A CRITICAL ANALYSIS, BASED ON EVALUATIVE CRITERIA, OF THE
HOUSING FACILITIES PROVIDED FOR INDUSTRIAL ARTS IN
THREE SENIOR HIGH SCHOOLS AND FOUR JUNIOR HIGH
SCHOOLS LOCATED AT BEAUMONT, TEXAS

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THESIS

Presented to the Graduate Council of the
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Fulfillment of the Requirements

For the Degree of

MASTER OF SCIENCE

By

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CHAPTER I

INTRODUCTION

In recent years, adequate schoolhousing has been one of the major topics under discussion in many educational groups. Since World War II, an increase in school enrollments has made it necessary for school administrators, board members, and school patrons to make plans for remodeling and for future expansion of the present school plants in order to accommodate the rapid increase in the scholastic population.

The planning of housing facilities for an industrial arts program in a school presents problems which are not common to the average classroom. This is true because an industrial arts program requires that special attention be given to such things as providing lumber storage, storage for pupils' projects, finishing rooms, and special electrical circuits for power equipment.

To realize the maximum benefit from remodeling or the construction of new industrial arts shops, it is desirable to study carefully current recommendations for housing facilities as suggested by authorities in the field of school planning. When the present facilities provided for industrial arts programs are carefully analyzed with respect to these recommendations, it is possible to determine whether or not improvements are needed in order to make the facilities adequate.
Statement of the Problem

This study is an analysis of the housing facilities provided for the industrial arts programs in three senior high schools and four junior high schools at Beaumont, Texas.

Purpose of the Study

The purpose of the study is to determine whether or not the housing facilities provided for the industrial arts programs in the Beaumont Public Schools meet current recommendations concerning housing facilities as stated by five selected authorities in the field of schoolhousing.

Limitations of the Study

This study is one of a series of studies being conducted under the supervision of the Industrial Arts Department, North Texas State College, Denton, Texas, concerning housing facilities provided for industrial arts programs, and therefore, the study is limited to an analysis of the housing facilities for industrial arts in the three senior high schools and four junior high schools located in Beaumont, Texas. Parochial schools in Beaumont, Texas, are not included in the study.

The study is limited further to those schools that have industrial arts programs in which courses in woodwork, mechanical drawing, and general shop are included, and does not include a treatment of the machines and equipment used in the industrial arts programs.
Definition of Terms

The terms used in this study are defined as follows:

Industrial Arts has been defined as those phases of general education which deal with industry—its organization, materials, occupations, processes and products—and with the problems resulting from the industrial and technological nature of society.¹

"Junior high school" is a school which is organized for the purpose of teaching the seventh, eighth, and ninth grades, or a combination of any of these grades.

"Senior high school" is a school which is organized for the purpose of teaching the ninth, tenth, eleventh, and twelfth grades, or a combination of any of these grades.

"Housing facilities" refer to the building in which the industrial arts program is housed and include such items as size of the classrooms, service, storage, and health and safety features.

"Woodwork" is an industrial arts course in which activities that include hand woodwork and machine woodwork are taught.

"Mechanical drawing" refers to that phase of industrial arts which is concerned with drawings made with instruments or freehand or partly with instruments and partly freehand.²

¹Gordon O. Wilber, Industrial Arts in General Education, p. 2.
"General shop" is a program in industrial arts in which two or more industrial arts areas are taught simultaneously. 3

"Light shops" refer to a program in which mechanical drawing and electricity are taught and which do not require the use of heavy equipment.

"Heavy shops" refer to those shops in which courses such as woodwork and metal are taught and which require the use of heavy equipment.

"Foot Candle Light Meter" is an instrument used to measure in units of foot candles either natural or artificial light. 4

"Natural light" is the light that is received directly or indirectly from daylight.

"Artificial light" is that light which is received from an artificial source of energy such as the incandescent or fluorescent type of electric fixture. 5

"Diffused light" is a type of light which, through a process of reflection or transmission, has been caused to spread in all directions.

3 Wilber, op. cit., p. 108.


Source of Data

The data for this study were secured from professional literature in the field of schoolhouse planning; from personal interviews with principals, supervisors, and industrial arts teachers employed in the schools included in the study; and from a checklist containing recommended standards for adequate housing facilities for industrial arts as stated by authorities in the field of schoolhousing.

Method of Obtaining Data and Organization of the Study

Professional literature pertaining to the areas of schoolhousing was read in order to ascertain the current recommendations which have been made concerning adequate housing facilities for industrial arts. After careful study of this literature, authorities in the field of building and school planning were arbitrarily selected and the recommendations made by them were used in this study. These authorities included such individuals and associations as the following: Gordol O. Wilber, Arthur B. Mayes, Carl H. Casberg, the American Association of School Administrators, the National Council on Schoolhouse Construction, and the publication entitled *The American School and University*.

A checklist containing recommendations by the foregoing was developed for use in studying the problem and recording the data secured concerning the present housing facilities provided for the industrial arts programs included in the
study. A personal interview was held with each of the industrial arts instructors and other school administrators in each of the schools in order to obtain needed information and data.

The study was organized into five chapters. Chapter I contains a statement of the problem, the purpose of the study, definition of terms, the source of data, the method of obtaining the data and the organization of the study, and some recent and related studies.

In Chapter II, standards for use in planning housing facilities as recommended by authorities in the field of school planning and building were presented, discussed, and finally restated into a composite set of recommendations.

A checklist was developed for use in recording and studying the information obtained concerning the present housing facilities provided for industrial arts and for analyzing these facilities with respect to the recommended standards included in the checklist. Chapter III consists of the checklist and its development.

A critical analysis was made of the present housing facilities provided for the industrial arts programs in the Beaumont Public Schools; this analysis was made through the application of the recommended standards included in the checklist and the information obtained on the present housing facilities recorded on the checklist. This analysis is presented in Chapter IV.

