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A STUDY TO IDENTIFY THE ESSENTIAL FURNITURE AND
EQUIPMENT NEEDED FOR INSTRUCTIONAL PROGRAMS
IN INDUSTRIAL ARTS IN GRADES SEVEN AND
EIGHT IN TEXAS PUBLIC SCHOOLS

THESIS

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By

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The purpose of this study was to identify the essential furniture and equipment needed for instructional programs in industrial arts in grades seven and eight in Texas public schools. The study includes a brief history of federal and state legislation affecting industrial arts and vocational education.

A checklist containing items of furniture and equipment applicable to each of the twelve approved areas of Introductory General Shop in grades seven and eight was sent to industrial arts teachers, supervisors of industrial arts in the pilot programs, and industrial arts teacher educators in Texas. Over 51 per cent of the respondents agreed that a majority of the items listed in the checklist were essential or desirable for instructional programs in industrial arts in grades seven and eight.

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CHAPTER I

INTRODUCTION

The industrial arts program in the State of Texas prior to 1973 was under the supervision of the Assistant Commissioner for Teacher Education and Instructional Services and the Division of Program Development in the Texas Education Agency. On July 14, 1973, the Commissioner of Education recommended to the State Board of Education that industrial arts be moved to the Division of Occupational Education and Technology in order to improve coordination between industrial arts and occupational education and develop a better financial base for industrial arts.¹ The State Board of Education approved the recommendations and authorized a pilot program for twenty-four school districts in industrial arts for grades seven and eight for 1973-1974.²

After industrial arts was placed for administrative purposes in the Division of Occupational Education and Technology, approval was secured to select a program director to work with the industrial arts programs. The Program Director

¹J. W. Edgar, "Proposal for Initiating Expansion of Vocational Education H. C. R. No. 77, 63rd Legislature," Austin, Texas, July 14, 1973.

²J. W. Edgar, "Progress Report on Vocational Industrial Arts Programs," Austin, Texas, October 6, 1973.

of Industrial Arts Education identified the need for developing program standards for grades seven and eight.

Purpose of the Study

The purpose of this study is to identify the essential furniture and equipment needed for instructional programs in industrial arts in grades seven and eight in the State of Texas.

More specifically, the study will seek answers to the following questions.

1. What furniture, power equipment, and hand tools are essential for woodworking?
2. What furniture, power equipment, and hand tools are essential for sheet metal?
3. What furniture, power equipment, and hand tools are essential for bench metal?
4. What furniture, power equipment, and hand tools are essential for forging?
5. What furniture, power equipment, and hand tools are essential for foundry?
6. What furniture and equipment are essential for drafting?
7. What furniture, power equipment, and hand tools are essential for power mechanics?
8. What furniture, power equipment, and hand tools are essential for electricity?

9. What furniture, power equipment, and hand tools are essential for printing?

10. What furniture and equipment are essential for photography?

11. What furniture, power equipment, and hand tools are essential for ceramics?

12. What furniture, power equipment, and hand tools are essential for jewelry?

13. What furniture and hand tools are essential for leather?

14. What equipment is essential for textiles?

15. What furniture, power equipment, and hand tools are essential for plastics?

It is believed this study will provide current information that will be useful in developing standards with respect to furniture, power equipment, and hand tools for each of the approved units in grades seven and eight.

Definition of Terms

1. "Industrial arts" as used in this study is defined as follows:

. . . those education programs which pertain to the body of related subject matter, or related courses, organized for the development of understanding about technical, consumer, occupational, recreational, organizational, managerial, social, historical, and cultural aspects of industry and technology including activities such as experimenting, designing, constructing, evaluating, and using tools, machines, materials, and processes which provide opportunities for creativity and problem solving and assisting

individuals in the making of informed and meaningful occupational choices.³

2. Furniture, tools, and equipment are interpreted to mean work surfaces, hand operated tools and power equipment used in industrial arts instructional programs.

3. "OSHA" refers to Public Law 91-596 known as the Williams-Steiger "Occupational Safety Health Act of 1970" which became effective April 28, 1971.⁴

Method of Procedure and Source of Data

A checklist was developed listing items of furniture, power equipment, and hand tools applicable to each of the twelve approved subject areas in Introductory General Shop for grades seven and eight. Items chosen for the checklist were taken from a tentative list prepared by personnel in the Texas Education Agency,⁵ recommendations from members of the staff in the Industrial Arts Department, North Texas State University, and from the catalogue of a major supplier of industrial arts equipment. The checklist was also designed to gather information concerning the respondent's professional preparation and teaching experience.

³U. S. Government Printing Office, Federal Register, Vol. 38, No. 244, Washington, D. C., Wednesday, November 21, 1973, p. 32243.

⁴U. S. Government Printing Office, Federal Register, Vol. 36, No. 105, Washington, D. C., Saturday, May 29, 1971.

⁵Letter from Neil Ballard, Program Director of Industrial Arts Education, Texas Education Agency, July 3, 1974.

The checklist was then sent to personnel in the Texas Education Agency for suggestions and approval. The suggestions from the personnel in the Texas Education Agency were incorporated into the checklist. On January 6, 1975, the Program Director for Industrial Arts Education in the Texas Education Agency mailed a letter of explanation (Appendix A), a checklist (Appendix B), and a self-addressed stamped envelope to twenty-five classroom industrial arts teachers and twenty-four supervisors of pilot programs in industrial arts. The checklist was also sent to twenty-one industrial arts teacher educators.

By January 28, 1975, eighteen classroom teachers, seventeen supervisors, and fourteen teacher educators had responded. A total of forty-nine, or 70 per cent, of the checklists were returned to the Texas Education Agency. The checklists were then used for tabulation and analysis.

Limitations of the Study

The study was limited in that persons chosen to receive the checklist were selected by personnel in the Texas Education Agency. Forty-nine usable checklists, or 70 per cent, were returned and contained the data presented in the study.

Organization of the Study

The study is organized as follows: Chapter I contains an introduction, purpose of the study, definition of terms,

methods of procedure and source of data, limitations of the study, and recent and related studies.

Chapter II contains information concerning legislation that placed industrial arts within the framework of vocational education for funding and administrative purposes. Chapter III presents and analyzes the data secured from checklists and identifies the furniture, power equipment, and hand tools believed essential for instructional programs. The summary, findings, conclusions, and recommendations based upon this study are presented in Chapter IV.

Recent and Related Studies

There have been several studies concerning the adequacy and design of physical facilities for industrial arts programs. Those having some elements of relationship to this study are listed and acknowledged.

In 1972, Ben W. Teague completed a study entitled "A Study of the Physical Facilities of Industrial Arts Metalworking Laboratories in the State of Texas."⁶ The purposes of this study were to: (1) determine whether the housing for industrial arts metalworking laboratories was adequate; (2) determine whether the enrollment of the school showed any correlation with the availability of a metalworking

⁶Ben W. Teague, "A Study of the Physical Facilities of Industrial Arts Metalworking Laboratories in the State of Texas," unpublished master's thesis, Department of Industrial Arts, North Texas State University, Denton, Texas, 1972.

facility; and (3) determine to what extent the physical facility for metalworking laboratories met current standards.

Data compiled from questionnaires in Teague's study concluded that the essential items for operation were present in most schools. However, there appeared a need for improvement in some of the laboratories.

Steve Mabry's study, in 1970, entitled "A Study of Industrial Arts Woodworking Housing and Facilities in Texas,"⁷ sought to evaluate the physical facilities and the availability of equipment in the woodworking laboratories in junior and senior high schools in Texas. Mabry concluded that the absence of a state adopted set of recommendations or standards was a factor affecting the lack of uniformity and deficiency of equipment in the laboratories studied.

The most comprehensive study of standards for industrial arts facilities was done in 1968 by Bernice Campbell.⁸ The purposes of this study were to analyze courses to identify learning activities, secure current literature for standards, and to compile a set of standards. The results

⁷Steve Mabry, "A Study of Industrial Arts Woodworking Housing and Equipment Facilities in Texas," unpublished master's thesis, Department of Industrial Arts, North Texas State University, Denton, Texas, 1970.

⁸Bernice Campbell, "A Study to Develop Standards for Use in Planning or Renovation of Industrial Arts Laboratories in Public Schools," unpublished master's thesis, Department of Industrial Arts, North Texas State University, Denton, Texas, 1968.

of Campbell's study contributed to the publication by the Texas Education Agency entitled A Guide for Planning Industrial Arts Facilities, Bulletin 701, 1970.⁹

A study by James Latham, in 1961, entitled "A Study to Determine What Constitutes Adequate or Desired Facilities for Industrial Arts Laboratories in Public Schools,"¹⁰ is closely related to the study of Bernice Campbell. Using information gathered from professional literature, industrial arts teachers, and recognized leaders in the area of industrial arts, Latham presented a set of recommended standards for industrial arts building facilities.

Two professional publications, School Shop and Journal of the Texas Industrial Arts Association, were reviewed. They contain several articles by individuals suggesting methods, procedures, and criteria for developing programs, designing laboratories, and evaluating and purchasing furniture, power equipment, and hand tools. The articles published in School Shop pertaining to planning and equipping laboratories were assembled and presented in Modern School Shop Planning.¹¹

⁹Texas Education Agency, A Guide for Planning Industrial Arts Facilities, Bulletin 701 (Austin, 1970).

¹⁰James Latham, "A Study to Determine What Constitutes Adequate or Desirable Physical Facilities for Industrial Arts Laboratories in Public Schools," unpublished master's thesis, Department of Industrial Arts, North Texas State University, Denton, Texas, 1961.

¹¹Lawrence W. Prakken, editor, Modern School Shop Planning (Ann Arbor, 1974).

Another source of information concerning industrial arts laboratory planning is a book by Robert D. Brown, Industrial Arts Laboratory Planning and Administration.¹² It is a book of ideas, information, and suggestions for industrial arts teachers. This publication covers all major phases of planning and design of the physical facility; however, it does not attempt to include recommendations for furniture and equipment.

¹²Robert D. Brown, Industrial Arts Laboratory Planning and Administration (Milwaukee, 1969).

CHAPTER II

FEDERAL AND STATE LEGISLATION

AFFECTING INDUSTRIAL ARTS

The impetus for federal funding of industrial arts programs in the United States began during the administration of President John F. Kennedy. In his first Message to Congress pertaining to education, President Kennedy asked the Secretary of Health, Education, and Welfare

. . . to convene an advisory body drawn from the educational profession, labor, industry, and agriculture, as well as the lay public, together with representatives from the Departments of Agriculture and Labor, to be charged with responsibility of reviewing and evaluating the current National Vocational Acts, and making recommendations for improving and redirecting the programs.¹

The President's Panel of Consultants on Vocational Education worked for two years in developing recommendations that would greatly improve federal funding for vocational programs previously administered under the Smith-Hughes Act of 1917, which had been in continuous force for forty-six years. On December 18, 1963, President Lyndon B. Johnson signed the Perkins Vocational Education Bill which became known as the Vocational Education Act of 1963. This act made more federal

¹Elaine Exton, "Study of the President's Panel on Vocational Education," Industrial Arts and Vocational Education, LII (February, 1963), 12-13.

funds available to assist state vocational education programs based on population groups and a per capita income factor. The Vocational Education Act of 1963 was to be a major instrument in the attack on the obstacles of economic growth and productivity.²

During the next three years, problems developed in the administration of the Vocational Education Act of 1963. Under provisions of the act, President Johnson appointed an advisory panel for the "purpose of reviewing the administration of the vocational education programs. The panel shall make recommendations with respect to the status of vocational education programs."³ The Advisory Council on Vocational Education made several recommendations. The five major ones were: (1) all federal vocational acts under the Office of Education be incorporated into one act; (2) more control of funds by the Commissioner of Education; (3) increased funds and emphasis on post secondary schools; (4) more sharply drawn and defined guidelines; and (5) emphasis on exemplary programs for career information.⁴

On October 16, 1968, President Johnson signed the Vocational Education Amendments Act of 1968. Congress was

²Elaine Exton, "The New Vocational Law," Industrial Arts and Vocational Education, LIII (April, 1964), 22-23.

