courses

In the area of Power and Transportation eight universities offered courses. One university offered the high number of three courses and one university offered no courses in this area.

Nine universities offered courses in Electricity/Electronics. One university offered the high number of eight courses and one university offered the low number of one course.

In the area of Internal Combustion Engines five of the nine universities surveyed offered courses. One university offered the high number of three courses and four universities had no courses.

Three universities listed courses that were not related to the general course titles. One university offered the high number of three courses and six had no courses.

Construction

The following information dealing with the most often listed courses in the Construction section is shown in Figure 3. It was found that six courses were listed most often in this section. All of these courses were listed at least three times.

The most often listed course was Woodworking. It was listed seven times in the questionnaire.

Construction and Electrical Wiring were listed an even number of times for the next most often listed courses. These courses were listed four times each.

Carpentry, Architectural Design and Estimating in Building Construction were the final courses listed most often in this section. These courses were listed three times each.

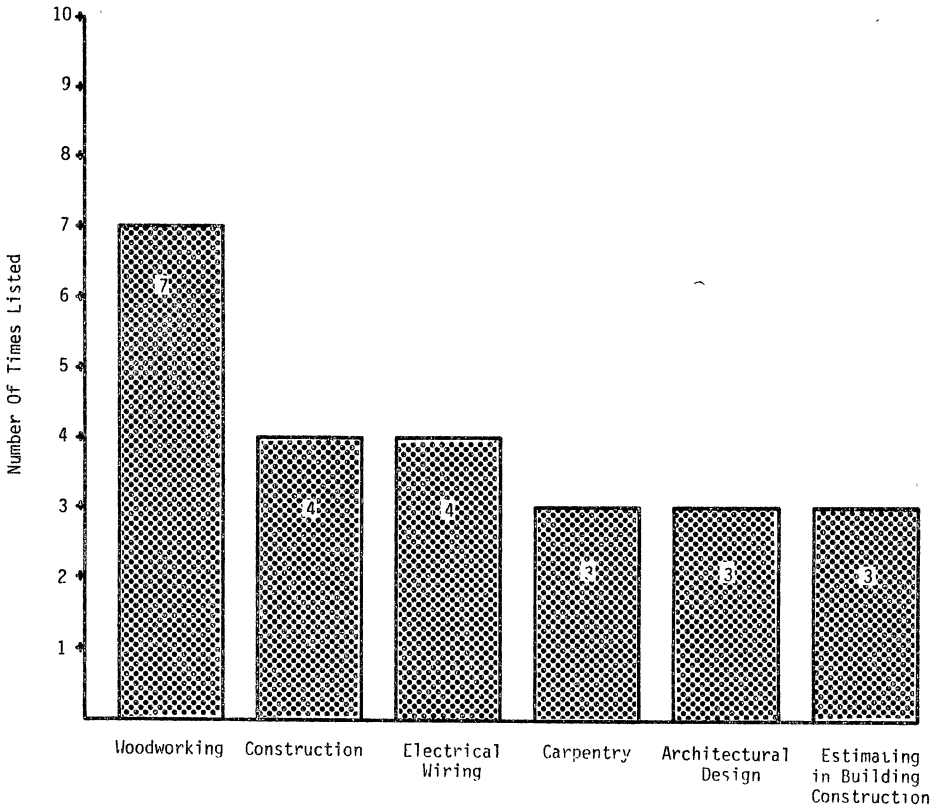


Figure 3. Courses Most Often Listed by the Surveyed Universities in the Construction Section

Manufacturing Processes

The following information dealing with the most often listed courses in the Manufacturing Processes section is shown in Figure 4. The questionnaire revealed that seven courses were most often listed in this section. These courses were listed at least three times.

Wood Processes and Metallic Material Processes were listed an even number of times as the most often listed courses. These courses were listed seven times each.

Manufacturing Processes and Welding Processes were listed an even number of times for the next most often listed courses. These courses were listed six times each.

Safety and Care of Equipment came next. This course was listed six times.

Manufacturing Materials and Testing and Machine Tool and Processes were the final most often listed courses. These courses were listed three and four times each respectively.

Topic Analysis By Section

In dealing with topic coverage it was important to report on which topics were covered and at what frequency this occurred. Topics covered by all of the surveyed universities were not included in this analysis in order to focus on the least covered topics.

Communications

The following data dealing with topics covered by university courses in the Communications section is represented in Figure 5. Eight topics were found not covered by courses from all of the surveyed