The summary, conclusions, and the recommendations based upon the findings of this study are presented in Chapter V.
Recent and Related Studies

Several studies which have been made during the past few years concerning housing facilities and equipment for industrial arts programs are presented and discussed as follows:

There was a study made of the housing facilities provided for industrial arts programs in junior high schools. This study was made by Richard G. Strickland in 1952, and included eleven junior high schools in seven counties in the Panhandle Area of Texas. The purpose of the study was to determine whether the housing facilities provided for industrial arts programs in these schools met current recommended standards. The data secured and presented in the study revealed that the industrial arts programs surveyed partially met the recommended standards for adequate housing facilities.6

A study was made by J. Elvin Newsom in 1952, and it was concerned with designs and materials used in school building construction which would meet the needs of the schools both today and in the future. The study includes criteria developed by Newsom, from information secured from professional literature, for determining sound school building plants. The study revealed that several new types of designs in schoolhouse construction were being used throughout the United States; and that, in areas where adequate building sites were available, the one-story building more nearly met the needs

6Richard G. Strickland, op. cit.
of education than the multi-story building. The data also indicated that since new materials and construction methods are continually being developed, a periodic study should be made of the new developments in design and materials and the information received be made accessible to the public in order to obtain the best in school construction.\footnote{J. Elvin Newsom, "An Analysis of Designs and Materials to Determine Sound School Building Construction" (unpublished Master's thesis, Department of Industrial Arts, North Texas State College, 1950).}

In 1951, Marvin D. King made a study of the lighting conditions found in the industrial arts shops of the Fort Worth Public Schools in Fort Worth, Texas. The purpose of the study was to determine whether the lighting in the industrial arts classes met the standards approved by authorities in the field of school lighting. The results of the study indicated that although much work had been done in the last five years to remedy poor illumination in the industrial arts shops, there were still several shops in which the lighting facilities were not adequate.\footnote{Marvin D. King, \textit{op. cit.}}

A study to analyze the power woodworking equipment in the high school industrial arts shops of Texas was made by L. M. Graham in 1949. This study included one hundred sixty-two high school shops in the state. The study indicated that the industrial arts teachers in the field believed that the teacher training institutions should place more emphasis
on the wise selection and maintenance of power woodworking equipment; and that the State Department should revise its recommended list of power woodworking equipment for industrial arts shops of the State of Texas.\textsuperscript{9}

CHAPTER II

A REVIEW OF STANDARDS FOR HOUSING FACILITIES PROVIDED FOR THE INDUSTRIAL ARTS PROGRAMS AS RECOMMENDED BY AUTHORITIES IN THE FIELD OF SCHOOLHOUSE PLANNING

In order to develop a checklist for use in determining the extent to which the schools of Beaumont, Texas, have provided adequate schoolhousing for industrial arts, it was necessary to study the current standards and recommendations with respect to housing facilities for the industrial arts programs. The recommendations of authorities in the field of schoolhouse planning were selected, presented, and studied for meaning and duplication in Chapter II. From these recommendations a composite set of recommendations were restated to be used as a basis for developing a checklist in Chapter III.

The standards suggested by each of the authorities are presented and discussed in the following pages, with a composite set of recommendations established from these recommendations also presented and entitled "Recommended Standards for Adequate Housing Facilities for Industrial Arts Programs."

In The American School and University, the following recommendations concerning housing facilities for industrial arts were given:
Location of shops.--(1) The school shops should be located in or near the main building. (2) They should not be placed in basement areas. (3) If the shops are housed in a separate building, they should be connected to other buildings of the school plant by covered walks. (4) Space should be provided for future expansion and the location should be near the street for access in delivering supplies or moving student projects. (5) The heavy equipment should be located on the ground floor.

Floor space per student.--(1) For the woodworking shop, general shop, and metal shop, there should be a minimum of seventy-five square feet per student. (2) In the mechanical drawing classroom, there should be a minimum of forty square feet per student.

Shape of shops.--(1) The shop should be rectangular in shape with a width to length ratio from 1:1¾ or 1:2.

Construction of shop floor.--(1) The floor surfaces of the shops should be resilient and durable. (2) The surface should be insulated to reduce noise. (3) Hardwood floors with special footings to take care of heavy machinery were recommended.

Type of lighting.--(1) Artificial lighting was recommended to supplement natural lighting. Regardless of the window space provided in shops, variable weather conditions make artificial lighting necessary. (2) General artificial lighting should be indirect or semi-indirect, incandescent or fluorescent, and should produce a uniform distribution of illumination without shadow or glare.

Light reading in shops.--(1) In the mechanical drawing shop, and other shop classrooms where precision drawing may be done, fifty foot candle power should be installed. (2) For shops in general, there should be thirty to forty foot candle power of light produced on the work area.

Height of ceiling.--(1) The height of the ceiling should be not less than twelve feet with fourteen feet preferred.

Square feet of window space.--No recommendation was given.
Demonstration area.--(1) A demonstration area should be provided and equipped with a teacher's desk, demonstration table or bench, portable blackboard, a table armchair for each student, and cabinets for storage of instructional materials.

Exits and outside doors.--(1) Each shop should have at least two exit doors. (2) One of the doors should be larger than the largest piece of shop equipment or instructional project work that will be moved in or out of the shop.

Washing facilities.--(1) In each shop, a washing station was recommended for each five students. (2) At least one washing station should be provided in the mechanical drawing shop. (3) Hot water should be available to all shops.

Drinking facilities.--(1) Every shop should have a water fountain installed and located where it will not cause congestion. (2) The water fountain should be in full view of the instructor.

Toilet facilities.--(1) Toilet facilities located in the shops were recommended; however, at times, the overall building plan of the school plant may provide facilities in a different location, yet near the shop.

Ventilation.--(1) The ventilating system should provide fresh air circulating constantly.

Heating facilities.--(1) The temperature variation from the floor to sixty inches above should not be more than five degrees. (2) The heating system should maintain a temperature of sixty-eight degrees approximately sixty inches above the floor.

Exhaust.--(1) An exhaust was recommended to carry off dust and sawdust from the woodworking shop.

Electrical outlets.--(1) Shops using portable power tools should be provided with one double electrical outlet for every ten feet of wall space.

Safety devices.--(1) Safety devices should be provided and properly identified.

Teacher's office and conference room.--(1) The shop instructor should have his headquarters in the open shop area or in an office with glass windows so that he commands a full view of the entire shop at all times.
(2) His office or headquarters in the shop should be equipped with one or two desks, desk chairs, and file cabinets.

Storage space for materials.--(1) The shops should have storage areas provided. (2) The storage areas may be designed for one or more shops that are close together. (3) The size and type of storage space is determined by the kind of shop or shops that use it, students to be accommodated, and type and quantity of supplies to be stored.

Storage space for student projects.--(1) Each student should have a separate storage area for his project.

Paint or finish room.--(1) A separate dust-proof finishing room equipped with an independent exhaust system was recommended for woodworking shops, cabinet shops, and other shops where project finishing is done.