³"Coast to Coast," (no author given), Industrial Arts and Vocational Education, LVI (February, 1967), 87.

⁴John L. Feirer, "Vocational Education--The Bridge Between Man and His Work," Industrial Arts and Vocational Education, LVII (June, 1968), 20-25.

beginning to broaden its concept of vocational education and make occupational literacy a significant goal of the new program. It was also during 1968 that Congress funded for the first time a program of research in industrial arts. Under provisions of the National Education Defense Act of 1968, funds were allocated for research in industrial arts at the post secondary level.⁵ Major federal funding through vocational education programs still did not include industrial arts programs, but emphasis on providing occupational information was another step away from the traditional vocational programs.

In 1969 the American Industrial Arts Association redefined the "Purposes of Industrial Arts Education" in keeping with the new thrust of career information. Two of the four "Purposes of Industrial Arts Education" were to "develop in each student an insight and understanding of industry and its place in society," and to "discover and develop student talent in industrial-technical fields."⁶ At the same time, Vice-President Spiro T. Agnew publicly criticized this nation's emphasis on higher education as the key to success and called for the restoration of manual arts "to their

⁵M. D. Mobley, "Washington Report," Industrial Arts and Vocational Education, LVI (January, 1967), 1.

⁶American Council of Industrial Arts Supervisors, Industrial Arts Education (Washington, 1969), p. 4.

rightful place of esteem."⁷ In a White House Message to Congress, President Richard M. Nixon demanded educational reform before new major expenditures were undertaken, and called for a "searching examination" of the entire approach to learning.⁸

The emphasis on career literacy or career information as proposed by the Amended Vocational Education Act of 1968 became more well defined under the direction of the new Commissioner of Education in 1970. Commissioner Sidney P. Marland developed the term "career education." In developing the role or purpose of career education, he stated as follows:

Career education provides for a broad approach to preparation for citizenship; provides for job information and skill development; and also helps individuals develop attitudes about personal, psychological, social, and economic significance of work in our industry. It develops and fosters vocational and recreational interests of individuals to help prepare for a well rounded living in a world in which leisure time is increasing and greater opportunity for a self-expression through creative production is available.⁹

To define the role of industrial arts in career education, the Ad Hoc Committee on Criteria and Guidelines for Funding Industrial Arts was established in 1971.¹⁰

⁷Walter Arnold, "Washington Report," Industrial Arts and Vocational Education, LIX (February, 1970), 9.

⁸Congressional Record, 91st Congress, 2nd Session, Vol. 116 (Washington, D. C.), p. 5603.

⁹Lawrence W. Prakken, "School Shop Talk," School Shop, XXI (January, 1972), 2.

¹⁰Ralph W. Steeb, "Let's Put It All Together--NOW," School Shop, XXXII (February, 1973), 36.

Following the Ad Hoc Committee's recommendations, on June 3, 1972, President Nixon signed the Educational Amendment Act of 1972, Public Law 92-318, which provided industrial arts with an opportunity for direct federal funding. The Vocational Education Act of 1963 was amended through the aforementioned act to include industrial arts in the definition of vocational education.¹¹

The role and scope of industrial arts as part of vocational education was interpreted and published in the Federal Register as follows:

Industrial arts education programs means those education programs which pertain to the body of related subject matter, or related courses, organized for the development of understanding about the technical, consumer, occupational, recreational, organizational, managerial, social, historical, and cultural aspects of industry and technology including learning experiences involving activities such as experimenting, designing, constructing, evaluating, and using tools, machines, and processes which provide opportunities for creativity and problem solving and assisting individuals in the making of informed and meaningful occupational choices; (2) which the Commissioner has determined, pursuant to § 102,4(b) (5), will accomplish or facilitate one or more of the purposes of the first sentence of section 108(1) of the Act.

.....
 (5) Industrial arts education instructional programs with objectives specified in subparagraph (1) of this paragraph shall be designed to:

(i) Assist individuals in the making of informed and meaningful occupational choices. In order to accomplish or facilitate this purpose, such programs shall:

(a) Provide occupational information and instruction pertaining to a broad range of occupations,

¹¹Ibid., p. 36.

including training requisities, working conditions, salaries or wages, and other relevant information;

(b) Provide exploratory experiences in shops, laboratories, and observations in business or industry to acquaint students with jobs in the occupations included in this purpose;

(c) Provide guidance and counseling for students enrolled in the industrial arts programs under § 102.4 (b) (5) of this part to assist them in making informed and meaningful choices in selected occupational fields; and

(d) Employ industrial arts teachers who have qualifications as provided in the State plan pursuant to § 102.38; or

(ii) Prepare individuals for enrollment in advanced or highly skilled vocational or technical education programs. In order to accomplish or facilitate this program, such programs shall:

(a) Provide individuals with occupational information and exploratory experience for enrollment in such programs;

(b) Provide occupational information and exploratory experiences directly related to current practices in industry, and

(c) Be conducted in an institution approved by the State Board of Vocational Education and by industrial arts teachers and guidance and counseling personnel who have qualifications as provided in the State plan pursuant to § 102.38.

.....
 (j) Industrial arts youth organizations. Industrial arts education programs may provide for students to participate in club activities as an integral part of the instruction which are offered as indicated by § 102.4 and which are supervised by industrial arts personnel.¹²

The federal guidelines required that each state plan for vocational education be modified to include industrial arts and set forth programs, services, and activities to be conducted and funded by the states under provision of the act.¹³

¹²U. S. Government Printing Office, Federal Register, Vol. 38, No. 244, Washington, D. C., Wednesday, November 21, 1973, p. 32243.

¹³Steeb, op. cit., p. 36.

The guidelines required that persons assigned responsibilities for industrial arts be "included in the Vocational Education Staff Directory."¹⁴

During the 63rd Session of the Texas Legislature, House Current Resolution No. 77 pertaining to vocational education and industrial arts was introduced. The resolution was as follows:

Requests the State Board of Education, under authority of Section 16.14, Texas Education Code, to expand vocational education programs in the public schools so that career awareness, exploration, and occupational skill development are made available to all students in grades 7-12. The Board is specifically requested to develop a plan to introduce these programs beginning with grades seven and eight and continuing gradual introduction until all high school grades have been included.¹⁵

House Current Resolution No. 77 was approved by the 63rd Legislature and signed by Governor Dolph Brisco on May 2, 1973.¹⁶

Pursuant to H. C. R. No. 77, J. W. Edgar, Commissioner of Education, made the following recommendations to the State Board of Education:

1. Accept the responsibility of implementing the request of the Legislature and the Governor.
2. Instruct the commissioner of education, working in cooperation with the Board committee on vocational

¹⁴Orieanna C. Syphax, "Memorandum to State Directors of Vocational Education," Department of Health, Education, Welfare, Washington, D. C., January 17, 1974.

¹⁵House Journal, 63rd Legislature, Regular Session, Austin, Texas, 64th Day, Wednesday, May 2, 1974, p. 2839.

¹⁶Ibid., p. 2839.

education, to propose to the Board on or before March 1, 1974, an overall plan for making vocational education available to all students in grades 7-12 on a gradual basis, including projected cost estimates for a five-year period.

3. Declare that the action to be taken for expanding vocational education will include the existing non-vocational occupational programs of industrial arts, business education, and aerospace/aviation in the State Plan for Vocational Education in a manner which will strengthen their vocational, career awareness, and exploration objectives and at the same time will preserve their present uniqueness of purpose, content, and organization. Provide that these programs shall not supplant established vocational programs which have employment skills as their objectives.

4. Approve the gradual introduction of industrial arts as an approved vocational education program.

a. Under Code Section 16.14 authorize the inclusion of seventh and eighth grade industrial arts courses in crafts, drafting, electricity-electronics, general shop, industrial materials and processes, metalworking, and woodworking as constituting the course structure of an approved vocational education program for 1973-74 and 1974-75 Foundation School Program eligibility; provided that the 1973-74 program shall be on an approved project basis in selected school districts for the purpose of assisting the agency in developing basic vocational standards for seventh and eighth grade industrial arts.

b. Authorize an amendment to the State Plan for Vocational Education to be submitted through appropriate channels to the Board for approval which will include industrial arts in the plan in accordance with the provisions of Public Law 92-313 and the regulations of the United States commissioner of education.

c. Approve the sponsorship by the agency of the industrial arts youth clubs of Texas in the same manner that the agency sponsors the youth clubs of other approved vocational education programs.

d. Authorize the commissioner, through the appropriate commissioner and director of public school occupational programs, to develop during 1973-74 basic vocational standards for seventh and eighth industrial arts in order that these standards, when approved by the Board, shall be used by the agency as a basis for approval of programs beginning with the 1974-75 school year, provided that the standards shall be developed jointly with representatives of the 1973-74 project school districts and with the advice and counsel of the agency industrial arts advisory commission.

e. Authorize allocation by the agency of vocational units under the Foundation School Program for seventh and eighth grade industrial arts on a full or fractional basis to school districts making application for them, provided the units are filled by appropriately certified personnel (no emergency permits).

For the school year of 1973-74, the allocation shall be made on an approved project basis to selected school districts whose officials agree to work with the agency in the development of vocational standards. For 1973-74 the total allocation shall not exceed 200 teacher units and 10 supervisory units (project directors). Beginning in 1974-75 the allocation shall be available on a discretionary basis to all school districts which meet agency standards.

Provide that no federal funds shall be budgeted for industrial arts until the State Plan for Vocational Education has been amended and standards have been approved.

The 1973-74 cost to the Foundation School Program is estimated as \$1,999,200. The cost to the Program for 1974-75 is estimated at \$6,877,200. This estimate is based on 700 teacher units supplemented by statutory allowances of \$660 per unit for maintenance and operation, \$400 per unit for instructional materials, and 25 local supervisory units.

f. Authorize an agency administrative unit for industrial arts education under the immediate supervision of the director of the division of public school occupational programs. Authorize an initial staff of one program director (grade 19), one consultant (grade 17) for coordinating youth clubs, one general consultant (grade 17) transferred from cost center 32-0, one secretary (grade 5), and one stenographer (grade 4). The cost to the agency operating budget for 1973-74 is estimated to be \$80,940.

5. Authorize the commissioner to develop and incorporate policies and administrative procedures in accordance with the above actions.¹⁷

The recommendations of the Commissioner of Education were approved by the State Board of Education.

¹⁷J. W. Edgar, "Proposal for Initiating Expansion of Vocational Education, H. C. R. No. 77, 63rd Legislature," Texas Education Agency, July 14, 1973.

On November 5, 1973, the Associate Commissioner for Occupational Education and Technology advised public school officials concerning industrial arts as follows:

The definition of Vocational Education has been broadened by Federal legislation to include industrial arts when such programs are designed to provide students with information and experiences that will enable them to make meaningful occupational choices in industry and technology.