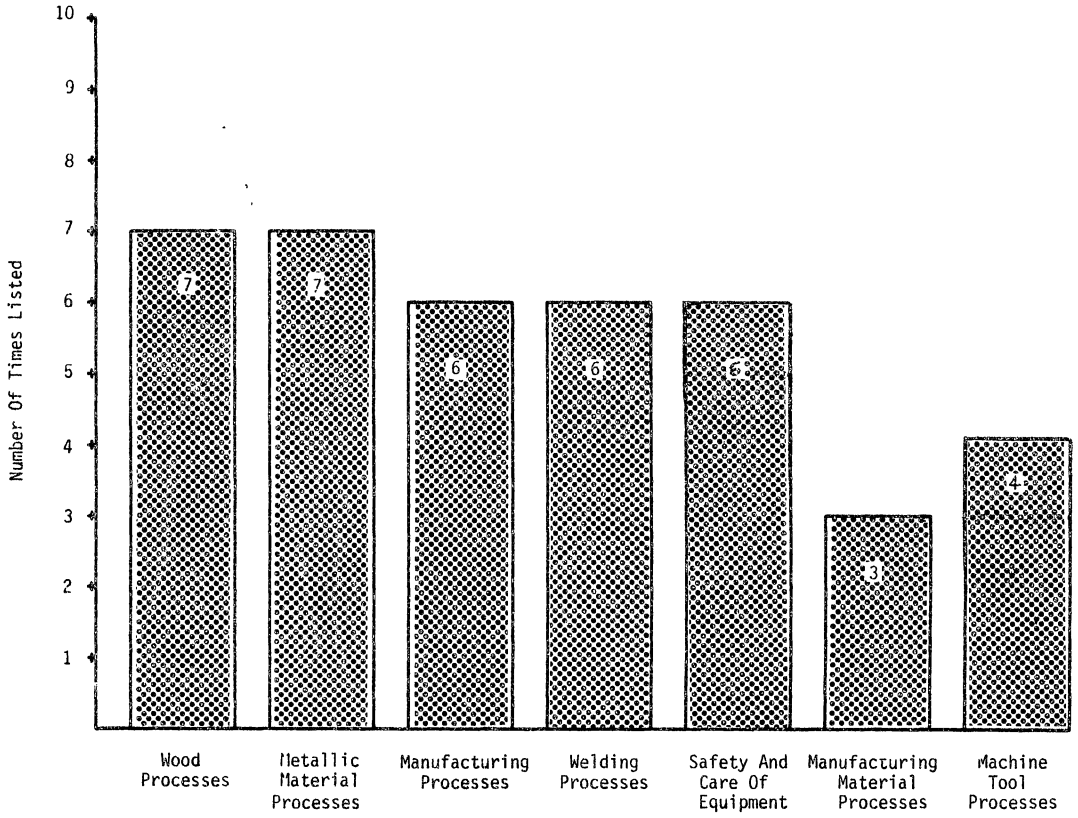
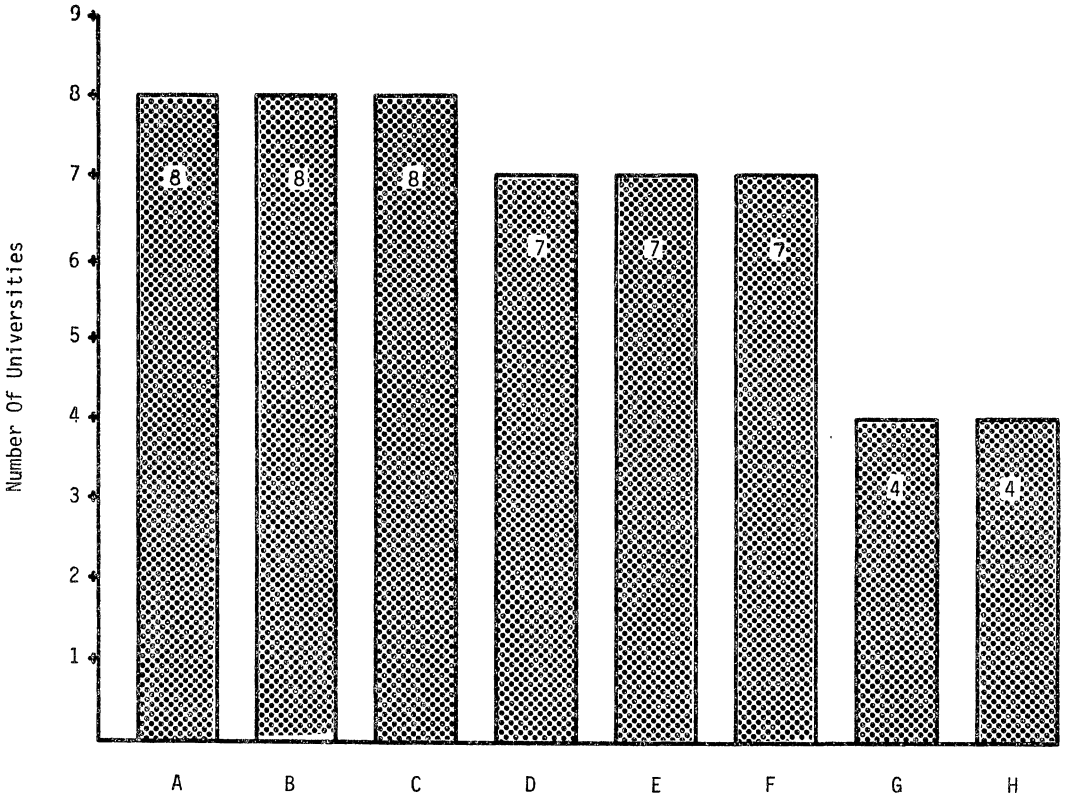


Figure 4. Courses Most Often Listed by the Surveyed Universities in the Manufacturing Processes Section



Legend:

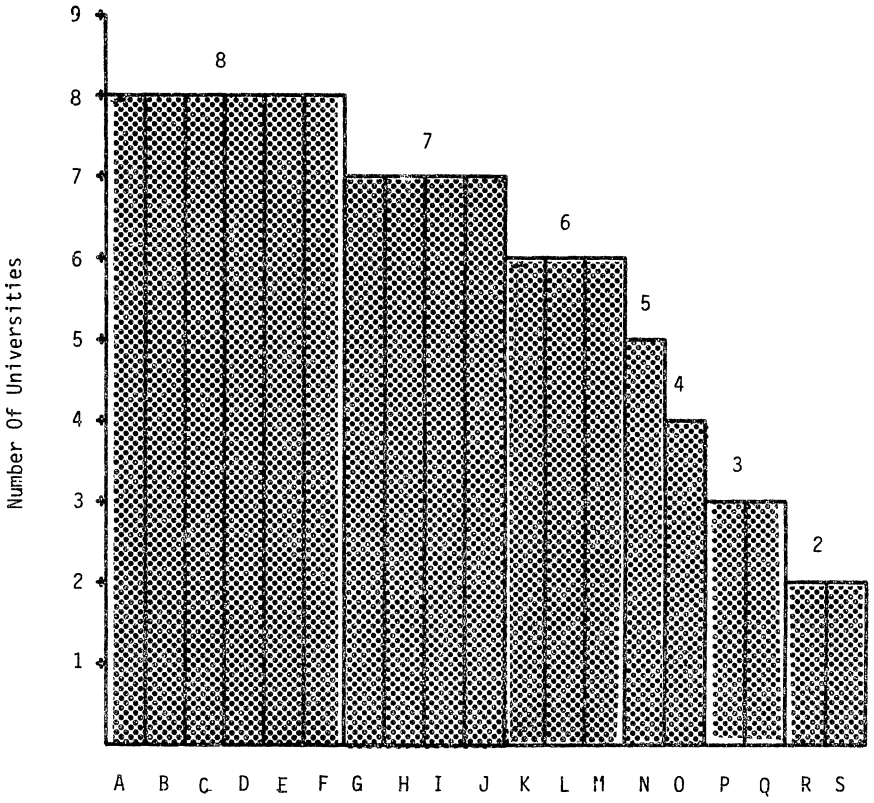
A. Electronic Communications
B. Film Developing
C. Photographic Equipment
D. Computer Software
E. Historical Development
F. Career Opportunities
G. Printing Methods
H. Paper Binding

Figure 5. Number of Universities Having Courses Covering the Listed Communications Topics

universities. The courses of four universities covered Paper Binding and Finishing or Printing Methods. The courses of seven universities covered Historical Development in Communications, Computer Software, and Electronic Communications. Career Opportunities, Photographic Equipment, and Film Developing were covered by the courses of eight of the universities surveyed.

Power and Transportation

The following information is represented in Figure 6. Nineteen topics were found not covered by courses from all of the surveyed universities. Two of the universities surveyed did have courses that covered the topics History and Principals of Jet and Rocket Engines, and Liquid and Solid Rocket Fuels. Three of the universities surveyed did have courses that covered the topics Types of Steam Engines, and Nuclear Power. One topic, Diesel Engine Principals, was covered by the courses of four of the universities surveyed. Five of the universities surveyed did not have courses that covered the topic Power Transmission. The following three topics were covered by the courses of six of the universities surveyed: Simple Machines, Mans Early Use of Power and Shop Management. The following four topics were covered by the courses of seven of the universities surveyed: Name and Function of Engine Parts, Fuel Systems and Carburetion, Kinds of Lubrication, and Cooling Principals of Small Engines. Finally the following six topics were covered by the courses of eight of the universities surveyed: Practical Applications of Math and Science, Types and Uses of Internal Combustion Engines, Ignition Systems of Small Engines, Engine



Legend:

A. Applications of Ohms Law
B. Trouble Shooting and Tune-Up Procedures
C. Engine Lubrication
D. Ignition Systems of Small Engines
E. Types and Uses of Internal Combustion Engines
F. Practical Uses of Math and Science
G. Cooling Principals of Small Engines
H. Kinds of Lubrication
I. Fuel Systems and Carburetion
J. Name and Function of Engine Parts
K. Shop Management
L. Mans Early Use of Power
M. Simple Machines
N. Power Transmission
O. Diesel Engine Principles
P. Nuclear Power
Q. Types of Steam Engines
R. Liquid and Solid Rocket Fuels
S. History and Principles of Jet and Rocket Engines

Figure 6. Number of Universities Having Courses Covering the Listed Power and Transportation Topics

Lubrication, Trouble Shooting and Tune-up Procedures for Small Engines, and Applications of Ohm's Law.