Library and planning area.--(1) The library and planning area may be the same as the shop classroom. (2) The library should be equipped with library shelving for shop reference books.

Tool room or tool panel.--(1) This room should be designed so that the instructor can easily observe the activities of the tool keeper without having to enter the tool room.

A second source of authority, the National Council on Schoolhouse Construction, recommended the following standards for industrial arts shops:

Location of shops.--(1) A preferred location recommended for the shops was the wing of the main building or a separate building so the noise would not disturb other school activities.

Floor space per student.--(1) Fifty to seventy-five square feet per student was recommended. (2) The space, however, should be determined by the type of activity carried on in each shop.

Shape of shops.--(1) Each shop should be rectangular in shape, with a width of at least thirty feet suggested as desirable.

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1The American School and University, Twenty-second Yearbook, pp. 314-326.
Construction of shop floor.--(1) The flooring should be of hardwoods. (2) Maple flooring was recommended.

Type of lighting.--(1) It was suggested that artificial lighting should produce a uniform distribution of shadow-free and glare-free illumination.

Light reading in shops.--(1) No specific recommendation was given for light reading in foot candle power. It was indicated that some research results stated that twenty to forty foot candle power was satisfactory for common school tasks, with more foot candle power needed for precision work.

Height of ceiling.--(1) The ceiling height should be a minimum of twelve and a maximum of fourteen feet.

Square feet of window space.--No specific recommendation was given.

Demonstration area.--(1) A demonstration area should be provided.

Exits and outside doors.--(1) An adequate number of service doors should be provided with exits conveniently located between related work areas which are frequently used together.

Washing facilities.--(1) There should be washing facilities located in each shop. (2) One wash station for each ten students was recommended.

Drinking facilities.--(1) One drinking fountain for each floor was recommended. (2) There should be a ratio of one drinking outlet for each seventy-five students.

Toilet facilities.--(1) These facilities should be located in the shop or easy access from the shop.

Ventilation.--(1) Ventilation facilities should provide fifteen cubic feet of fresh air per minute for each student.

Heating facilities.--(1) The heat should be controlled to maintain a sixty-eight degree temperature measured sixty inches above the floor.

Exhaust.--(1) No specific type of system was recommended. (2) Central dust and refuse collecting systems were considered highly desirable in woodworking shops and some types of metal shops.
Electrical outlets.--(1) Service outlets for 110-volt and single-phase and 220-volt three-phase should be provided. . . .

Safety devices.--(1) Safety emergency controls for all equipment should be connected to the main power supply and located at intervals around the room. (2) These controls should be properly identified. . . .

Teacher's office and conference room.--(1) No specific recommendation was given except that a teacher's working and planning area should be provided. . . .

Storage space for materials.--(1) Storage space for materials was recommended as necessary. (2) The storage area should be located for convenient delivery of supplies. . . .

Storage space for student projects.--(1) A room or space should be provided for the storage of pupil's projects. (2) Lockers under benches may be adequate in some shops; in some cases, a storage room may be necessary. . . .

Paint or finish room.--No specific recommendation was given.

Library and planning area.--(1) A library and planning area should be provided. . . .

Tool room or tool panel.--(1) A tool room or tool panel was recommended. (2) It was considered highly desirable to provide a tool room or tool panel for each type of shop. . . .

The American Association of School Administrators recommended the following standards for industrial arts housing facilities:

Location of shops.--(1) Shops should be located on the ground floor of the school building or in a separate building which would be accessible to service drives. . . .

Floor space per student.--(1) A minimum of seventy-five square feet per student was recommended. . . .

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Shape of shops.—No specific recommendation was given.

Construction of shop floor.—(1) The floors should have a nonslip finish. (2) They may be made of different materials in different parts of the shop, depending on the activities carried on in that part of the room.

Type of lighting.—No specific recommendations were given. The amount of artificial light needed is determined by the amount of natural light provided.

Light reading in shops.—(1) Fifty foot candle power of light was recommended for drafting rooms and other shop areas where precision work was carried out. (2) For the average shop room, thirty foot candle power of light was considered necessary.

Height of ceiling.—(1) A minimum of twelve feet was recommended.

Square feet of window space.—(1) The window area should be equal to one-fifth or twenty per cent of the floor area. (2) If possible, the window glass should run up within six inches of the ceiling.

Demonstration area.—(1) Seating accommodations should be provided for pupils in an area of the shop where demonstrations can be given.

Exits and outside doors.—(1) There should be at least one door in each shop which is not less than twelve feet wide and sufficiently high to facilitate the loading and unloading of supplies and equipment.

Washing facilities.—(1) Wash rooms connected with the shops were recommended as essential.

Drinking facilities.—(1) Drinking fountains in the shops were recommended as desirable. (2) A suggested minimum requirement for drinking fountains was one fountain to each floor and one fountain outlet to each seventy-five pupils.

Toilet facilities.—(1) No special recommendations were listed for toilet facilities in the shops. (2) General standards suggested toilet facilities be placed on each floor with one toilet fixture for ninety boys.

Ventilation.—(1) Facilities for ventilation purposes should provide fresh air at the rate of ten to fifteen cubic feet per minute.
Heating facilities.--(1) The temperature reading sixty inches above the floor should be from sixty-six degrees to seventy degrees.

Exhaust.--No specific recommendation was given.

Electrical outlets.--(1) Electrical outlets should be provided. (2) No special position for these outlets was suggested.

Safety devices.--(1) Safety devices should be provided and identified.

Teacher's office and conference room.--(1) A teacher's office and conference room should be provided.

Storage space for materials.--(1) Adequate space should be provided for supplies and materials which would be convenient to work stations and delivery areas.

Storage space for student projects.--(1) Separate storage space was recommended for student work.

Paint or finish room.--No recommendation was given.

Library and planning area.--(1) The shop area may provide a separate planning area, or an open area in the shop proper may serve the same purpose. (2) If the planning area is located in the shop itself, the seating may be in the form of removable bleachers. (3) No special recommendations were made concerning a shop library.

Tool room or tool panel.--(1) Tool and supply cabinets were recommended.

Arthur B. Mayes and Carl H. Casberg made the following recommendations concerning housing facilities for industrial arts:

Location of shops.--(1) The metal and woodworking shops, which require heavy equipment and large storerooms, should be located on ground level either in special wings or detached buildings. (2) Those shops such as drafting, printing, and electrical may be on upper floors. (3) A shop should never be located in the basement of a school building.