Approval has been granted by the State Board of Education to establish an administrative unit in the Department of Occupational Education and Technology. . . . The new vocational program area is now established on the fourth floor of the Texas Education Agency with professional staff consisting of a director and two consultants. . . .

Dr. Edgar secured approval from the State Board of Education to establish pilot programs in selected school systems for seventh and eighth grade students to provide for the orderly development of program standards and redirection of the curriculum as needed to strengthen the vocational and career awareness objectives desired. These pilot programs are being funded as vocational units; therefore, they will operate under the leadership of the local vocational administrators who can furnish the leadership needed for them to operate as vocational units.

These pilot programs allocated for the 1973-74 school year will permit us to establish organization patterns and program standards and to identify curriculum changes needed to write the operational guidelines for reallocation of these units and allocation of additional units.

.
As soon as operational guidelines can be developed and funds are provided, there will be a gradual expansion of these programs, followed by the ninth grade until all existing industrial arts programs can be converted to vocational units--that is, programs which provide information and experiences to enable students to make occupational choices in industry.¹⁸

In an article appearing in the Journal of the Texas Industrial Arts Association, the purpose of the pilot program was

¹⁸Letter from John R. Guemple, Texas Education Agency, November 5, 1973.

. . . to develop seventh and eighth grade program standards for industrial arts on which program approval will be based for 1974-75. Program standards include such areas as certification requirements, curriculum standards, and facility standards. After the pilot program is completed and the new standards for program approval are in effect during 1974-75, the districts are in line for improved financial support from the State.¹⁹

Twenty-four school districts were selected by personnel within the Texas Education Agency and pilot programs were initiated during the 1973-1974 school year.²⁰

¹⁹Texas Industrial Arts Association, "Industrial Arts and Occupational Education and Technology," Journal of the Texas Industrial Arts Association, XVIII (October, 1973), 18.

²⁰J. W. Edgar, "Progress Report on Vocational Industrial Arts Programs," Texas Education Agency, October 6, 1973.

CHAPTER III

DATA CONCERNING EQUIPMENT FOR INSTRUCTIONAL PROGRAMS IN INDUSTRIAL ARTS GRADES SEVEN AND EIGHT

The purpose of this chapter is to present and interpret the data collected by checklists returned by eighteen classroom industrial arts teachers, seventeen supervisors of industrial arts in the pilot programs, and fourteen industrial arts teacher educators.

Table I presents data concerning the classroom teaching experience of the industrial arts teachers, the supervisors of the pilot programs, and the teacher educators. The teaching experience ranged from one year to thirty-five years. The average number of years of teaching experience of the classroom teachers was 8.33; for the supervisors in the pilot programs the average was 10 years; and, the teacher educators had an average of 20 years. Eleven of the eighteen industrial arts classroom teachers had less than 10 years of teaching experience. Of the supervisors in the pilot programs, ten of the seventeen had less than 10 years. Only two of the industrial arts teacher educators had less than 10 years of teaching experience.

TABLE I
TEACHING EXPERIENCE OF INDUSTRIAL ARTS
TEACHERS, SUPERVISORS, AND EDUCATORS

Number of Years Experience	Teachers	Supervisors	Educators
1	1	. .	. .
2	1	. .	. .
3	1	. .	. .
4	3	1	. .
5	1	. .	. .
6	2	2	1
7	1	2	1
8	. .	4	. .
9	1	1	. .
10	. .	3	. .
11	. .	1	2
12	1	. .	. .
13	2	. .	1
14	. .	. .	1
15	2	. .	1
16	. .	. .	. .
17	. .	. .	. .
18	. .	1	. .
19	1	. .	. .
20	. .	2	2
21-25	1	. .	1
26-30	. .	. .	1
31-35	. .	. .	3
Total	18	17	14

Data concerning the experience in supervision of the eighteen supervisors of industrial arts in the pilot programs are shown in Table II. The amount of experience in supervision of the supervisors ranged from one to eleven years with an average of 3.65.

TABLE II
EXPERIENCE IN SUPERVISION OF SUPERVISORS

<u>Number of Years</u> <u>Experience</u>	<u>Supervisors</u>
1	5
2	3
3	2
4	2
5	2
6	1
7	0
8	0
9	0
10	1
11	1

Table III presents data showing the educational preparation of the eighteen classroom industrial arts teachers, the seventeen supervisors of industrial arts in the pilot programs, and the fourteen industrial arts teacher educators. All of the forty-nine respondents held the bachelor's degree.

TABLE III
EDUCATIONAL PREPARATION OF INDUSTRIAL ARTS
TEACHERS, SUPERVISORS, AND EDUCATORS

Respondents	Bachelor's	Master's	Additional Preparation
Teachers	18	6	. . .
Supervisors	17	15	1
Educators	14	14	9

Thirty-five of the forty-nine, or 71.4 per cent, had completed the master's degree, and ten, or 20.4 per cent, had educational preparation beyond the master's degree. Of the teachers, six of the eighteen, or 33.3 per cent, held master's degrees and none had acquired additional educational preparation. Fifteen of the seventeen supervisors, or 88.2 per cent, had completed the master's degree. One supervisor, or 5.8 per cent, had preparation beyond the master's degree. All of the teacher educators had completed the master's degree with nine of the fourteen, or 64.2 per cent, having educational preparation in addition to the master's degree.

The areas of teaching preparation in industrial arts of the eighteen classroom industrial arts teachers, the seventeen supervisors of industrial arts in the pilot programs, and the fourteen industrial arts teacher educators are presented in the data of Table IV. Over 50 per cent of the classroom teachers and supervisors have preparation for teaching in the areas of metal, drawing, power mechanics, leather, wood, and electricity. In the areas of wood, metal, drawing, leather, and jewelry, over 50 per cent of the teacher educators have teaching preparation. None of the teachers and teacher educators had preparation for teaching textiles. Only one, or 2 per cent, of the supervisors had textile teaching experience. Construction had six of forty-nine, or 12 per cent, and manufacturing had three of forty-nine, or 6 per

cent, respondents with teaching experience. These were the two lowest areas other than textiles.

TABLE IV
AREAS OF TEACHING PREPARATION IN INDUSTRIAL ARTS

Area	Eighteen Classroom Teachers	Seventeen Supervisors	Fourteen Teacher Educators
Wood	17	17	12
Metal	16	17	10
Drawing	15	17	13
Power	13	10	2
Leather	13	13	8
Jewelry	6	7	8
Electricity	14	12	5
Plastics	5	5	4
Photography	7	6	5
Printing	6	6	2
Textiles	. .	1	. . .
Ceramics	3	8	2
Construction	4	1	1
Manufacturing	1	1	1
Other	2	2	6

In Table V data are presented concerning the areas in which the eighteen industrial arts teachers, the seventeen

supervisors of industrial arts in the pilot programs, and the fourteen industrial arts teacher educators are now teaching or have taught.

TABLE V
AREAS PREVIOUSLY AND CURRENTLY TAUGHT BY THE
RESPONDENTS IN INDUSTRIAL ARTS

Area	Eighteen Classroom Teachers	Seventeen Supervisors	Fourteen Teacher Educators
Wood	13	16	11
Metal	10	13	7
Drawing	13	16	10
Power	3	1	1
Leather	7	7	6
Jewelry	3	4	3
Electricity	10	7	3
Plastics	2	3	4
Photography	4	. .	1
Printing	2	. .	1
Textiles	. .	. .	. .
Ceramics	1	2	2
Construction	4	. .	1
Manufacturing	1	. .	2
Other	1	2	4

A majority of the classroom teachers, the supervisors, and the teacher educators have taught or are now teaching in the areas of wood, metal, and drawing. None of the respondents had taught or are currently teaching in the area of textiles.

Data concerning equipment needed for woodworking in grades seven and eight are presented in Table VI. Fifteen of the industrial arts teachers, seventeen of the supervisors of industrial arts in the pilot programs, and twelve of the industrial arts teacher educators rated fifty-seven items as either essential, desirable, or not needed. A majority, or 51 per cent, of the respondents rated forty-eight of the fifty-seven items, or 84.2 per cent, as essential. Those items were: shop benches with vises, drill press, electric hand drill, tool grinder, jointer, band saw, tilting arbor saw, orbital sander, saber saw, combination sander, sixteen ounce and thirteen ounce nail hammers, ratchet brace, hand chisels, ten inch rasps, ten inch files, scratch awls, nail set, screwdrivers, rip saw, crosscut saw, back saw, try square, framing square, bench rule, jack plane, smooth plane, block plane, coping saw, file card, sharpening stone, bar clamp, C clamp, dividers, bench dusters, countersink, sliding T bevel, combination square, mitre box saw, belt sander, wood lathe, planer, rubber mallets, expansion bit, marking gauge, hand drill, doweling jig, and wood scrapers. The panel saw was considered not necessary by a majority of the respondents.

TABLE VI

DATA CONCERNING EQUIPMENT NEEDED FOR WOODWORKING
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (15)			Super- visors (17)			Teacher Educator (12)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Shop benches with vises	15	..	..	17	..	..	11	1	..	43	1	..
Drill press	12	3	..	15	2	..	8	3	..	35	8	..
Electric hand drill	12	3	..	14	1	2	8	4	..	34	8	2
Tool grinder	9	6	..	16	1	..	6	6	..	31	13	..
Jointer	11	4	..	15	2	..	5	7	..	31	13	..
Band saw	12	3	..	15	2	..	10	2	..	37	7	..
Tilting arbor saw	13	2	..	15	2	..	9	2	1	37	5	1
Radial arm saw	7	4	4	4	9	3	2	6	4	13	19	11
Panel saw	1	8	5	1	4	10	..	5	7	2	17	22
Mitre box saw	8	6	1	13	4	..	6	6	..	27	16	1
Belt sander	8	6	1	13	3	1	4	7	1	25	16	3
Orbital sander	9	4	2	13	3	1	8	3	1	30	10	4
Combination sander	8	6	1	15	1	1	8	3	1	31	10	3
Saber saw	10	4	1	13	4	..	8	4	..	31	12	1
Router	7	7	1	9	8	..	5	5	2	21	20	3
Wood lathe	11	3	1	10	6	1	5	7	..	26	16	2

TABLE VI--Continued

Equipment	Teachers (15)			Super- visors (17)			Teacher Educator (12)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Planer	10	5	..	6	7	4	7	2	3	23	14	7
Rubber mallet	8	5	1	11	3	2	8	4	..	27	12	3
Nail hammer: 16 oz.	9	3	2	14	2	1	7	4	1	30	9	4
Nail hammer: 13 oz.	10	4	..	16	..	..	9	2	..	35	6	..
Ratchet brace	11	3	..	16	1	..	10	2	..	37	6	..
Expansion bit	7	6	1	13	4	..	5	7	..	25	17	1
Hand chisels	14	..	..	17	..	..	11	1	..	42	1	..
Marking gauge	8	4	2	12	3	2	8	4	..	28	11	4
Rasp: 10"	10	3	1	16	1	..	7	5	..	33	9	1
File: 10"	12	2	..	16	1	..	9	3	..	37	6	..
Scratch awl	8	5	1	14	1	1	6	6	..	28	12	2
Nail set	14	..	..	14	3	..	7	5	..	35	8	..
Screwdrivers	14	..	..	17	..	..	12	..	..	42	1	..
Rip saw	12	1	1	16	..	1	12	..	..	40	1	2
Crosscut saw	13	1	..	17	..	..	12	..	..	42	1	..
Back saw	12	2	..	17	..	..	11	1	..	39	3	..
Try square	14	..	..	17	..	..	11	1	..	42	1	..