Construction

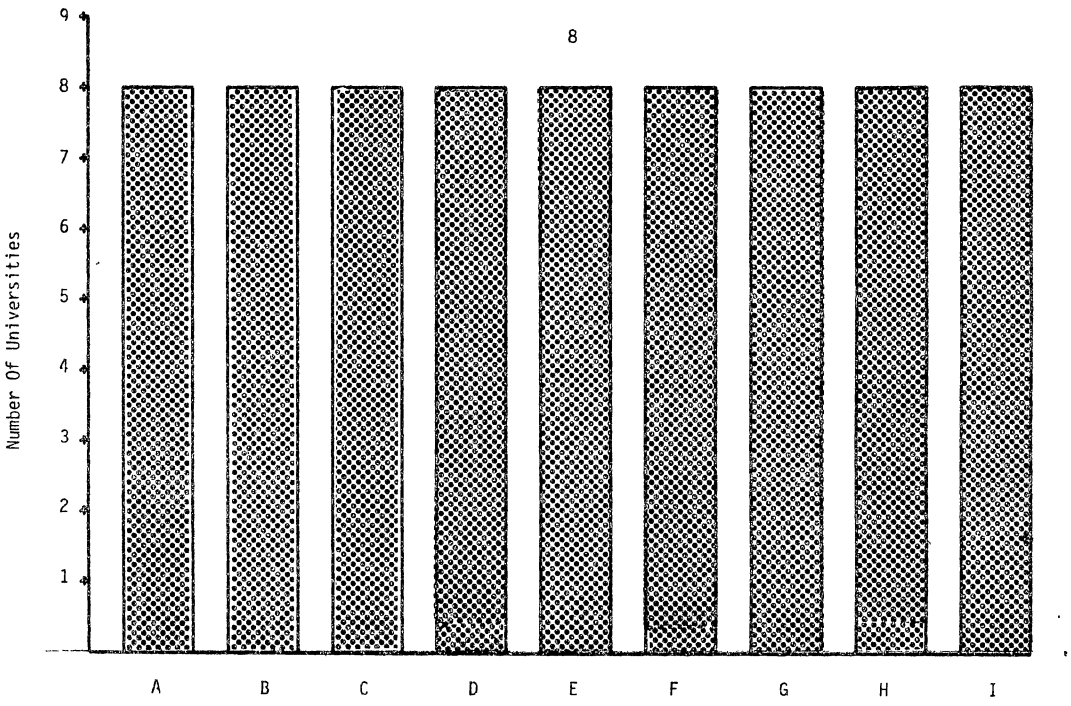
The following information on the Construction section is shown in Figure 7. All 13 of the topics included in this section were covered by courses from eight of the nine universities surveyed. Nine topics were not covered by the courses of one university. The following is a list of those topics: Preparation for Building, Site Clearing and Excavation, Concrete Composition, Concrete Form Construction, Concrete Reinforcement, Concrete Finishing, Masonry, Wood Frame Construction, and Plumbing.

Manufacturing Processes

The following data is included in Figure 8. Of the 11 topics included in this section it was found that five topics were not covered by the courses of all of the universities. One topic, Research and Development, was covered by the courses of seven of the surveyed universities. The following topics were covered by the courses of eight of the nine surveyed universities: Major Processes, Operation Sequence, Activities in Tool Design and Construction, and Activities in Supervision.

Data Analysis

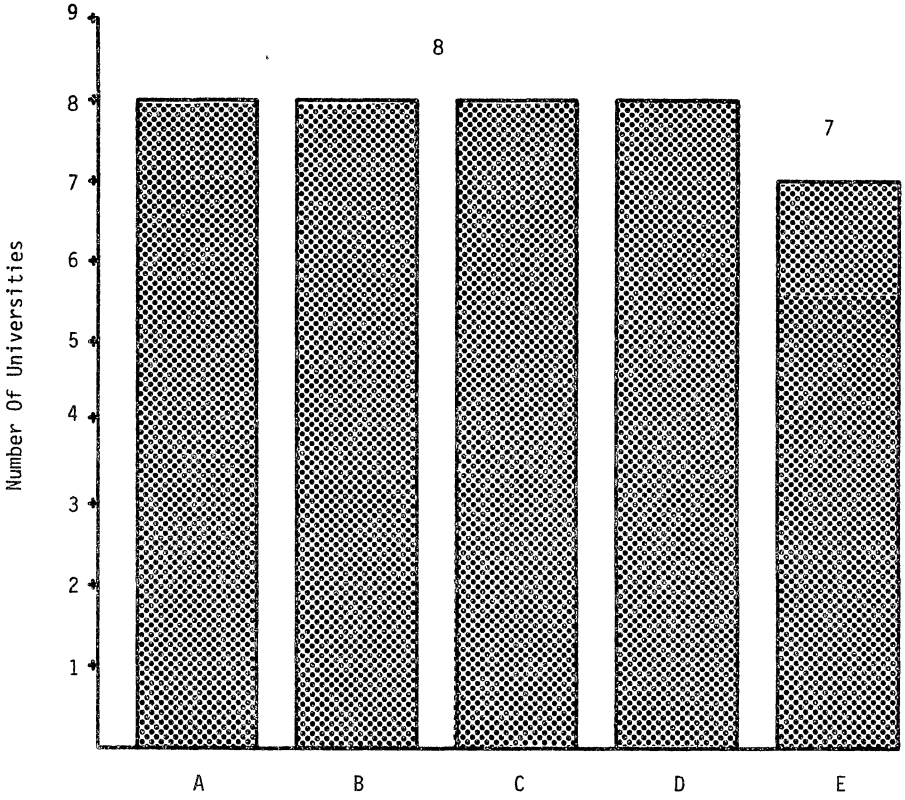
The information received from the nine returned questionnaires was tabulated for each of the four sections of the questionnaire. For each section (Communications, Power and Transportation, Construction, and Manufacturing Processes) the average number of courses offered by



Legend:

A. Preparation for Building
B. Site Clearing and Excavation
C. Concrete Composition
D. Concrete Form Construction
E. Concrete Reinforcement
F. Concrete Finishing
G. Masonry
H. Wood Frame Construction
I. Plumbing

Figure 7. Number of Universities Having Courses Covering the Listed Construction Topics



Legend:

A. Activities in Supervision
B. Activities in Tool Design and Construction
C. Operation Sequence
D. Major Processes
E. Research and Development

Figure 8. Number of Universities Having Courses Covering the Listed Manufacturing Processes Topics

the universities was tabulated. Also the highest and lowest number of courses were included.