3American Association of School Administrators, American School Buildings, Twenty-seventh Yearbook, pp. 100-239.
Floor space per student.--(1) In shops of twenty or less students, the minimum floor space per student should be at least sixty or seventy square feet. . . .

Shape of shops.--(1) The desirable shop should be rectangular in shape with proportions of 1:2. . . .

Construction of shop floor.--(1) The floors should be of wood with special foundations for heavy equipment. . . .

Type of lighting.--(1) Diffused lighting should be used in the classroom to prevent glare. . . .

Light reading in shops.--(1) The foot candle power in shops should be not less than fifteen, and in the mechanical drawing classroom not less than twenty-five. . . .

Height of ceiling.--(1) The ceiling should be not less than ten feet or more than fourteen feet. . . .

Square feet of window space.--(1) There should be one square foot of glass for every five square feet of shop floor space. . . .

Demonstration area.--(1) A demonstration room was recommended. (2) In the room, chairs should be provided for each student and placed at graduated heights. . . .

Exits and outside doors.--(1) It was recommended that at least one large door be located in each shop to allow for loading and unloading of materials and projects. . . .

Washing facilities.--(1) Washrooms in each shop were recommended. . . .

Drinking facilities.--No recommendation was given.

Toilet facilities.--No recommendation was given.

Ventilation.--(1) The ventilation facilities should allow enough fresh air to eliminate stuffiness and body odors in the room. . . .

Heating facilities.--No recommendation was given.

Exhaust.--(1) The woodworking shop should have an exhaust system to remove sawdust and shavings. . . .

Electrical outlets.--No recommendation was given.
Safety devices.--(1) It was recommended that safety devices be provided and properly identified.

Teacher's office and conference room.--(1) Space should be provided for a teacher's office and conference room. (2) If possible, this area should be located where the shop instructor will have a full view of the shop either through the use of glass partitions or glass doors.

Storage space for materials.--(1) It was recommended that storage space for materials and supplies be provided. (2) These storage areas should be located where they are easily accessible for loading and unloading of materials and projects and for convenience in issuing materials to students in shop.

Storage space for student projects.--(1) Storage space should be provided for students' projects. (2) The storage area may be in the form of individual lockers; or, where costs must be kept to a minimum, it may be in the form of large lockers where all unfinished projects can be stored.

Paint or finish room.--(1) There should be a finishing room provided. (2) The windows in the room should be on the north side.

Library and planning area.--(1) A planning room and shop library combination was recommended. This room should be well-lighted and equipped with chairs, tables, and bookshelves. (2) The room should be located either in one end of the shop on a mezzanine or in an adjacent room to the shop.

Tool room or tool panel.--(1) It was recommended that a tool room or tool panel be provided for each shop.

Gordon O. Wilber suggested the following recommendations for housing facilities for industrial arts:

Location of shops.--No specific recommendation was given.

Floor space per student.--(1) The minimum amount of floor space per student should be sixty square feet with a maximum of seventy-five square feet.

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4 Arthur B. Mayes and Carl H. Casberg, School-Shop Administration, pp. 3-34.
Shape of shops.--(1) Each shop should be rectangular, with a ratio of 1:1 1/2 or 1:2.

Construction of shop floor.--(1) No specific recommendation was given as to the type of floor, but mention was made that machinery should be placed on concrete footings.

Type of lighting.--(1) Fluorescent lighting was recommended for the shop.

Light reading in shops.--(1) In heavy shops, thirty foot candle power of light was recommended for bench height, with forty-five to fifty foot candle power for mechanical drawing.

Height of ceiling.--No specific recommendation was given.

Square feet of window space.--No specific recommendation was given.

Demonstration area.--(1) A demonstration area should be provided in the shop layout. (2) The demonstration area should include seating facilities, blackboard, demonstration bench, and projection screen.

Exits and outside doors.--No specific recommendation was given.

Washing facilities.--(1) Washing facilities should be provided for the shops and located as close to the main entrance as possible. (2) Hot and cold water should be available in the washroom.

Drinking facilities.--No specific recommendation was given.

Toilet facilities.--No specific recommendation was given.

Ventilation.--No specific recommendation was given.

Heating facilities.--No specific recommendation was given.

Exhaust.--(1) An exhaust system was highly recommended for the woodworking shop.

Electrical outlets.--(1) It was recommended that duplex convenience outlets be installed in the shops at ten foot intervals on all walls at a height of forty-two inches. (2) Special outlets were recommended for bench machines.
Safety devices.--(1) All power circuits should be controlled with the main switch so that all machines may be stopped in case of an emergency. . . .

Teacher's office and conference room.--(1) A teacher's office and conference room should be provided. . . .

Storage space for materials.--(1) It was recommended that storage space be provided for each shop. . . .

Storage space for student projects.--No recommendation was given.

Paint and finish room.--(1) If space and finances would permit, it was recommended that a dust-free finish room with an exhaust fan be provided. . . .

Library and planning area.--(1) A library and planning area should be provided and equipped with chairs and tables for the students. (2) This planning area should be as near the center of the shop as possible. . . .

Tool room or tool panel.--(1) Tool panels were recommended for each shop. . . .

After presenting the recommendations of the authorities concerning housing facilities for industrial arts shops, it was necessary to study each recommendation by each authority in order to determine the extent to which they were in agreement concerning the various phases of housing facilities believed to be essential. There was a high degree of agreement with respect to their recommendations concerning housing facilities. These recommended standards are discussed in the following pages to determine their meaning and eliminate duplication.

Concerning the location of industrial arts shops, there was a high degree of agreement. All of the authorities recommended that the industrial arts shops should be located in a wing of the main building or in a separate building easily accessible for deliveries of materials and supplies. They all agreed that the industrial arts shops should never be housed in the basement of a school building. If the shops are located in a separate building, covered passageways should be provided to connect them with the main building. When the amount of space is limited on the first floor of the main building, heavy shops such as woodwork and metal shops should be located on the lower floor, but the light shops such as mechanical drawing and electrical classes may be located on upper floors.

A range of fifty to seventy-five square feet of floor space per student was recommended by the authorities. One authority suggested that a minimum of forty square feet per student in the mechanical drawing classroom be provided. It was also agreed that the shape of the industrial arts shop should be rectangular with proportions of 1:1\(\frac{1}{2}\) or 1:2, and that the floors should be constructed of hardwood with special footings for heavy machinery.