TABLE VI--Continued

Equipment	Teachers (15)			Super- visors (17)			Teacher Educator (12)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Framing square	13	1	..	14	2	1	10	2	..	37	5	1
Bench rule	13	1	..	16	1	..	10	2	..	39	4	..
Jack plane	7	7	..	17	..	..	8	4	..	32	11	..
Smooth plane	9	4	1	15	2	..	9	3	..	33	9	1
Block plane	7	6	1	15	2	..	8	4	..	30	12	1
Spoke shave	3	6	5	4	7	6	..	6	6	7	19	17
Coping saw	10	2	2	10	6	1	10	2	..	30	10	3
Hand drill	6	6	2	10	5	2	12	..	..	28	11	4
File card	11	3	..	13	3	1	10	2	..	34	8	1
Sharpening stone	12	1	..	16	1	..	11	1	..	39	3	..
Bar clamp	13	..	1	16	1	..	10	2	..	39	1	1
C clamp	12	2	..	16	1	..	9	3	..	36	6	..
Dividers	10	2	2	15	2	..	11	1	..	36	5	2
Bench duster	13	1	..	16	1	..	10	2	..	39	4	..
Countersink	12	2	..	13	4	..	10	2	..	35	8	..
Screw-mates	8	6	..	6	9	2	3	8	1	17	23	3
Sliding T bevel	9	4	1	11	4	1	8	4	..	28	12	2
Combination square	11	3	..	16	1	..	8	4	..	35	8	..

TABLE VI--Continued

Equipment	Teachers (15)			Super- visors (17)			Teacher Educator (12)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Carpenter's nippers	5	9	..	9	5	2	3	7	2	17	21	4
Bit gauge	6	7	1	7	7	2	2	10	..	15	24	3
Doweling jig	8	4	2	10	4	2	4	8	..	22	16	4
Level	4	8	2	9	5	3	4	8	..	17	23	5
Nail bar	5	9	..	8	8	1	2	8	2	15	26	3
Wood scrapers	6	8	..	13	2	2	8	4	..	27	14	2

A majority of the thirteen industrial arts teachers, the fourteen supervisors of industrial arts in the pilot programs, and the three industrial arts teacher educators considered fifteen of the seventeen items, or 88.2 per cent, listed in Table VII to be essential in teaching electricity. A majority of the respondents indicated commercial teaching aids were desirable. There was no majority opinion about the oscilloscope. The variable power supply, wire stripper, and oscilloscope were the only items considered as not needed by any of the respondents. There was not unanimous agreement on any single item listed.

TABLE VII

DATA CONCERNING EQUIPMENT NEEDED FOR ELECTRICITY
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (13)			Super- visors (14)			Teacher Educator (3)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Work surface	12	1	..	14	..	..	3	..	..	29	1	..
Commercial instr. syst.	8	5	..	8	6	..	3	..	..	19	11	..
Instructor designed syst.	9	4	..	7	7	..	3	..	..	19	11	..
Commercial teaching aids	4	9	..	6	8	..	3	..	..	13	17	..
Volt meter	13	..	..	12	2	..	3	..	..	28	2	..
Ohm meter	13	..	..	13	3	..	3	..	..	29	1	..
Milliamp meter	12	1	..	9	5	..	3	..	..	24	6	..
Power supply	11	..	1	12	2	..	3	..	..	26	3	1
Oscilloscope	6	5	1	5	6	1	1	2	..	12	13	3
Soldering gun	13	..	..	12	2	..	3	..	..	28	2	..
Screwdrivers	13	..	..	12	2	..	3	..	..	28	2	..
Nut driver set	9	4	..	12	2	..	3	..	..	24	6	..
Seizer	10	2	..	8	6	..	3	..	..	21	8	..
Heat sink tool	8	4	..	8	5	..	3	..	..	19	9	..
Needlenose pliers	13	..	..	12	2	..	3	..	..	28	2	..
Wire stripper	12	1	..	9	4	1	3	..	..	24	5	1
Wire cutter	13	..	..	11	2	..	3	..	..	27	2	..

Table VIII contains data concerning equipment needed for sheet metal as indicated by fifteen industrial arts teachers, sixteen supervisors of industrial arts in the pilot programs, and ten industrial arts teacher educators. All of the thirty-two items listed except the cornice brake were deemed essential by a majority, or 51 per cent, of the respondents. It was considered desirable by twenty, or 48.8 per cent, of the respondents.

Table IX contains data concerning equipment needed for teaching industrial plastics. A majority, or 51 per cent, of five industrial arts teachers, ten supervisors of industrial arts in the pilot programs, and five industrial arts teacher educators considered all fifteen of the items listed as essential.

On pages thirty-seven and thirty-eight, Table X contains data concerning equipment needed for foundry. A majority, or 51 per cent, of the fourteen industrial arts teachers, the thirteen supervisors of industrial arts in the pilot programs, and the eight industrial arts teacher educators considered all of the twenty-seven items listed to be essential. The riddle and face shields were unanimously considered to be essential by the respondents. The band saw, combination sander, drill press, crucible lifter and pourer, and shrink rule were considered to be unnecessary by at least two of the respondents.

TABLE VIII

DATA CONCERNING EQUIPMENT NEEDED FOR SHEET METAL
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (15)			Super- visors (16)			Teacher Educator (10)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed*
Bench with stake plate	12	3	..	13	2	1	8	1	1	33	6	2
Brake: box and pan	13	2	..	15	1	..	7	3	..	35	6	..
Brake: cornice	9	5	1	7	8	1	4	5	1	20	18	3
Bar folder	9	4	2	12	3	1	9	1	..	30	8	3
Shear	14	1	..	15	1	..	8	2	..	37	4	..
Combination machine	9	6	..	8	7	1	6	3	1	23	16	2
Slip roll former	13	1	1	14	2	..	7	3	..	34	6	1
Stake	11	3	1	13	3	..	6	4	..	30	10	1
Soldering coppers	9	5	1	12	3	1	8	1	1	29	9	3
Soldering furnace	10	4	1	12	3	1	8	2	..	30	9	2
Spot welder	12	3	..	8	6	2	2	7	1	22	16	3
Drill press	14	1	..	15	1	..	8	1	1	37	3	1
Grinder	14	1	..	14	1	..	8	1	1	36	3	1
Electric hand drill	13	2	..	15	1	..	9	1	..	37	4	..
Combination snips	15	..	..	16	..	..	10	..	..	41	..	..
Aviation snips	13	2	..	16	..	..	10	..	..	39	2	..

TABLE VIII--Continued

Equipment	Teachers (15)			Super- visors (16)			Teacher Educator (10)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Pliers	15	..	..	16	..	..	10	..	..	41	..	..
Scribe	14	1	..	15	1	..	10	..	..	39	2	..
Combination square	15	..	..	15	1	..	10	..	..	40	1	..
Dividers	15	..	..	15	1	..	10	..	..	40	1	..
Hammer: tinner	10	5	..	15	1	..	9	1	..	34	7	..
Hammer: rivet	11	4	..	15	1	..	9	1	..	35	6	..
Rivet and draw set	11	4	..	14	2	..	8	2	..	33	8	..
Hand groover	12	3	..	15	1	..	8	2	..	35	6	..
Hand seamer	12	3	..	15	1	..	9	1	..	36	5	..
Bench rule	15	..	..	16	..	..	8	2	..	39	2	..
Circumference rule	12	3	..	12	4	..	8	2	..	32	9	..
Hand crimper	12	3	..	14	2	..	7	3	..	33	8	..
Hand notcher	9	4	2	10	5	1	7	3	..	26	12	3
Prick punch	13	2	..	16	..	..	8	2	..	37	4	..
U.S. standard gauge	8	5	2	14	2	..	7	2	1	29	9	3
Hammer: ball pein	13	2	..	16	..	..	7	3	..	36	5	..

TABLE IX

DATA CONCERNING EQUIPMENT NEEDED FOR INDUSTRIAL
PLASTICS IN GRADES SEVEN AND EIGHT

Equipment	Teachers (5)			Super- visors (10)			Teacher Educator (5)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Shop benches	5	..	..	10	..	..	5	..	..	20	..	..
Buffer	5	..	..	10	..	..	5	..	..	20	..	..
Eddy heat gun	5	..	..	9	1	..	5	..	..	19	1	..
Flexible shaft machine	4	1	..	7	3	..	2	2	1	13	6	1
Band saw	5	..	..	10	..	..	5	..	..	20	..	..
Drill press	5	..	..	10	..	..	5	..	..	20	..	..
Tilting arbor saw	4	1	..	8	2	..	4	1	..	14	6	..
Combination sander	5	..	..	10	..	..	4	1	..	19	1	..
Laminating machine	4	1	..	8	2	..	3	2	..	15	5	..
Injection molding mach.	4	1	..	9	1	..	5	..	..	18	2	..
Vacuum forming mach.	5	..	..	10	..	..	4	1	..	19	1	..
Strip heater	5	..	..	10	..	..	5	..	..	20	..	..
Plastic welder	4	1	..	7	3	..	2	3	..	13	7	..
Oven	5	..	..	10	..	..	4	1	..	19	1	..
Assorted hand tools	5	..	..	10	..	..	5	..	..	20	..	..

TABLE X

DATA CONCERNING EQUIPMENT NEEDED FOR FOUNDRY
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (14)			Super- visors (13)			Teacher Educator (8)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Furnace	14	..	..	12	1	..	7	..	1	33	1	1
Molding bench	14	..	..	13	..	..	7	1	..	34	1	..
Flasks	14	..	..	12	1	..	8	..	..	34	1	..
Combination sander	9	4	1	12	1	..	6	1	1	27	6	2
Band saw	7	5	2	8	3	1	5	3	..	20	11	3
Drill press	11	2	1	10	3	..	6	1	1	27	6	2
Crucible lifter	14	..	..	11	1	1	7	..	1	32	1	2
Crucible pourer	14	..	..	11	1	1	7	..	1	32	1	2
Patterns	13	1	..	11	2	..	7	1	..	31	4	..
Sprue cutter	13	1	..	11	2	..	8	..	..	32	3	..
Bulb sponge	13	1	..	12	1	..	8	..	..	33	2	..
Riddle	14	..	..	13	..	..	8	..	..	35	..	..
Shrink rule	7	6	1	8	4	1	5	3	..	20	13	2
Shovel	12	1	1	13	..	..	7	1	..	32	2	1
Bellows	11	3	..	12	1	..	7	1	..	30	5	..
Bench rammer	13	1	..	13	..	..	8	..	..	34	1	..

TABLE X--Continued

Equipment	Teachers (14)			Super- visors (13)			Teacher Educator (8)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Sprue and gate cutter	14	..	..	11	1	..	8	..	..	34	..	1
Lifting tool	11	3	..	11	1	..	8	..	..	30	4	..
Slick and oval	11	3	..	11	2	..	8	..	..	30	5	..
Trowel	14	..	..	10	3	..	7	..	1	31	3	1
Tongs	14	..	..	11	2	..	7	1	..	32	3	..
Protective clothing	13	..	1	13	..	..	8	..	..	34	..	1
Face shields	14	..	..	13	..	..	8	..	..	35	..	..
File: 10"	12	1	1	12	1	..	8	..	..	33	1	1
Hammer: 12 oz.	12	1	1	12	1	..	7	1	..	31	3	1
Rotary files and burrs	8	4	2	10	3	..	6	2	..	24	9	2
Cold chisel	11	2	1	11	2	..	5	3	..	27	7	1

In Table XI there were four unanimous responses by eight industrial arts teachers, seven supervisors of industrial arts in the pilot programs, and four industrial arts teacher educators concerning equipment needed for photography. The enlarger, chemical trays, work surface, and dark room were all deemed to be essential. A majority, or 51 per cent, considered the other three items listed to be essential.