To demonstrate how well the topics listed in each section were covered by the university courses, a percentage rating based on the average number of topics covered was used. Also the highest and lowest number of topics covered was given.

The following information on average courses per university, per section, is represented in Figure 9. The following data on the average percentage of topics per section covered by the Oklahoma Universities surveyed is represented in Figure 10.

In the Communications section an average of 7.4 courses was found to be offered. The highest number of courses, ten, was offered by two universities. The lowest number of courses, five, was also used by two universities.

Of the 15 topics listed in the Communications section 86.6 per cent of the topics, based on an average of 13 topics, were covered by courses from all of the universities. Three universities had courses that covered all 15 topics. The courses from one university covered nine topics, the lowest number.

In the Power and Transportation section an average of 5.5 courses was found to be offered. One university offered nine courses for the highest number of courses listed and one university offered two courses for the lowest.

Of the 25 topics listed in the Power and Transportation section 66 per cent of the topics, based on an average of 16.6 topics, were covered by the courses from all of the universities. One university had courses that covered all 25 topics. Two universities had courses

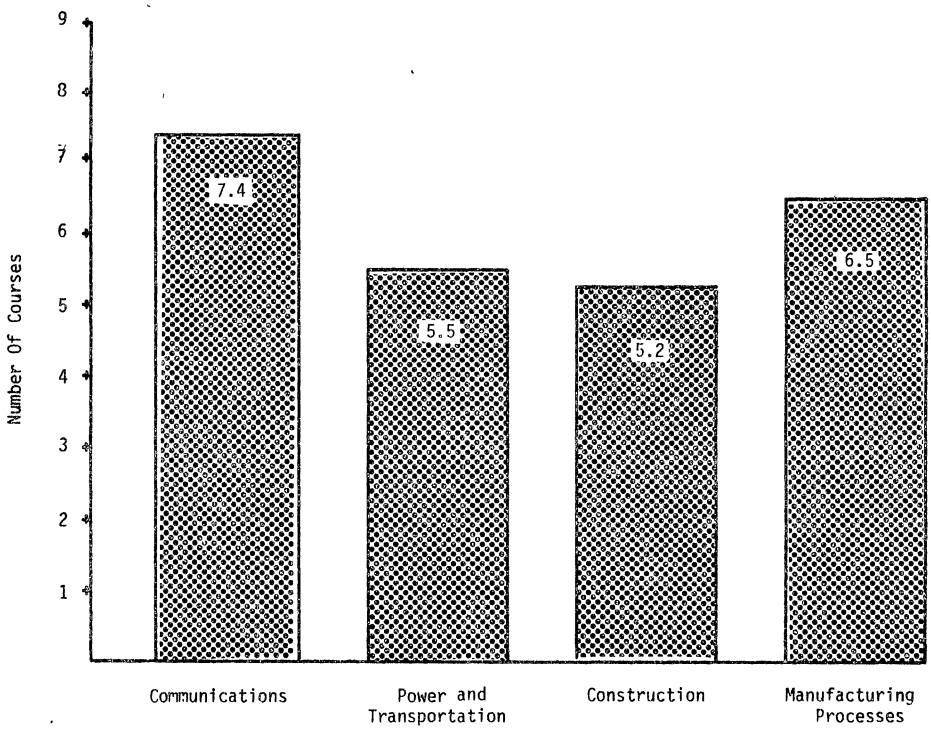


Figure 9. Average Number of Courses per Section Offered by the Universities Surveyed