The authorities were in agreement concerning artificial lighting, and recommended that artificial lighting should be installed in the shops to supplement natural lighting in order that the correct amount of foot candle power could be
maintained. Three of the authorities also suggested that the artificial lighting be diffused in order to prevent glare. Thirty to forty foot candle power of light for regular shop work and fifty foot candle power of light for precision work were the general recommendations made concerning the amount of light needed in industrial arts shops. One authority suggested a minimum of fifteen foot candle power of light for regular work in industrial arts shops and a minimum of twenty-five foot candle power of light for precision work.

Concerning the recommendation with respect to the height of the ceiling and the amount of square feet of window space which should be provided in industrial arts shops, the authorities were in general agreement. A maximum ceiling height of fourteen feet and a minimum of twelve feet were suggested by three of the authorities, and one recommended a maximum of fourteen feet and a minimum of ten feet. They all recommended that one square foot of window space should be provided for every five square feet of floor space in the shop.

It was found in reviewing the recommendations they proposed that a demonstration area should be provided and equipped with a demonstration bench, portable blackboard, and seating area for students. One authority suggested that the seating area should be placed at graduated heights in order to provide a better view for the students.

There was universal agreement between the authorities concerning exits and outside doors. All of them recommended
that adequate exits should be in all shops, and at least one outside door large enough for loading and unloading supplies, equipment, and student projects should be provided.

In studying the recommendations given for washing facilities, drinking facilities, and toilet facilities, it was found that the authorities unanimously agreed that these facilities should be provided and located in or near all the shops. Four of the authorities considered it highly desirable to have drinking facilities located in each shop and two recommended that washing facilities be located in each shop. All of them agreed that hot and cold water should be provided in all industrial arts shops.

The recommendations made with respect to providing adequate ventilation and heating facilities showed high agreement among the authorities. A majority of the authorities recommended that the ventilation facilities should provide enough fresh air to eliminate both body odors and stuffiness from the room; three authorities suggested a controlled room temperature which would range from sixty-six to seventy degrees when the temperature was measured at points of sixty inches from the floor level.

Concerning facilities which should be provided for exhaust systems, electrical outlets, and safety devices, it was found that most of the authorities made specific recommendations concerning those subjects. Four of the authorities suggested an exhaust system for the woodworking shop to carry off sawdust
and shavings; four of them stated that electrical outlets should be installed, and two of them suggested that the outlets should be installed at intervals of every ten feet around the walls. All of the authorities recommended that adequate safety devices be installed and properly identified.

It was recommended that an office for the teacher and a conference room should be provided. It was also suggested that the use of glass windows and doors in this room was highly desirable in order to give the teacher a full view of the activities in the shop.

Storage space for materials and student projects was considered necessary and emphasized when planning housing facilities for industrial arts shops. All of the authorities were in agreement and recommended that storage space for materials should be provided and located where they would be convenient for the delivery of materials and supplies and for issuing these supplies to students. Adequate storage space for students' projects was recommended with a separate locker for each student if cost permit, otherwise, a room for each class group was recommended.

A majority of the authorities recommended that a paint or finish room should be provided for the woodworking shop. This room should be dust free and equipped with an exhaust fan. One educator suggested that the room be located so that the windows would be on the north side of the room in order to avoid direct sunshine.
In studying the recommendations concerning the last two standards presented, namely, the library and shop planning area and the tool room or tool panel, it was found that all of the authorities recommended that these facilities should be provided and included in the industrial arts shop layout. One authority suggested that if the costs were limited, two related shops could use one tool room together if the tool room was located conveniently between the two shops.

It is possible that continued research would reveal other recommendations concerning housing facilities other than those presented by the authorities selected. It is believed, however, that these recommendations represent a cross-section of the current recommendations. After studying each of the aforementioned recommendations for meaning and duplication, the following is a composite set of recommendations based on those of the authorities selected and are restated as follows:

**Recommended Standards for Adequate Housing Facilities for Industrial Arts Programs**

1) **Location of shops.**—The industrial arts shop should be located in a wing of the main building or in a separate building and easily accessible for the delivery of materials and supplies; if the shop is located in a separate building, covered passageways should be provided to connect it with the main building. Heavy shops such as the woodworking and metal shops should be located on the ground floor and light shops such as mechanical drawing and electrical classes located on upper floors; industrial arts shops should never be located in the basement of a school building.
2) **Floor space per student.**—Sixty to seventy-five square feet of space per student should be provided in the industrial arts shop.

3) **Shape of shops.**—The shops should be rectangular in shape with proportions of 1:1½ or 1:2.

4) **Construction of shop floor.**—The floors should be constructed of hardwood, with special footings provided for heavy machinery.

5) **Type of lighting.**—Diffused artificial lighting should be installed in the industrial arts shop to supplement natural lighting so the correct amount of foot candle power of light can be maintained.

6) **Light reading in shops.**—Thirty to forty foot candle power of light should be provided for the industrial arts shop; fifty or more foot candle power of light should be provided for mechanical drawing and other work areas where precision work is carried on.

7) **Height of ceiling.**—The height of the ceiling may vary between a minimum of twelve and a maximum of fourteen feet.

8) **Square feet of window space.**—The window space should have a ratio of one square foot of glass to every five square feet of floor space.

9) **Demonstration area.**—A demonstration area should be provided with a demonstration bench, portable blackboard, and a seating area for students.

10) **Exits and outside doors.**—Exits and outside doors should be provided in all industrial arts shops. One of the outside doors in each shop should be large enough for loading and unloading projects, supplies, and equipment.

11) **Washing facilities.**—Washing facilities with hot and cold water should be provided in each shop at a ratio of one washing station for every ten boys.

12) **Drinking facilities.**—Drinking fountains should be installed in each shop and placed in full view of the instructor, with a ratio of one fountain for every seventy-five boys.
13) **Toilet facilities.**—Toilet facilities should be located in each shop or easy access from each shop, with a ratio of one toilet for every ninety boys.

14) **Ventilation.**—Ventilation facilities should provide enough fresh air to eliminate body odors and stuffiness from the room.

15) **Heating facilities.**—At sixty inches above the floor there should be a controlled temperature of approximately sixty-eight degrees.

16) **Exhaust.**—An exhaust system should be installed in woodworking shops to carry off excess sawdust and shavings.

17) **Electrical outlets.**—In the shop area where portable equipment is used, an electrical outlet for every ten feet of wall space should be provided.

18) **Safety devices.**—Safety devices should be provided in all shops. These devices should be of the approved type and properly identified.