TABLE XI
DATA CONCERNING EQUIPMENT NEEDED FOR PHOTOGRAPHY
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (8)			Super- visors (7)			Teacher Educator (4)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Enlarger	8	..	..	7	..	..	4	..	..	19	..	..
Chemical trays	8	..	..	7	..	..	4	..	..	19	..	..
Camera	7	1	..	7	..	..	3	1	..	17	2	..
Dryer	7	1	..	7	..	..	4	..	..	18	1	..
Work surface	8	..	..	7	..	..	4	..	..	19	..	..
Dark room	8	..	..	7	..	..	4	..	..	19	..	..
Contact printer	5	3	..	6	1	..	3	1	..	14	5	..

In Table XII data concerning equipment needed in forging are presented. Fourteen industrial arts teachers, fifteen supervisors of industrial arts in the pilot programs, and eight industrial arts teacher educators agreed by a majority, or 51 per cent, that all of the items listed were considered to be essential. The forty ounce and thirty-two ounce hammers were considered by 10.8 per cent and 16 per cent respectively to be not needed.

TABLE XII

DATA CONCERNING EQUIPMENT NEEDED FOR FORGING
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (14)			Super- visors (15)			Teacher Educator (8)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Anvil	14	..	..	14	..	1	7	..	1	35	1	1
Furnace	14	..	..	14	1	..	7	1	..	35	2	2
Buffer	11	3	..	13	2	..	4	3	..	28	8	..
Grinder	14	..	..	15	..	..	7	..	1	35	..	1
Hammer: 40 oz.	12	1	1	11	1	3	6	2	..	29	4	4
Hammer: 32 oz.	10	1	2	12	..	2	4	2	1	26	3	5
Hammer: 12 oz.	13	1	..	13	1	..	7	..	..	33	2	..
Tongs	13	1	..	14	..	..	7	..	..	34	1	..
Pliers	14	..	..	13	1	..	7	..	..	34	1	..
Cold chisel	12	2	..	14	..	..	6	1	..	32	3	..

Presented in Table XIII are data concerning equipment needed in ceramics. A majority, or 51 per cent, consisting of one industrial arts teacher, nine supervisors of industrial arts, and two industrial arts teacher educators agreed that all of the items listed were essential.

TABLE XIII
 DATA CONCERNING EQUIPMENT NEEDED FOR CERAMICS
 IN GRADES SEVEN AND EIGHT

Equipment	Teachers (1)			Super- visors (9)			Teacher Educator (2)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Kiln	1	..	..	9	..	..	2	..	..	13	..	..
Potter's wheel	1	..	..	8	..	1	1	1	..	10	1	1
Clay storage box	1	..	..	7	2	..	2	..	..	10	2	..
Damp proof cabinet	1	..	..	7	2	..	2	..	..	10	2	..
Drying cabinet	1	..	..	8	1	..	1	1	..	10	2	..
Assorted glazes	1	..	..	9	..	..	2	..	..	13	..	..
Clay and plaster set	1	..	..	9	..	..	1	1	..	11	1	..
Retouching set	1	..	..	9	..	..	1	1	..	11	1	..
Ceramic scraper	1	..	..	8	1	..	1	1	..	10	2	..

Table XIV contains data concerning equipment needed in the area of textiles. Only two of the industrial arts teachers and two of the supervisors of industrial arts in the pilot programs responded to this part of the checklist. Both unanimously agreed that the two items listed were essential.

TABLE XIV

DATA CONCERNING EQUIPMENT NEEDED FOR TEXTILES
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (2)			Super- visors (2)			Teacher Educator			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Loomes	2	..	..	2	..	..	..	..	..	4	..	..
Rug frames	2	..	..	2	..	..	..	..	..	4	..	..

The responses of fifteen industrial arts teachers, seventeen supervisors of industrial arts in the pilot programs, and thirteen industrial arts teacher educators concerning equipment needed for instructional purposes in drafting are presented in Table XV. Sixteen of the nineteen items, or 84.2 per cent, were considered essential by 51 per cent of the respondents. The paper cutter and erasing shield were deemed desirable by 45.6 per cent. Three items: engineer scales, drafting machine, and circle template were considered desirable by 38.7 per cent. The drafting machine was considered unnecessary by 35.5 per cent of the respondents. The only item listed to be considered as essential by all of the respondents was the bow compass.

TABLE XV

DATA CONCERNING EQUIPMENT NEEDED FOR DRAFTING
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (15)			Super- visors (17)			Teacher Educator (13)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Drafting table	14	1	..	13	2	2	12	1	..	39	4	2
Paper cutter	7	8	..	10	6	1	6	7	..	23	21	1
Bow compass	14	..	..	17	..	..	13	..	..	44	..	..
Dividers	11	4	..	16	..	1	13	..	..	38	4	1
Engineer scale	5	7	3	8	6	2	8	4	1	21	17	6
Architect scale	15	..	..	16	1	..	12	1	..	43	2	..
T square	15	..	..	17	..	..	11	1	..	43	2	..
Triangle: 45° x 45°	15	..	..	17	..	..	12	1	..	44	1	..
Triangle: 30° x 60°	15	..	..	17	..	..	12	1	..	44	1	..
Drafting machine	7	5	3	1	6	10	4	6	3	12	17	16
Drawing board	14	..	1	14	3	..	10	3	..	38	6	1
Pencil sharpener	11	3	1	14	3	..	8	5	..	33	11	1
Erasing shield	7	7	1	12	5	..	6	7	..	25	19	1
Lettering guide	5	8	2	6	8	3	4	7	2	15	23	7
Circle template	9	4	2	8	9	..	8	4	1	25	17	3
Ellipse template	10	3	2	7	8	2	8	4	1	25	15	5

TABLE XV--Continued

Equipment	Teachers (15)			Super- visors (17)			Teacher Educator (13)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Protractor	9	3	3	11	6	..	11	2	..	31	11	3
Irregular curve	12	3	..	11	5	1	10	3	..	33	11	1
Pencil pointer	12	2	1	10	5	1	8	4	1	30	11	3

Data in Table XVI show the responses of four industrial arts teachers, five supervisors of industrial arts in the pilot programs, and eight industrial arts teacher educators concerning the equipment needed in the area of jewelry. All twenty-two of the items listed were considered to be essential by a majority, or 51 per cent, of the seventeen respondents. The buffer, swiss needle files, jeweler's saw, and pliers were checked as being essential by all of the respondents. Six items including the enameling kiln, casting machine, burnout kiln, vibrator, engraving set, and rubber bowls were checked by at least one respondent as being unnecessary for instructional purposes in the area of jewelry.

TABLE XVI

DATA CONCERNING EQUIPMENT NEEDED FOR JEWELRY
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (4)			Super- visors (5)			Teacher Educator (8)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Work surface	4	..	..	5	..	..	6	2	..	15	2	..
Buffer	4	..	..	5	..	..	8	..	..	17	..	..
Enameling kiln	4	..	..	2	1	1	7	1	..	13	2	1
Casting machine	4	..	..	4	1	..	5	1	2	13	2	2
Burnout kiln	4	..	..	2	1	1	5	2	1	11	3	2
Vibrator	4	..	..	4	1	..	5	2	1	13	3	1
Gas-air blow pipe	4	..	..	4	1	..	7	1	..	15	2	..
Charcoal block	4	..	..	3	2	..	6	2	..	13	4	..
Ring clamp	4	..	..	4	1	..	7	1	..	15	2	..
Jeweler's saw	4	..	..	5	..	..	8	..	..	17	..	..
Swiss needle files	4	..	..	5	..	..	8	..	..	17	..	..
Swiss riffle files	3	1	..	4	1	..	4	1	..	12	5	..
Standard ring sizes	4	..	..	4	1	..	6	2	..	14	3	..
Burnishing tool	4	..	..	4	1	..	7	1	..	15	2	..
Engraving set	4	..	..	3	2	..	4	3	1	11	5	1
Rubber bowls	4	..	..	4	1	..	3	4	1	11	5	1

TABLE XVI--Continued

Equipment	Teachers (4)			Super- visors (5)			Teacher Educator (8)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Ring stick	4	..	..	4	1	..	6	2	..	14	3	..
Pliers	4	..	..	5	..	..	8	..	..	17	..	..
Horn anvil	4	..	..	5	..	..	6	2	..	15	2	..
Jeweler's shears	4	..	..	4	1	..	6	2	..	14	3	..
Tongs	4	..	..	4	1	..	7	1	..	15	1	..
Hand vise	4	..	..	4	1	..	8	..	..	16	1	..

Equipment needed for instructional purposes in printing is shown by the data presented in Table XVII. A majority, or 51 per cent, of six classroom industrial arts teachers, six supervisors of industrial arts in the pilot programs, and two industrial arts teacher educators considered all twenty-two items listed to be essential. All of the respondents indicated that the following items were essential: assorted type, proof press, work surface, composing sticks, planer, type gauge, brayer, ink knife, benzene can, and makeup galley.

TABLE XVII

DATA CONCERNING EQUIPMENT NEEDED FOR PRINTING
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (6)			Super- visors (6)			Teacher Educator (2)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Paper cutter	6	..	..	5	1	..	2	..	..	13	1	..
Silk screen frame	6	..	..	5	1	..	1	1	..	12	1	1
Assorted type	6	..	..	6	..	..	2	..	..	14	..	..
Platen press	6	..	..	6	..	..	1	1	..	13	1	..
Proof press	6	..	..	6	..	..	2	..	..	14	..	..
Work surface	6	..	..	6	..	..	2	..	..	14	..	..
Rubber stamp press	5	1	..	5	1	..	..	1	1	10	3	1
Process camera	4	2	..	4	1	1	2	..	..	10	3	1
Offset press	3	3	..	5	..	1	2	..	..	10	3	1
Plate maker camera	3	3	..	4	1	1	2	..	..	9	4	1
Light table	4	2	..	5	1	..	2	..	..	11	2	1
Composing sticks	6	..	..	6	..	..	2	..	..	14	..	..
Planer	6	..	..	6	..	..	2	..	..	14	..	..
Type gauge	6	..	..	6	..	..	2	..	..	14	..	..
Quoins	6	..	..	6	..	..	1	1	..	13	1	..
Brayers	6	..	..	6	..	..	2	..	..	14	..	..

TABLE XVII--Continued

Equipment	Teachers (6)			Super- visors (6)			Teacher Educator (2)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Ink knife	6	..	..	6	..	..	2	..	..	14	..	..
Benzene can	6	..	..	6	..	..	2	..	..	14	..	..
Makeup galley	6	..	..	6	..	..	2	..	..	14	..	..
Linoleum block cutter	6	..	..	6	..	..	1	1	..	13	1	..
X-acto knife set	6	..	..	6	..	..	1	1	..	13	1	..

Data in Table XVIII show the equipment needed for instructional purposes in leather work. All seventeen items listed were considered to be essential by a majority, or 51 per cent, of the nine classroom industrial arts teachers, the twelve supervisors of industrial arts in the pilot programs, and the nine industrial arts teacher educators. The revolving head punch, thonging chisel, and assorted stamping tools were considered to be essential by all of the respondents. The head knife was rated as not needed by three of the thirty respondents, or 10 per cent, of the respondents. The scratch awl and edger were considered unnecessary by one respondent.