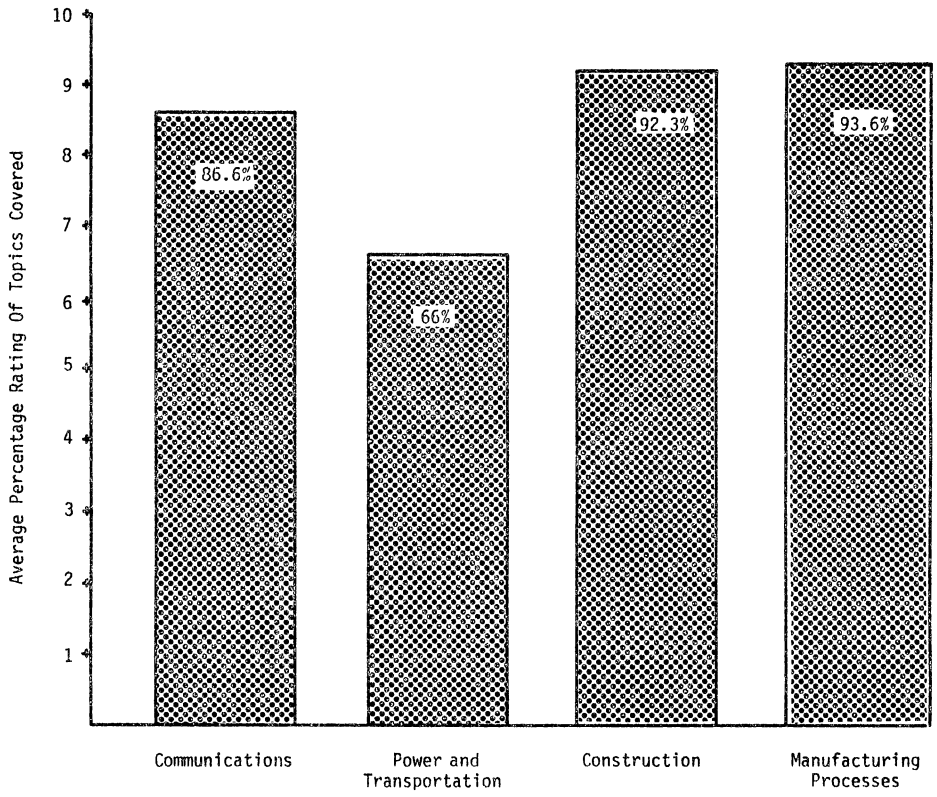


Figure 10. The Average Percentage Rating of the Topics Covered by the Universities Surveyed

that covered the low number of seven topics.

In the Construction section an average of 5.2 courses was found to be offered. One university offered 11 courses for the highest number of courses listed and one university offered one course for the lowest number.

Of the 13 topics listed in the Construction section 92.3 per cent of the topics, based on an average of 12 topics, were covered by courses from all of the universities. Eight of the nine universities had courses which covered all 13 topics. One university covered four of the topics for the low number covered.

In the Manufacturing Processes section an average of 6.5 courses was offered. The highest number, 12, and the lowest number, one, of courses were each offered were each offered by one university.

Of the 11 topics listed in the Construction section 93.6 per cent of the topics, based on an average of 10.3 topics, were covered by courses from all of the universities. Five universities offered courses which covered all 11 topics. Two universities offered courses which covered the lowest number of nine topics.

Summary

As determined by the previously presented data the courses and topics of the Construction and Manufacturing Processes sections were well covered by the courses of the surveyed universities. Courses from the Communications and Power and Transportation sections were not as well represented by universities. The courses from the Communications section that were not well represented were Printing, Computer and Electronic Communications. One course, Internal Combustion Engines,

from the Power and Transportation section was not well represented by the universities surveyed. Accordingly the topics involved with these courses were not covered. For an overall summary of the course offerings of the surveyed universities refer to Table I.

TABLE I

SUMMARY OF COURSES OFFERED BY THE NINE SURVEYED UNIVERSITIES

List of Courses	Universities Surveyed								
	1	2	3	4	5	6	7	8	9
Drafting	X	X	X	X	X	X	X	X	X
Printing	X			X	X	X			
Photography	X	X	X	X	X	X	X		X
Computer	X			X	X	X	X	X	X
Electronic Communications		X	X	X	X			X	X
Others in Communications			X			X			
Power and Transportation	X	X	X	X	X	X	X	X	
Electricity / Electronics	X	X	X	X	X	X	X	X	X
Internal Combustion Engines	X			X	X	X		X	
Others in Power and Transportation	X		X		X				
Woodworking	X	X		X	X		X	X	X
Construction	X			X		X	X	X	
Electrical Wiring		X			X			X	X
Carpentry			X			X			X
Architectural Design		X		X	X				
Estimating in Building Construction		X				X		X	
Wood Processes	X	X	X	X		X	X		X
Metallic Materials Processes		X	X	X	X	X	X		X
Manufacturing Processes	X	X			X	X	X		X
Welding Processes		X	X		X	X		X	X
Safety and Care of Equipment	X		X	X	X			X	X
Manufacturing Material Processes	X	X						X	
Machine Tool Processes	X	X		X			X		

X = Course offered by the university listed

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The primary purpose of this study was to determine, by comparison, if the courses and topics included in a proposed set of minimum standards for industrial arts programs in secondary schools were covered in the content of the courses required for industrial arts teachers from Oklahoma universities. By making this comparison, statements could be made concerning the preparation of new industrial arts teachers, graduating from Oklahoma universities, for teaching the proposed set of minimum standards. This study was not made with the intent of judging the programs or curriculums involved in it.

To be able to make the comparison a questionnaire was developed from the content of the curriculum guide for the proposed set of minimum standards for industrial arts programs at the secondary school level. This questionnaire was sent to the head or chairman of the industrial arts department of the nine Oklahoma universities that offer teaching degrees in industrial arts.

The questionnaire was mailed to the selected universities on April 16, 1985. By May 7, 1985, eight of the nine questionnaires had been filled out and returned. By May 21, 1985 all of the questionnaires had been received. All nine had been filled in correctly and contained usable information.

After analyzing the data from the questionnaires two areas of the curriculum guide had courses that were not well covered by university courses. These clusters were the Communications cluster and the Power and Transportation cluster. The courses from these clusters that were not well covered were: Printing, Computer, Electronic Communications, and Internal Combustion Engines. Accordingly the topics from these courses were not well covered.

Conclusions

After analyzing the data from the study the following conclusions were made.

1. All of the Oklahoma universities had courses covering topics in the four cluster areas from the proposed set of minimum standards for industrial arts programs for secondary schools.

2. None of the Oklahoma universities surveyed had programs that could cover all of the topics listed in the curriculum guide.

3. By using the assumptions stated in this study, the specific Oklahoma university a future industrial arts teacher chooses to attend would play an important factor in determining how well that person would be prepared to teach the proposed industrial arts curriculum used in this study.

Recommendations

In view of the findings of this study the following recommendations are made.