19) **Teacher's office and conference room.**—An office for the teacher and a conference room should be provided. Glass windows and doors are desirable in order to give the teacher a full view of the activities in the shop.

20) **Storage space for materials.**—Storage space for materials and an outside service door for the deliveries should be provided in each shop. This area should be located where it is convenient for issuing supplies to students in the classroom.

21) **Storage space for student projects.**—Separate lockers should be provided for each student. If costs will not permit, a room or space should be provided for the storage of unfinished projects of each class.

22) **Paint or finish room.**—A paint or finish room should be provided for each woodworking shop. The room should be dust-free and equipped with an exhaust fan. Windows should be on the north side in order to avoid direct sunshine.

23) **Library and planning area.**—A library and planning area should be included in the shop, and desks and tables should be provided for the students.
24) **Tool room or tool panel.**—A tool room or tool panel should be provided for each shop.

This set of recommended standards was used in Chapter III as a basis for the standards included in the checklist developed in that chapter. The wording of the standards as they appear in the checklist differ slightly from those presented above. The standards in the checklist were worded so they could be applied more effectively to each shop included in the survey. The recommended standards as presented above were stated in general terms as the recommendations made by the various authorities on each subject.
CHAPTER III

THE DEVELOPMENT OF A CHECKLIST FOR ANALYZING HOUSING FACILITIES PROVIDED FOR INDUSTRIAL ARTS PROGRAMS IN BEAUMONT, TEXAS

In Chapter II, the recommendations for industrial arts housing facilities as suggested by authorities in the field of schoolhousing were presented and discussed. From these recommendations, a composite set of recommended standards were presented in which the recommendations made by the authorities were compiled and restated.

This chapter presents a checklist which includes these recommended standards. The checklist was used to determine whether the housing facilities provided for the industrial arts programs in the Public Schools of Beaumont, Texas, met the current recommendations concerning adequate housing for industrial arts programs.

The recommended standards are restated and criteria are designed for use in determining the extent to which each standard has been observed in the planning and building of the housing facilities for industrial arts programs. These criteria are actually a set of questions, and each question makes inquiry concerning some particular phase or implication of the standard concerned. These standards, restated and
worded to ascertain the extent to which adequate housing facilities have been provided, are stated as follows:

Standard I

The industrial arts shop should be located in a wing of the main building or in a separate building easily accessible for delivery of materials and supplies; if the shop is located in a separate building, covered passageways should be provided to connect it with the main building; and heavy shops such as woodwork and metal classes are best located on the ground floor, with light shops such as mechanical drawing and electrical classes placed on upper floors; an industrial arts shop should never be placed in the basement of a school building.

1. Is the industrial arts shop located in the wing of the main building?

2. Is the industrial arts shop located in a separate building?

3. If the shop is located in a separate building, are connecting passageways provided?

4. Is the shop located so it is accessible for the delivery of materials and supplies?

5. Is the shop located on the ground floor?

6. Is the shop located in the basement of the building?

7. Is the shop located on an upper floor?

Standard II

There should be a work area of sixty to seventy-five square feet of floor space provided for each student in the industrial arts shop.

1. Is there a minimum of sixty square feet of floor space per student provided in the shop?

Standard III

The industrial arts shop should be rectangular in shape with proportions of 1:1\(\frac{1}{2}\) or 1:2.

1. Is the shop rectangular in shape?
2. Does the shop have proportions of 1:1\(\frac{1}{2}\)?
3. Does the shop have proportions of 1:2?

**Standard IV**

The floor should be constructed of hardwood with special footings provided for heavy machinery.

1. Is the floor constructed of hardwood?
2. Are special footings provided for heavy machinery?

**Standard V**

Diffused artificial lighting should be installed in the industrial arts shop to supplement natural lighting so the correct amount of foot candle power of light can be maintained.

1. Is the shop equipped with artificial lighting?
2. Is the artificial lighting diffused?

**Standard VI**

Thirty to forty foot candle power of light should be provided for the industrial arts shop, with fifty or more foot candle power of light for mechanical drawing and other work areas where precision work is done.

1. Is there a minimum of thirty foot candle power of light in the shop proper?
2. Is there a minimum of fifty foot candle power of light in shop areas where precision work is done?
3. Is there a minimum of fifty foot candle power of light in the mechanical drawing room?

**Standard VII**

The height of the industrial arts shop ceiling should range from a minimum of twelve feet to a maximum of fourteen feet.

1. Does the ceiling in the shop measure twelve feet or more in height?
Standard VIII

The window area of the industrial arts shop should equal one square foot of window space for every five square feet of floor space.

1. Does the square feet of window space equal one-fifth of the square feet of floor space in the industrial arts shop?

Standard IX

A demonstration area should be provided with a demonstration bench, portable blackboard, and seating area for students.

1. Is there a demonstration area provided for the shop?

2. Is a demonstration bench provided in the demonstration area?

3. Is a portable blackboard provided in the demonstration area?

4. Are seating facilities provided in the demonstration area?

Standard X

Exits and outside doors which are easily accessible should be provided in the industrial arts shop; one of the outside doors in the shop should be large enough for loading and unloading projects, supplies, and equipment.

1. Is there an adequate number of exits for the shop?

2. Is there an outside door large enough to load and unload projects, supplies, and equipment?

3. Are the exits and outside doors located where they are easily accessible?

Standard XI

Adequate washing facilities with hot and cold water should be provided in the industrial arts shop.

1. Are washing facilities provided in the shop?

2. Is there a ratio of one washing station for every ten students?
3. Is hot and cold water provided in the shop?

Standard XII

There should be an adequate number of drinking fountains installed in each industrial arts shop placed in full view of the instructor; and located so as not to cause congestion.

1. Is there a drinking fountain located in the shop?

2. Is the fountain placed in the shop so as to give the instructor a full view of it at all times?

3. Is the fountain located where it will not cause congestion of student traffic?

4. Is there a ratio of one fountain for every seventy-five students?

Standard XIII

Adequate toilet facilities should be located in each industrial arts shop or in easy access to each shop.

1. Are toilet facilities located in the shop?

2. Are toilet facilities located in easy access to the shop?

3. If the toilet facilities are located outside the shop, are they provided in a ratio of one to every ninety boys?

Standard XIV

Adequate ventilation facilities should provide enough fresh air to eliminate body odors and stuffiness from the room.

1. Do the ventilation facilities in the shop appear to be adequate?

Standard XV

Adequate heating facilities should be provided and a temperature of approximately sixty-eight degrees measured sixty inches above the floor should be maintained.
1. When outside conditions demand that the shop be heated, is there a controlled temperature of approximately sixty-eight degrees fahrenheit sixty inches above the floor?