TABLE XVIII

DATA CONCERNING EQUIPMENT NEEDED FOR LEATHER
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (9)			Super- visors (12)			Teacher Educator (9)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Draw gauge	8	1	..	9	3	..	6	3	..	23	7	..
Revolving head punch	9	..	..	12	..	..	9	..	..	30	..	..
Thonging chisel	9	..	..	12	..	..	9	..	..	30	..	..
Modeler	9	..	..	12	..	..	8	1	..	29	1	..
Scratch awl	9	2	..	10	2	..	7	1	1	24	5	1
Edger	9	..	..	10	2	..	8	1	..	27	2	1
Space marker	8	1	..	9	3	..	5	4	..	22	8	..
Rawhide mallet	9	..	..	12	..	..	8	1	..	29	1	..
Shears	9	..	..	11	1	..	7	2	..	27	3	..
Lacing pliers	8	1	..	9	3	..	5	4	..	22	8	..
Skife	8	1	..	10	2	..	7	2	..	25	5	..
Swivel knife	9	..	..	11	1	..	8	1	..	28	2	..
Creaser	8	1	..	10	2	..	8	1	..	26	4	..
Head knife	7	1	1	9	3	..	2	5	2	18	9	3
Assorted stamping tools	9	..	..	12	..	..	9	..	..	30	..	..
Rampart gouge	7	2	..	10	2	..	6	3	..	23	7	..

Data in Table XIX present the responses of fourteen industrial arts teachers, sixteen supervisors of industrial arts in the pilot programs, and nine industrial arts teacher educators concerning the equipment needed for instructional purposes in bench metal. A majority, or 51 per cent, of the respondents indicated that all of the thirty-three items listed were essential. The band saw, micrometer, and pipe vise were considered desirable by 38 per cent of the respondents and not needed by 5 per cent. The universal bender, band saw, forty ounce and thirty-two ounce hammers, circular and straight tin snips, and pipe vise were considered unnecessary by at least two of the respondents.

Table XX presents data concerning the equipment needed for instructional purposes in power mechanics. Twelve industrial arts teachers, twelve supervisors of industrial arts, and three industrial arts teacher educators rated the fifty-two items listed in the checklist. Forty-seven of the fifty-two items, or 90.4 per cent, were deemed essential by a majority, or 51 per cent, of the respondents. Four items: steam engine, wankel engine, planetary gear, and hydraulic brake were considered as desirable by 51 per cent. The only item considered as desirable by all of the respondents was a screwdriver. The parts washer, planetary gear, four stroke diesel, pipe wrench, spark tester, piston groove cleaner, cylinder ridge reamer, valve grinder, valve refacer, flywheel puller, and tap and die set were considered as unnecessary by at least one respondent.

TABLE XIX

DATA CONCERNING EQUIPMENT NEEDED FOR BENCH METAL
IN GRADES SEVEN AND EIGHT

Equipment	Teachers (14)			Super- visors (16)			Teacher Educator (9)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Anvil	13	1	..	15	1	..	8	1	..	36	3	..
Universal bender	13	1	..	13	2	1	5	3	1	31	6	2
Drill press	14	..	..	15	1	..	8	..	1	37	1	1
Grinder	14	..	..	16	..	..	8	..	1	38	..	1
Shear	10	4	..	14	2	..	5	4	..	29	10	..
Electric hand drill	11	3	..	15	1	..	8	..	..	34	4	..
Band saw	10	3	1	7	8	1	4	4	..	21	15	2
Hammer: 40 oz.	11	2	1	10	4	2	3	4	1	24	10	4
Hammer: 32 oz.	9	2	2	11	3	2	6	2	..	26	7	4
Hammer: 12 oz. & 16 oz.	11	3	..	15	1	..	7	1	..	33	5	..
File: 10"	14	..	..	15	1	..	8	..	..	37	1	..
File: 8"	11	3	..	15	1	..	7	1	..	33	4	..
File card	14	..	..	15	1	..	7	1	..	36	2	..
C clamp	13	1	..	14	2	..	8	..	..	35	3	..
Pipe wrench	8	6	..	12	3	1	6	2	..	26	11	1
Adjustable wrench	12	2	..	14	2	..	8	..	..	34	4	..

TABLE XIX--Continued

Equipment	Teachers (14)			Super- visors (16)			Teacher Educator (9)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Bench rule	14	..	..	16	..	..	6	2	..	36	2	..
Combination square	14	..	..	16	..	..	8	..	..	38	..	..
Dividers	12	1	1	16	..	..	8	..	..	36	1	1
Outside calipers	12	2	..	14	1	1	6	2	..	32	5	1
Inside caliper	12	2	..	14	1	1	6	2	..	32	5	1
Scratch awl	11	3	..	15	1	..	7	1	..	33	5	..
Cold chisel	13	1	..	15	..	1	7	1	..	35	2	1
Center punch	14	..	..	15	1	..	9	..	..	38	1	..
Screwdriver	13	1	..	16	..	..	9	..	..	38	1	..
Pliers	14	..	..	16	..	..	9	..	..	39	..	..
Hack saw	14	..	..	16	..	..	9	..	..	39	..	..
Tin snips: circular	11	1	2	14	2	..	7	2	..	32	5	2
Tin snips: straight	11	1	2	15	1	..	9	..	..	35	2	2
Micrometer	9	4	1	8	7	1	6	2	1	23	13	3
Pipe vise	9	4	1	11	4	1	4	5	..	24	13	2
Tap and die set	11	3	..	12	4	..	7	2	..	30	9	..
Rivet set	12	2	..	15	..	1	7	1	..	34	4	..

TABLE XX
 DATA CONCERNING EQUIPMENT NEEDED FOR POWER
 MECHANICS IN GRADES SEVEN AND EIGHT

Equipment	Teachers (12)			Super- visors (12)			Teacher Educator (3)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Shop benches with vises	11	1	..	12	..	..	3	..	..	26	1	..
Grinder	11	1	..	9	3	..	3	..	..	23	4	..
Electric hand drill	12	..	..	9	3	..	3	..	..	24	3	..
Parts washer	7	5	..	6	5	1	3	..	..	14	10	1
Two stroke engine	10	2	..	8	4	..	3	..	..	21	6	..
Four stroke engine	10	2	..	9	3	..	3	..	..	22	5	..
Steam engine	5	7	..	5	7	..	3	..	..	13	14	..
Wankel engine	4	8	..	4	8	..	2	1	..	10	17	..
Planetary gear	6	5	1	2	10	..	2	1	..	10	16	1
Four stroke diesel	7	4	1	4	7	1	2	..	1	13	11	3
Hydraulic brake	6	6	..	4	8	..	2	1	..	12	15	..
Small gasoline engines	11	1	..	10	2	..	3	..	..	24	3	..
Screwdrivers	12	..	..	12	..	..	3	..	..	27	..	..
Combination wrenches	12	..	..	11	1	..	3	..	..	26	1	..
Hammer: ball pein	12	..	..	11	1	..	3	..	..	26	1	..
Hammer: soft face	12	..	..	11	1	..	3	..	..	26	1	..

TABLE XX--Continued

Equipment	Teachers (12)			Super- visors (12)			Teacher Educator (3)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Pliers	12	..	..	11	1	..	3	..	..	26	1	..
Pliers: needle nose	12	..	..	11	1	..	3	..	..	26	1	..
Pliers: slip joint	12	..	..	11	1	..	3	..	..	26	1	..
Reversible ratchet	12	..	..	11	1	..	3	..	..	26	1	..
Extension bar	11	1	..	11	1	..	3	..	..	25	2	..
Hinge handle	9	3	..	11	1	..	3	..	..	23	4	..
Speed handle	7	5	..	11	1	..	3	..	..	21	6	..
Hex key set	12	..	..	10	2	..	3	..	..	25	2	..
Standard socket set	12	..	..	11	1	..	3	..	..	26	1	..
Deep socket set	11	1	..	11	1	..	3	..	..	25	2	..
Adjustable wrenches	12	..	..	11	1	..	3	..	..	26	1	..
Cold chisel	10	2	..	10	2	..	3	..	..	23	4	..
Ignition gauge set	12	..	..	11	1	..	3	..	..	26	1	..
Hack saw	11	1	..	11	1	..	3	..	..	25	2	..
Pipe wrench	12	..	..	10	1	1	2	1	..	24	2	1
Pliers: diagonal	12	..	..	11	1	..	3	..	..	26	1	..
Feeler gauge	12	..	..	11	1	..	3	..	..	26	1	..
Torque wrench	12	..	..	11	1	..	3	..	..	26	1	..

TABLE XX--Continued

Equipment	Teachers (12)			Super- visors (12)			Teacher Educator (3)			Total of Respon- ses		
	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed	Essential	Desirable	Not Needed
Screw extractor	12	..	..	11	1	..	3	..	..	26	1	..
Gasket scraper	12	..	..	9	3	..	2	1	..	23	4	..
Locking pliers	12	..	..	9	3	..	3	..	..	24	3	..
Spark tester	9	3	..	9	2	1	3	..	..	21	5	1
Valve spring compressor	11	1	..	12	..	..	3	..	..	26	1	..
Cylinder gauge	12	..	..	11	1	..	2	1	..	25	2	..
Piston ring expander	11	1	..	11	1	..	3	..	..	25	2	..
Piston ring compressor	12	..	..	11	1	..	3	..	..	26	1	..
Piston groove cleaner	11	1	..	10	1	1	1	2	..	22	4	1
Cylinder ridge reamer	12	..	..	10	1	1	2	1	..	24	2	1
Valve grinder	10	2	..	7	4	1	3	..	..	20	6	1
Valve refacer	11	..	1	7	4	1	3	..	..	21	4	2
Gear puller	12	..	..	10	2	..	3	..	..	25	2	..
Flywheel puller	11	1	..	11	1	..	3	..	..	25	1	1
Tap and die set	12	..	..	10	1	1	3	..	..	25	1	1
File: 8"	12	..	..	10	1	1	3	..	..	25	1	1
Ignition wrenches	12	..	..	10	2	..	3	..	..	25	2	..
Ignition file	12	..	..	11	1	..	3	..	..	26	1	..

Incorporated into the checklist was a provision for the respondents to make additional suggestions for equipment and furniture they considered to be essential in each of the instructional areas. In the forty-nine checklists, 155 suggestions were made. Of the additional items suggested, none were recommended more than twice. Many of the recommendations made were related to physical facilities such as lighting, compressed air, electrical connections, and safety equipment. Other recommendations made by the respondents were for various types of audio-visual aids and equipment.

CHAPTER IV

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to identify essential furniture and equipment needed for instructional purposes in industrial arts programs in grades seven and eight in Texas schools. The study was limited to equipment for General Introductory Shop in grades seven and eight in the twelve approved areas of woodworking, sheetmetal, bench metal, forging, foundry, drafting, power mechanics, electricity, printing, photography, ceramics, jewelry, leather, textiles, and industrial plastics.

Data were secured, presented, and interpreted to determine what equipment and furniture were considered to be essential, desirable, or not needed for instructional purposes in the General Introductory Shop courses in grades seven and eight.

To secure the data necessary for the study, an instrument was developed in cooperation with personnel in the Texas Education Agency, Austin, Texas. Twenty-five industrial arts teachers, twenty-four supervisors of industrial arts in the pilot programs, and twenty-one industrial arts teacher

educators were selected and mailed a letter of explanation (Appendix A) and a checklist (Appendix B) by the Director of Industrial Arts Education in the Texas Education Agency. A total of forty-nine, or 70 per cent, of the checklists were returned. The data were then tabulated and presented in Chapter III.