1. Before potential statements about teacher preparation can be made more research on the relationship between completing university courses and teaching secondary school courses must be made.

2. Industrial Arts curriculum developers at both the university and secondary school levels must work more closely in developing curriculums at both levels to be sure that what is being taught to the future industrial arts teachers corresponds with what is expected to be taught at the secondary school level.

3. If the proposed set of minimum standards for industrial arts programs at the secondary school level, used in this study, are to be used in the public school system one of the following conditions must be met. All of the Oklahoma universities surveyed must cover all of the topics in the curriculum guide for secondary schools or the curriculum guide for secondary schools must be changed to match what is being offered by university programs. This must be done to guarantee that future industrial arts teachers are exposed to the topics that are expected to be taught at secondary school levels.

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Weiner, Donald A. "Evaluation of the Industrial Arts Teacher Education at Peru State College." (Unpub. Ed.D. dissertation, Northern Colorado State University, 1971.)

APPENDIX A

A LIST OF QUESTIONNAIRE RECIPIENTS

1. Dr. Emmet Osgood, Central State University, Edmond, Oklahoma 73034

2. Dr. Craig L. Benedict, East Central Oklahoma State University, Ada, Oklahoma 74820

3. Dr. Raymond Johnson, Langston University, Langston, Oklahoma 73050

4. Dr. Vernon Isom, Northeastern Oklahoma State University, Tahlequah, Oklahoma 74464

5. Dr. Jerry R. Brownrigg, Northwestern Oklahoma State University, Alva, Oklahoma 73717

6. Dr. Harold Polk, Oklahoma State University, Stillwater, Oklahoma 74078

7. Dr. Harold S. Kachel, Panhandle State University, Goodwell, Oklahoma 73939

8. Dr. Charles R. Hammack, Southeastern Oklahoma State University, Durant, Oklahoma 74701

9. Dr. Don Mitchell, Southwestern Oklahoma State University, Weatherford, Oklahoma 73096

APPENDIX B

LETTER OF REQUEST

Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER OKLAHOMA 74078
CLASSROOM BUILDING 406
(405) 624-6275

April 2, 1985

Dear

As you know all through history the definition of the content for industrial arts programs has been in a state of flux. In following with this many curriculums have been developed for secondary school use. Sadly enough the majority of these have experienced a short lived success. One reason for this may be a lack of preparation for teaching the courses involved in new curriculums, at the university level, of industrial arts teachers.

To be able to make a hypothesis on teacher preparation it is necessary to compare the required technical courses for Industrial Arts Education Majors from Oklahoma universities to the courses of a proposed secondary school industrial arts curriculum.

Your name and university was chosen as one of the nine Oklahoma universities that offer a degree in Industrial Arts Education. This information was gathered from the 1984-85 Industrial Teachers Education Directory.

The industrial arts curriculum guide used for the comparison purpose of this study is a proposed set of minimum standards for industrial arts programs at the secondary school level. This program was proposed by the Oklahoma State Department of Vocational Technical Education. You are most likely aware of this program due to the fact that the committee that is developing it is made up of teachers and teacher educators from all over Oklahoma.

I am collecting the information on this topic for the purpose of writing a Master Degree thesis titled, "Oklahoma Universities' Teacher Education Industrial Arts Course Requirements Compared to Proposed Minimum Standards for Industrial Arts Programs at the Secondary School Level". This study will not be used to judge the quality of Industrial

Arts Teacher Education programs nor does it profess that the proposed industrial arts curriculum guide is or is not the goal to be reached by industrial arts programs at the secondary school level. This survey is being conducted to determine which topics included in the proposed curriculum were covered by the required industrial arts courses from the above mentioned universities. In doing this a hypothesis about teacher preparation can be stated.

Due to the number of Oklahoma universities that offer a degree in Industrial Arts Education, it is of great importance to my study that I obtain the data from this questionnaire. Your cooperation in completing the questionnaire and returning it to me at your earliest convenience will be greatly appreciated. I am enclosing an addressed, stamped envelope for your use.

Thank you for your time.

Sincerely,

Duane A. Renfrow
Graduate Assistant

APPENDIX C

INSTRUMENT

QUESTIONNAIRE

This questionnaire is divided into four sections. These sections are used by the proposed industrial arts curriculum guide in describing the four main cluster areas of industrial arts. They are ; Section I: COMMUNICATIONS, Section II: POWER & TRANSPORTATION, Section III: CONSTRUCTION, and Section IV: MANUFACTURING PROCESSES. This questionnaire is designed to gather data in the form of course titles, numbers, departments, and topics from required courses for Industrial Arts Education majors.

Please fill in the following information.
Your Name: _____
Position: _____

Section I: COMMUNICATIONS

PART (A) DIRECTIONS: List the course titles, numbers, and the department under which the course is offered that your industrial arts program utilizes to teach the following Communications courses.

(1) DRAFTING
(2) PRINTING
(3) PHOTOGRAPHY
(4) COMPUTER
(5) ELECTRONIC COMMUNICATIONS

X	COURES TITLE	COURSE #	DEPT. ABV.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

(6) OTHERS: List any other required courses that cover topics in PART (B) that are not covered by the above courses.