Standard XVI

An adequate exhaust system should be installed in the industrial arts shop to carry off sawdust and shavings.

1. Is the woodworking shop equipped with an exhaust system to carry off sawdust and shavings?

2. Is there an exhaust system in the metal shop to remove or carry off fumes from welding?

3. Is there an exhaust system in the metal shop to remove or carry off fumes from soldering?

4. If a paint and finish room is provided, is it equipped with an exhaust fan?

Standard XVII

An electrical outlet for every ten feet of wall space should be provided in the industrial arts shop area where portable equipment is used.

1. Are electrical outlets provided where needed?

2. Are electrical outlets of an approved type?

3. Are electrical outlets provided for every ten feet of wall space in the industrial arts shop area where portable equipment is used?

Standard XVIII

Properly identified safety devices should be provided in the industrial arts shop.

1. Is there a main switch controlling all machinery in the shop?

2. Is the main switch properly identified?

3. Are the switches on the machines of an approved type?

4. Are the switches on the machines properly identified?
Standard XIX

A teacher's office and conference room should be provided in the shop area. Glass windows and doors are desirable to give the teacher a full view of the activities in the shop.

1. Is a teacher's office provided for the shop?
2. Is the teacher's office located in the shop area?
3. Are glass windows and doors provided to give the teacher a full view of shop activities?
4. Is there a conference room provided for the shop?
5. Is the conference room located in the shop area?

Standard XX

Storage space for materials, with an outside service door for deliveries, should be provided in each industrial arts shop; this area should be located where it is convenient for issuing supplies to students in the classroom.

1. Is storage space for materials and supplies provided?
2. Is there an outside service door for unloading supplies and materials?
3. Is the storage space located for convenience in issuing supplies to students?

Standard XXI

Separate lockers should be provided for storage for students' projects and equipment; if costs will not permit, a room or space should be provided for the unfinished projects of each class; all lockers and storage space should be located in or near to the industrial arts shop.

1. Is separate storage space provided for each pupil?
2. Is there a room or space provided for storage of projects of each class?
3. Is there a room or space provided for storage of projects of all classes?
4. Is the storage space located in or near the shop?

Standard XXII

A suitable paint and finish room should be provided for the industrial arts shop; the room should be dust-free; windows should be on the north side to avoid direct sunshine.

1. Is a paint and finish room provided for the woodwork shop?

2. Are the windows located on the north side to avoid direct sunshine?

3. Is the room dust-free?

4. Is a paint and finish room provided for the metal shop?

5. Are the windows located on the north side to avoid direct sunshine?

6. Is the room dust-free?

Standard XXIII

There should be a library and planning area included in the industrial arts shop layout, with desks or tables provided for the students.

1. Is a library and planning area provided for the shop?

2. Are tables or desks provided for the students?

Standard XXIV

A tool room or tool panels should be provided in all industrial arts shops where they are needed.

1. Is there a tool room provided for the shop?

2. Is the tool room located easily accessible to the pupils?

3. Is the tool room so arranged that it can be secured when not in use?

4. Is there a tool panel provided for the shop?
5. Is the tool panel located so as to make the tools easily accessible to the students?

6. Is the tool panel so arranged that the tools may be secured when not in use?

This foregoing checklist, which includes twenty-four standards concerning adequate housing facilities for industrial arts programs was compiled from the recommendations made by the authorities selected and was used to gather data presented in Chapter IV for making an analysis of the housing facilities provided for industrial arts programs in the schools of Beaumont, Texas. This analysis was made by applying the information recorded on the checklist to the particular standard under consideration to determine whether or not the shop met the standard.
CHAPTER IV

AN ANALYSIS OF THE HOUSING FACILITIES PROVIDED
FOR INDUSTRIAL ARTS PROGRAMS IN THREE SENIOR
HIGH SCHOOLS AND FOUR JUNIOR HIGH SCHOOLS
LOCATED AT BEAUMONT, TEXAS

Recommendations concerning adequate housing facilities for industrial arts as stated by authorities in the field of schoolhousing were presented in Chapter II. From these recommendations, a composite set of recommended standards was developed and used as a basis to establish the checklist presented in Chapter III. This checklist was used for recording data and information obtained concerning the present housing facilities provided for industrial arts. By presenting each standard included in the checklist and the information obtained in the survey relative to each standard, it was the purpose of this chapter to analyze the present housing facilities provided for industrial arts in the Public Schools in Beaumont, Texas, and to determine whether or not the facilities meet the recommended standards. There are twenty-four standards included in the checklist; each of these standards is stated in the order it appeared in the checklist and the results of the information obtained were analyzed according to that particular standard.
The first standard concerned the location of the industrial arts shop and stated that the shop should be located in a wing of the main building or in a separate building and that it should be easily accessible for the delivery of materials and supplies. If the industrial arts shop is located in a separate building, covered passageways should be provided to connect it with the main building. Heavy shops such as woodwork and metal shops should be located on the ground floor and light shops in which mechanical drawing and electrical classes are taught may be located on upper floors; an industrial arts shop should never be placed in the basement of a school building.

It was found that there were thirteen industrial arts shops or combination of shops in the seven schools included in the survey. Of these thirteen shops, nine were located in the main building; three shops were located in a separate building with covered passageways provided to connect them with the main building; one shop was located in a separate building without a passageway provided to connect it with the main building. Twelve of the industrial arts shops were located on the ground floor, and one mechanical drawing classroom was located on an upper floor; and all but one of the industrial arts shops were located so as to be easily accessible for the delivery of supplies and materials. This particular shop was situated in the middle of the main building in a classroom originally designed for regular academic subjects.
With two exceptions, the thirteen industrial arts shops met the above recommended standard concerning the location of shops. Those two exceptions included one shop which was located in a separate building without a covered passageway provided to connect the shop with the main building and one shop which was located in the middle of the main building so that the delivery of supplies was inconvenient.

In Standard II, it was stated that a work area of sixty to seventy-five square feet of floor space should be provided for each student in an industrial arts shop. Of the thirteen industrial arts shops included in the survey, two woodworking shops and one mechanical drawing classroom did not have a minimum of sixty square feet of floor space per student. The James Bowie Junior High School woodworking shop has only 34.9 square feet of floor space per student and the MacArthur Junior High School provides 39.1 square feet of floor space per student. In the mechanical drawing classroom in Dick Dowling Junior High School 20.6 square feet of floor space per student was provided. The other ten shops included in the study met the requirement for a work area in that an area of sixty or more square feet per student was provided. Approximately 77 per cent of the thirteen industrial arts shops did have an adequate work area in terms of square feet for the students.