This study was organized into four chapters. Chapter I includes an introduction, purpose of the study, definition of terms, methods of procedure and source of data, limitations of the study, and recent and related studies. Information concerning legislation that placed industrial arts within the framework of vocational education for funding and administrative purposes was included in Chapter II. The data secured through the use of the checklist were tabulated, presented, and analyzed in Chapter III. Chapter IV contains the summary, findings, conclusions, and recommendations.

Findings

1. The teaching experience of the forty-nine respondents ranged from one to thirty-five years. The average number of years of teaching experience was as follows: 8.33 years for the classroom industrial arts teachers; 10 years for the supervisors of industrial arts in the pilot programs; and, 20 years for the industrial arts teacher educators. The average number of years of supervisory experience for the supervisors in the pilot programs was 3.65.

2. All of the forty-nine respondents held a bachelor's degree. Six of eighteen, or 33.3 per cent, of the industrial arts teachers had completed a master's degree. None of them had preparation beyond the master's degree. All of the industrial arts teacher educators and 88.2 per cent of the supervisors in the pilot programs held a master's degree. One supervisor and nine teacher educators had educational preparation beyond the master's degree.

3. In the areas of teaching preparation, a majority, or 51 per cent, of the teachers and supervisors were prepared for teaching in the areas of wood, drawing, metal, power, leather, and electricity. A majority of the teacher educators were prepared to teach in the areas of wood, metal, drawing, leather, and jewelry. In the area of textiles, none of the industrial arts teachers and teacher educators and only one supervisor had teaching preparation.

4. A majority of the industrial arts teachers, the supervisors, and the teacher educators had taught or were currently teaching in the areas of wood, metal, and drawing. Electricity had also been taught or was being taught by a majority of the teachers. None of the respondents had taught or were currently teaching in the area of textiles.

5. A majority, or 51 per cent, of the respondents rated forty-eight of the fifty-seven items of equipment listed for woodworking as essential. The panel saw was considered not necessary by a majority of the respondents.

6. All of the items listed for sheetmetal were considered essential by a majority of the respondents except the cornice brake. However, it was considered essential by twenty, or 48.8 per cent, of the respondents.

7. The entire thirty-three items listed for bench metals were considered essential by a majority of the respondents.

8. The respondents agreed by a majority that all the items listed for forging were essential.

9. All of the items listed for the area of foundry were considered essential by a majority of the respondents. The riddle and face shields were unanimously considered essential.

10. Sixteen of the nineteen, or 84.2 per cent, of the items listed for drawing were considered essential by a majority of the respondents. Drafting machines were considered unnecessary by 35.5 per cent of the respondents.

11. The respondents agreed by a majority that all the items listed for photography were essential. The enlarger, chemical trays, dark room, and work surface were checked as being essential by all of the respondents.

12. In the area of power mechanics, forty-seven of the fifty-two, or 90.4 per cent, items were deemed essential by a majority of the respondents. The steam engine, wankel engine, planetary gear, and hydraulic brake were considered as desirable by a majority.

13. A majority of the respondents rated all nine of the items listed for the area of ceramics to be essential. The

kiln and assorted glazes were unanimous choices by the respondents.

14. The entire twenty-two items listed for jewelry were considered essential by a majority of the respondents.

15. Only two industrial arts teachers and two supervisors in the pilot programs responded to the section of the checklist concerning equipment for the area of textiles. The four respondents agreed the items listed were essential.

16. All of the items listed for printing were considered essential by a majority of the respondents. Ten items were unanimously considered essential.

17. A majority, or 51 per cent, of the respondents considered all of the items listed for the area of leatherwork to be essential. The head knife was checked by 10 per cent of the respondents as not needed for instructional purposes.

18. Fifteen of the seventeen items, or 88.2 per cent, listed in the area of electricity were considered essential by a majority of the respondents. There was no unanimous agreement on any one of the items listed.

19. All of the fifteen items listed in the area of plastics were considered essential by a majority of the respondents. Six items were considered essential by all of the respondents.

20. Some additional essential equipment and tools were recommended by the respondents. However, none of the items

were recommended more than twice. Many recommendations were made concerning physical facilities and audio-visual aids and equipment. Since the study was concerned with only laboratory equipment for instructional purposes, these recommendations are not included in this study.

Conclusions

Based upon the data secured and analyzed the following conclusions are drawn.

First, a majority of the respondents believe a majority of all the items listed in the checklist are essential or desirable for instructional purposes in each of the twelve approved areas of industrial arts in grades seven and eight.

Second, the instructional program in the pilot programs is rather traditional because the curriculum is primarily built around the areas of woodworking, drafting, general metals, and crafts.

Third, if the newer approved areas such as textiles, ceramics, power, jewelry, plastics, printing and photography are to be included in and taught to a greater degree, it will be necessary to secure classroom teachers and supervisors who have formal preparation for organizing and teaching these subject matter areas.

Fourth, since some of the newer aforementioned areas are not being taught in the pilot programs by classroom teachers with prior preparation, instruction is not provided or

required in the curriculum in teacher education programs designed to prepare industrial arts teachers.

Recommendations

The following recommendations are made based upon the findings and conclusions of this study:

1. A study should be undertaken to determine the equipment and furniture deemed essential for all approved areas in industrial arts for grades nine through twelve in Texas schools.

2. It is recommended that teacher educators in teacher education programs design a curriculum that will provide instruction in all of the approved subject areas taught in industrial arts for grades seven through twelve.

3. It is recommended that the furniture, tools, and equipment considered necessary by the participants in this study be submitted to a larger group selected at random from experienced classroom industrial arts teachers, supervisors of industrial arts, and industrial arts teacher educators for further study.

APPENDIX A

TO THE EDUCATOR ADDRESSED:

I wish to solicit your assistance in gathering data and information to assist in establishing standards for approved furniture and equipment lists for instructional programs in industrial arts in grades 7 and 8. When the data and information have been collected, tabulated, and analyzed, they will be submitted to Mr. Neil Ballard, Director of Industrial Arts Education, Division of Occupational Education and Technology, Texas Education Agency, Austin, Texas, for his consideration and use in establishing minimum furniture and equipment standards for approved industrial arts programs.

You have been selected because of your experience in industrial arts. Your assistance and expertise with respect to equipment deemed essential for instructional purposes in industrial arts will be appreciated in order to complete the study. Please complete the survey instrument and return in the enclosed prepaid envelope by January 31, 1975.

Sincerely yours,

Sam W. Sibley

In cooperation with:

Neil E. Ballard, Program Director
Industrial Arts Education
Texas Education Agency
Austin, Texas 78701

Earle Blanton, Professor
Industrial Arts
North Texas State University
Denton, Texas 76201

APPENDIX B

INDUSTRIAL ARTS FURNITURE AND EQUIPMENT SURVEY
FOR 7-8 GRADE

67

Personal Data

NAME _____ SCHOOL _____
Last First Middle

MAILING ADDRESS _____ CITY _____, TEXAS _____ Zip _____

Please check the following (if other, please specify).

1. Years of professional experience:
- Industrial Arts ___ yrs.
 - Other Areas ___ yrs.
 - Supervisor ___ yrs.
 - Total Years _____
2. Subject areas in which you have preparation to teach:
- Wood
 - Metal
 - Drawing
 - Power Mech.
 - Leather
 - Jewelry
 - Other _____
 - Electricity
 - Ind. Plastics
 - Photography
 - Printing
 - Textiles
 - Ceramics
3. Subject areas you now teach or have taught:
- Wood
 - Metal
 - Drawing
 - Power Mech.
 - Leather
 - Jewelry
 - Other _____
 - Electricity
 - Ind. Plastics
 - Photography
 - Printing
 - Textiles
 - Ceramics

College or university preparation:

Undergraduate Degree _____ Master's Degree _____ Other _____

INSTRUCTIONS FOR THE SURVEY: The following checklist has been developed for use in determining minimum furniture and equipment requirements for the various 12-week units in Introductory General Shop, grades 7 and 8. This survey does not attempt to suggest quantity of items and includes equipment that might be reserved for teacher use only. Based on your interpretation of revised TEA course descriptions, Bulletin 615, rate the listed items as "Essential," "Desirable," and "Not Needed" by placing a check (✓) in the appropriate column. Rate only those items in the instructional areas in which you have been prepared to teach.

Equipment and Furniture for 12-Week Teaching
Unit in Introductory General Shop

Grades 7 and 8

A. WOODWORKING* (12-Week Unit)

	Essential	Desirable	Not Needed
1. Shop benches with vises			
2. Drill press: 15" min., floor model, variable speed, tilting table			
3. Electric hand drill: 3/8" min., variable speed			
4. Tool grinder: 7" min., pedestal model, water pot, plane iron grinding attachment			
5. Jointer: 6" min., or uniplane, floor model			
6. Band saw: 14" min., floor model, tilting table, rip fence, miter gauge			
7. Tilting arbor saw: 10" min., rip fence, miter gauge, blades			
8. Radial arm saw: 10" min., floor model			
9. Panel saw: 50" min., cut 3/4" min. thickness			
10. Miterbox saw: 28" x 5" min. back saw			
11. Portable belt sander: 3" x 21" min.			
12. Orbital sander: 4 1/2" x 11" min.			
13. Combination disc and belt sander: floor model, tilting table, 6" belt min., 12" dia. disc min.			
14. Saber saw: 7/16" stroke min.			
15. Router: 7/8 hp. min., 1/4" collet			
16. Wood lathe: floor model, 12" swing min., 36" distance between centers min., standard accessories			
17. Planer: 13" x 5" min.			

*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

18. Hand tools

	Essential	Desirable	Not Needed
rubber mallets: 18 oz.			
nail hammers: 16 oz.			
nail hammers: 13 oz.			
ratchet brace: 10" with bits 4-16 complete			
expansion bits			
hand chisels: 1/4", 3/8", 1/2", 3/4", 1"			
marking gauges			
cabinet rasps: 10", handled			
cabinet files: 10", handled			
scratch awls: 6"			
nail set: assorted sizes			
screwdrivers: assorted			
rip saws: 26" min.			
crosscut saws: 24" min.			
back saws: 12" min.			
try squares: 6" and 12"			
framing squares			
bench rules: 24"			
jack planes			
smooth planes			
block planes			
spoke shaves			

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
coping saws			
hand drills: 3/8" min.			
file cards			
sharpening stones			
bar clamps: 6' min.			
C clamps: 6" and 12"			
dividers: 8"			
bench dusters			
countersink			
screw-mates: 3/4" x no. 6-2" x no. 12			
sliding T bevel			
combination squares: 12"			
carpenters nippers: 8"			
bit gauge			
doweling jig			
level: 24"			
nail bar			
wood scrapers: 2 1/2"			

Please list any additional equipment you believe to be essential

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
B. METALWORKING* (12-Week Unit with a minimum of two areas)			
<u>Sheet Metal</u>			
1. Bench with 30" x 8" stake plate			
2. Brake: box and pan, 24" min.			
3. Brake: cornice, 36" min.			
4. Bar folder: 24" min.			
5. Shear: squaring, 24" min.			
6. Combination machine with crimping, bending, turning, and burning rollers			
7. Slip roll former: 24" min.			
8. Stake set with hollow mandrell			
9. Soldering coppers			
10. Soldering furnace: two burner with pilot light			
11. Spot welder: 12" min. tongs, 10 KVA, floor model			
12. Drill press: 15" min., floor model, variable speed, tilting table			
13. Grinder: 7" min., floor model, water pot, tool tray			
14. Electric hand drill: 3/8" min., variable speed			
15. Hand tools			
combination snips: 3" cut			
aviation snips: M-1, M-2, M-3, with 1 1/2" cut			
pliers: 6"			
scribes: 6"			

*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
combination squares: 12"			
dividers: 6"			
hammers: tinner's, 12 oz.			
hammers: riveting, 12 oz.			
rivet and draw set: One set of 3			
hand groovers: no. 4, 2, 0			
hand seamer: 3" and 6"			
bench rules: 24"			
circumference rule: 36"			
hand crimper			
hand notcher with 45' blade and die			
prick punches: 6"			
U. S. Standard Gauge: sizes 0 to 36			
hammers: ball pein, 12 oz.			