13			
14			
15			
16			

PART (B) DIRECTIONS: The following is a list of major topics covered by the Communications cluster from the proposed industrial arts curriculum guide. In the space provided next to the topic place the number from column X in PART (A) of the course that covers the topic. Space has been provided for use if more than one course covers the topic. If the topic is not covered leave the space blank.

	Historical Development
	Lettering
	Multiview Drawing
	Dimensioning
	Pictorial Drawing
	Design Principals
	Reproduction Equipment
	Paper Binding & Finishing

	Freehand Techinical Drawing
	Printing Methods
	Photographic Equipment
	Film Developing
	Computer Software
	Electronic Communications
	Career Opportunities

(OVER)

Section II: POWER & TRANSPORTATION

PART (A) DIRECTIONS: List the course titles, numbers, and the department under which the course is offered that your industrial arts program utilizes to teach the following Power & Transportation courses.

(1) POWER & TRANSPORTATION

(2) ELECTRICITY/ ELECTRONICS

(3) INTERNAL COMB. ENGINES

X	COURSE TITLE	COURSE #	DEPT. ABV.
1			
2			
3			
4			
5			
6			
7			
8			
9			

(4) OTHERS: List any other required courses that cover topics in PART (B) that are not covered by the above courses.

10			
11			
12			

PART (B) DIRECTIONS: The following is a list of major topics covered by the Power & Transportation cluster from the proposed industrial arts curriculum guide. In the space provided next to the topic place the number from column X in PART (A) of the course that covers the topic. Space has been provided for use if more than one course covers the topic. If the topic is not covered leave the space blank.

	Safety Practices
	Shop Management
	Practical Applications of Math & Science
	Occupations
	Mans Early Use of Power
	Simple Machines
	Sourses Of Electrical Power
	Principals of Electricity
	Direct & Alternating Current
	Applications of Ohms Law
	Types and Uses of Internal Combustion Engines
	Name & Function of Engine Parts

	Ignition Systems of Small Engines
	Fuel Systems & Carburation
	Kinds of Lubrication
	Engine Lubrication
	Cooling Princ. of Small Engines
	Diesel Engine Principals
	Trouble Shooting & Tune-Up Procedures for Small Engines
	History & Principals of Jet & Rocket Engines
	Liquid & Solid Rocket Fuels
	Types of Steam Engines
	Nuclear Power
	Power Transmission

Section III: CONSTRUCTION

PART (A) DIRECTIONS: List the course titles, numbers, and the departments under which the course is offered of the required courses from your program that covers topics in Construction. No specific course titles were given in the proposed industrial arts curriculum guide. List those courses from your program that covers the topics in PART (B).

X	COURSE TITLE	COURSE #	DEPT. ABV.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

PART (B) DIRECTIONS: The following is a list of major topics covered by the Construction cluster from the proposed industrial arts curriculum guide. In the space provided next to the topic place the number from column X in PART (A) of the course that covers the topic. Space has been provided for use if more than one course covers the topic. If the topic is not covered leave the space blank.

	Design Processes
	Preparation for Building
	Site Clearing & Excavation
	Concrete Composition
	Concrete Form Construction
	Concrete Reinforcement
	Concrete Finishing
	Masonry
	Occupations
	Wood Frame Construction
	Electrical Systems
	Plumbing Systems
	Safety Practices

(OVER)

Section IV: MANUFACTURING PROCESSES

PART (A) DIRECTIONS: List the course titles, numbers, and the department under which the course is offered of the required courses from your program that covers topics in Manufacturing Processes. No specific titles were given in the proposed industrial arts curriculum guide. List those courses from your program that cover the topics in PART (B).

X	COURSE TITLE	COURSE #	DEPT. ABV.
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

PART (B) DIRECTIONS: The following is a list of the major topics covered by the Manufacturing Processes cluster from the proposed industrial arts curriculum guide. In the space provided next to the topic place the number from column X in PART (A) of the course that covers the topic. Space has been provided for use if more than one course covers the topic. If the topic is not covered leave the space blank.

	Major Processes for Changing Raw Materials Into Usable Products
	Relationships Between Manufacturing, Technology, Industry, & Society
	Design Activities
	Material Properties
	Primary & Secondary Material Processing Activities
	Safety Practices
	Activities In Tool Design & Construction
	Research & Development
	Material Specifications
	Operation Sequence
	Activities In Supervision

VITA

Duane A. Renfrow

Candidate of the Degree of

Master of Science

Thesis: OKLAHOMA UNIVERSITIES' TEACHER EDUCATION INDUSTRIAL ARTS COURSE REQUIREMENTS COMPARED WITH PROPOSED MINIMUM STANDARDS FOR INDUSTRIAL ARTS PROGRAMS AT THE SECONDARY SCHOOL LEVEL

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Education: Graduated from Pawhuska High School, Pawhuska, Oklahoma, in May, 1973; received the Bachelor of Science degree in Industrial Arts Education from Oklahoma State University in May, 1979; completed requirements for the Master of Science degree in July, 1985.

Professional Experience: Student teaching, fall semester, 1978, Pawnee High School, Pawnee, Oklahoma; industrial arts teacher, fall 1979 through spring 1982, Sharon Public Schools, Sharon, Kansas; industrial arts teacher, fall 1982 through spring 1984, Sallisaw High School, Sallisaw, Oklahoma; graduate teaching assistant, fall 1984 to present, Oklahoma State University, Stillwater, Oklahoma.

Professional Organizations: Lambda Chapter Kappa Delta Pi