Please list any additional equipment you believe to be essential

Bench Metals

1. Anvil and stand: 100 lb. min.			
2. Bar and rod universal bender: 1/2" round and square min., pipe 1" min., floor model			

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
3. Drill press: 15" min., floor model, variable speed, tilting table			
4. Grinder: 7" min., floor model, water pot, tool tray			
5. Shear: 3/8" min. bar capacity			
6. Electric hand drill: 3/8" min., variable speed			
7. Band saw: 14" min., floor model, tilting table, rip fence, miter gauge			
8. Hand tools			
hammers: blacksmith, 40 oz.			
hammers: engineer, 32 oz.			
hammers: ball pein, 12 oz. and 16 oz.			
files: assorted 10" with handles			
files: assorted 8" with handles			
file cards			
C clamps: 4" and 6"			
pipe wrench: 10" min.			
adjustable wrench: 10" min.			
bench rules: 24"			
combination squares: 12"			
dividers: 6"			
outside calipers: 6" min.			
inside calipers: 6" min.			
scratch awls: 6"			
cold chisels: assorted sizes			

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
center punches: assorted sizes			
screwdrivers: assorted			
pliers: 6"			
hack saws			
tin snips: circular, 7"			
tin snips: straight, 11 1/2"			
micrometer: 1" min.			
pipe vice: 1/8" to 2"			
tap and die set complete			
rivet set			

Please list any additional equipment you believe to be essential

Forging

1. Anvil and stand: 100 lb. min.			
2. Furnace: forge and heat treating with spark ignitor, 90,000 Btu. hr. min.			
3. Buffer: 8" min., floor model			
4. Grinder: 7" min., floor model, water pot, tool tray			
5. Hand tools			
hammers: blacksmith, 40 oz.			

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

10. Hand tools

	Essential	Desirable	Not Needed
sprue cutters: 1/2"-1" x 10"			
bulb sponge: 8 oz			
riddles: 18" dia., nos. 4 and 8			
shrink rule			
shovels: 10" x 12"			
bellows			
bench rammer: 3 1/2" x 14"			
spoon and gate cutter			
lifting tool			
slick and oval			
trowel: 10" x 2" x 1"			
blacksmith tongs: 24" min.			
asbestos protective clothing			
face shields			
files: assorted 10" with handles			
hammers: ball pein, 12 oz.			
rotary files and burrs: assorted sizes			
cold chisels: assorted sizes			

Please list any additional equipment you believe to be essential

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
C. DRAFTING (12-Week Unit)			
1. Drafting tables and stools: tilting top, 24" x 36" min., pencil ledge			
2. Paper cutter: 18" min., scale, safety guard			
3. Bow compass: 6"			
4. Dividers: 5 1/2"			
5. Engineer scales			
6. Architects scales			
7. T-squares: 24"			
triangles: 8", 45' x 45'			
triangles: 8", 30' x 60'			
8. Drafting machines: 18" arms with full and half scales.			
9. Drawing boards: 18" x 24"			
10. Draftsman pencil sharpener			
11. Erasing shields			
12. Lettering guides			
13. Circle templates: assorted sizes			
14. Ellipse templates: assorted sizes			
15. Protractors			
16. Irregular curves			
17. Pencil pointers			

Please list any additional equipment you believe to be essential

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

Essential

Desirable

Not Needed

D. ELECTRICITY* (12-Week Unit)

1. Work surfaces			
2. Commercial instructional system			
3. Instructor designed teaching aids			
4. Commercial teaching aids			
5. Volt meter			
6. Ohm meter			
7. Milliamp meter			
8. Power supply: 0-140 VAC adjustable output			
9. Oscilloscope: 3" min. screen for demonstration			
10. Hand tools			
soldering gun: 125 watt min.			
screwdrivers: assorted			
nut driver set: 3/16"-9/16"			
seizers: 6", straight and curved			
heat sink tool			
needle nose pliers: 6"			
wire strippers: no. 10 to no. 20			
wire cutters: 4"			

*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop
Grades 7 and 8

Essential

Desirable

Not Needed

Please list any additional equipment you believe to be essential

E. POWER MECHANICS* (12-Week Unit)

- 1. Benches with metal working vises
- 2. Grinder: 7" min., floor model, tool tray, water pot .
- 3. Electric hand drill: 3/8" min., variable speed
- 4. Parts washer: 32" x 17" x 11"
- 5. Instructional models
 - two-stroke engine
 - four-stroke engine
 - steam engine
 - wankel engine
 - planetary gear
 - four-stroke diesel
 - hydraulic brake
- 6. Small gasoline engines
- 7. Hand tools
 - screwdrivers: assorted
 - combination wrenches: 1/4"-3/4" by 16ths

Essential	Desirable	Not Needed

*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
hammers: ball pein, 8 oz. and 16 oz.			
hammers: soft face, 8 oz.			
pliers: 6"			
pliers: needle nose, 6"			
pliers: slip joint, 6"			
reversible ratchet: 3/8" drive			
extension bars: 3/8" drive, 3 1/2" and 7 1/2" . . .			
hinge handle: 3/8" drive			
speed handle: 3/8 drive			
hex key set: 5/64"-3/8"			
standard socket set: 3/8" drive, 3/8"-3/4" by 16ths			
deep socket set: 3/8" drive, 3/8"-3/4" by 16ths . .			
adjustable wrenches: 6" and 12"			
cold chisels: assorted sizes			
ignition gauge set			
hack saws			
pipe wrench: 10"			
pliers: diagonal cutting, 7"			
feeler gauges: 3" long, .001-.040			
torque wrench: 0-150 lbs.			
screw extractors: 1/8"-3/8"			
gasket scrapers: 6"			
locking pliers: 8"			

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
spark tester			
valve spring compressor			
cylinder gauge			
piston ring expander			
piston ring compressor			
piston groove cleaner			
cylinder ridge reamer			
valve grinder			
valve refacer			
gear puller			
small engine flywheel puller			
tap and die set complete			
files: assorted 8" with handles			
ignition wrenches: 13/64"-11/32"			
ignition file			

Please list any additional equipment you believe to be essential

F. PRINTING* (12-Week Unit)

1. Paper cutter: 18" min., scale, safety guard

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*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
2. Silk screen frame: 11" x 14"			
3. Assorted type and furniture			
4. Platen press: 9" x 12" min. inside chase			
5. Proof press: 13" x 18" min.			
6. Work surface			
7. Rubber stamp press: 5" x 4" min.			
8. Process camera			
9. Offset press			
10. Plate maker camera			
11. Light table			
12. Hand tools			
composing sticks: 8" min.			
planer: 6" min.			
type gauges: 12" min.			
quoins: assorted sizes with keys			
brayers: 4" min.			
ink knives: 6" min.			
benzene cans: 1 pint capacity min.			
make-up galleys: 8" x 13" min.			
linoleum block cutters: assorted sizes			
X-Acto knife set			

Please list any additional equipment you believe to be essential

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

Essential	Desirable	Not Needed
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G. PHOTOGRAPHY (12-Week Unit)

- 1. Enlarger
- 2. Chemicals and trays for developing and printing
- 3. Camera
- 4. Dryer
- 5. Work surface and sink
- 6. Dark room
- 7. Contact printer

Please list any additional equipment you believe to be essential

H. CERAMICS* (12-Week Unit)

- 1. Kiln: 14" x 14" x 14" min.
- 2. Portable potter's wheel--foot operated, 10" min.
- 3. Clay storage box
- 4. Damp proof cabinet

*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
5. Drying cabinet			
6. Assorted glazes			
7. Hand tools			
clay and plaster set			
retouching set			
ceramic scrappers and texturizing set			

Please list any additional equipment you believe to be essential

I. JEWELRY* (12-Week Unit)

1. Bench with stake plates and stakes			
2. Buffer: 7" min., floor model			
3. Enameling kiln: 6" x 7" x 3" min., 1500°F min., pyrometer			
4. Centrifugal casting machine with crucibles			
5. Burnout kiln: 1800°F min., pyrometer			
6. Vibrator			
7. Gas-air blow pipes			
8. Charcoal blocks			

*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
9. Hand tools			
ring clamp: double end			
jeweler's saw			
swiss needle files: cuts 2, 3, 4, set of 12, 5 1/2"			
swiss riffle files: 6 1/2"			
standard ring sizes: 1-13			
burnishing tool			
engraving set			
rubber bowls			
ring stick			
pliers: assorted			
horn anvil			
jeweler's shears: 6"			
tongs: 17"			
hand vise: 5 1/2"			

Please list any additional equipment you believe to be essential

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

J. LEATHER (12-Week Unit)

	Essential	Desirable	Not Needed
1. Draw gauge			
2. Revolving head punch, no. 0-6			
3. Thonging chisels, no. 1-4			
4. Modeler, flat and pointer ends			
5. Scratch awl, 2"			
6. Edger, no. 0, 2, 4			
7. Space marker, 5, 6, 7 stitches per inch			
8. Rawhide mallets			
9. Shears, 8"			
10. Lacing pliers, 5"			
11. Skife			
12. Adjustable swivel knives			
13. Creaser, no. 1, 3, 5			
14. Head knife			
15. Snap fastener set			
16. Assorted stamping tools			
17. Rampart gouge			

Please list any additional equipment you believe to be essential

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

Essential	Desirable	Not Needed
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K. TEXTILES (12-Week Unit)

- 1. Looms: 2 harness, 1' wide
- 2. Rug frames: 48" x 18"

Please list any additional equipment you believe to be essential

L. INDUSTRIAL PLASTICS* (12-Week Unit)

- 1. Benches with woodworking vises
- 2. Buffer: 7" min., floor model
- 3. Eddy heat gun: 750^o-1000^oF
- 4. Flexible shaft machine: 1/10 hp. with assorted burrs
- 5. Band saw: 14" min., floor model, tilting table, rip fence, miter gauge
- 6. Drill press: 15" min., floor model, variable speed, tilting table
- 7. Tilting arbor saw: 10" min., rip fince, miter gauge, blades
- 8. Disc and belt sander: floor model, tilting tables, 6" belt min., 12" dia. disc. min.
- 9. Laminating machine: 6" x 8"
- 10. Injection molding machine: 1/4 oz. min.

*All equipment must meet OSHA standards.

Equipment and Furniture for 12-Week Teaching
Units in Introductory General Shop

Grades 7 and 8

	Essential	Desirable	Not Needed
11. Vacuum forming machine: 20" x 20" min., sheet size .			
12. Strip heater: 23"			
13. Plastic welder: 450 ^o -1000 ^o F			
14. Oven: 18" x 16" x 12" I.D., with forced air circulation			
15. Assorted hand tools			

Please list any additional equipment you believe to be essential

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