The third standard developed in this investigation and included in the checklist concerning the shape of industrial
arts shops stated that the shop should be rectangular in shape with the proportions of $1:1\frac{1}{2}$ or $1:2$. In studying the information obtained concerning the shape and proportion of the thirteen shops, it was noted that twelve of the industrial arts shops were rectangular in shape and one woodworking shop located in the Beaumont High School was square in shape. Concerning the proportions of the shops, five shops had a proportion of $1:1\frac{1}{2}$ and one shop had a proportion of $1:2$; six of the industrial arts shops were rectangular in shape but did not meet the recommended proportions.

The type of floors recommended for industrial arts shops was included in the fourth standard. This standard stated that the floor should be constructed of hardwood with special footings provided for heavy machinery. In analyzing the information concerning the type of floors, it was found that of the seven woodworking shops included in the study, six of them had floors which were constructed of concrete and only one had a floor constructed of hardwood. Special footings for heavy machinery were provided in all of the shops where heavy machinery was used. The one general shop which was included in the study had a floor which was constructed of concrete with special footings provided for heavy machinery.

Five mechanical drawing classes were analyzed; two of the classroom floors were constructed of hardwood and three of the classroom floors were constructed of concrete; since none of the mechanical drawing classrooms were equipped with heavy machinery, special footings were not required.
It was noted in the analysis of the information concerning this standard that there were only three shops which had floors constructed of the type of material recommended. Ten of the industrial arts shops had floors which were constructed of concrete; special footings, however, were provided in all of the shops which were equipped with heavy machinery.

Standard V stated that diffused artificial lighting should be installed in industrial arts shops to supplement natural lighting so a correct amount of foot candle power of light could be maintained. In the checklist the two questions included to obtain the data for this standard were: Is the shop equipped with artificial lighting? Is the artificial lighting diffused? From the answers received with respect to the first question, it was found that all of the thirteen industrial arts shops were equipped with some type of artificial lighting. In the answers to the second question, it was found that all of the shops, with the exception of the mechanical drawing room in the South Park High School, were equipped with some type of diffused lighting.

The recommended amount of candle power of light which should be provided for industrial arts shops was given in Standard VI. This standard stated that from thirty to forty foot candles of light should be provided for industrial arts shops, and fifty or more foot candle power of light should be provided for mechanical drawing rooms and other areas where
precision work was done. A minimum of thirty foot candle power of light was provided in six of the woodworking shops and the one general shop; the lighting in one woodworking shop located in MacArthur Junior High School did not meet this recommended standard. In the areas where precision work was done in these shops it was found that six of the eight shops were provided with fifty or more foot candle power of light. Of the five mechanical drawing classrooms included in the survey, only one mechanical drawing classroom located in South Park High School had the minimum of fifty foot candle power of light.

Standards VII and VIII are concerned with the height of ceilings in the industrial arts shop and the amount of window area in the industrial arts shop. It was noted that the height of the ceilings in all but two of the thirteen shops met the recommended ceiling height which ranged from a minimum of twelve feet to a maximum of fourteen feet. In regard to the amount of window area which should be provided in industrial arts shops, it was recommended that there should be one square foot of window space for every five square feet of floor space. The data recorded on the checklist concerning this standard revealed that only six of the thirteen shops met this standard. This is approximately 46 per cent of the schools included in the study.

Standard IX stated that a demonstration area should be provided with a demonstration bench, portable blackboard, and seating area for students. Table 1 contains the information concerning the standard.
<table>
<thead>
<tr>
<th>Name of School and Phases of Industrial Arts Taught in Each</th>
<th>Is there a demonstration area provided for this type of work?</th>
<th>Is there a demonstration bench provided in the demonstration area?</th>
<th>Is there a portable blackboard provided in the demonstration area?</th>
<th>Are adequate seating facilities provided in the demonstration area?</th>
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<tbody>
<tr>
<td>Mechanical Drawing:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>David Crockett Jr. High</td>
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<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Dick Dowling Jr. High</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>Beaumont Senior High</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>French Senior High</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>South Park Senior High</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>General Industrial Arts:</td>
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<tr>
<td>Woodworking:</td>
<td></td>
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<tr>
<td>Dick Dowling Jr. High</td>
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<td>MacArthur Jr. High</td>
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</tr>
<tr>
<td>South Park Senior High</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The information in Table 1 shows that of the thirteen schools, ten had a demonstration area which was equipped with seating facilities for the students. In nine of the industrial arts shops a demonstration bench had been provided, and in only two schools was there a portable blackboard available for demonstration purposes.

The information in the table indicates that the necessity for providing a demonstration area and seating facilities for the industrial arts shops has been recognized, but that many of the shops still lack an area set aside for this purpose with adequate teaching aids such as a demonstration bench and portable blackboard.

In the tenth standard included in the checklist, the subject of exits and outside doors was considered. This standard stated that exits and outside doors which are easily accessible should be provided in the industrial arts shop, and one of the outside doors in the shop should be large enough for loading and unloading projects, supplies, and equipment. The results of the information obtained concerning this standard indicated that twelve of the industrial arts shops had an adequate number of exits, but in one shop there was one exit provided which was considered inadequate for the number of students and the shape of the shop. Eight of the shops had been provided with service doors for the loading and unloading of supplies, equipment, and projects; all
exits and outside doors were located easily accessible to the students.

Standard XI stated that adequate washing facilities with hot and cold water should be provided with a ratio of one wash basin to each ten students. In nine of the shops washing facilities were provided for the students; but only seven of the nine shops provided one washing station for each ten students; eight of the shops were equipped with washing facilities which had both hot and cold water. These data indicate that only 69 per cent of the schools provided washing facilities of any type in the shop for the student. In those shops in which these facilities were not provided, it was necessary for the student to leave his work and go elsewhere to the nearest washing station, thus increasing his opportunities for developing bad work habits by loafing on the job.

In the twelfth standard another health factor in the industrial arts shop was considered. The standard stated that an adequate number of drinking fountains should be installed in each shop so as not to cause congestion and located where they would be in full view of the instructor at all times. Table 2 presents the information obtained concerning this standard. Since the answers to the questions asked in relation to this standard indicated that most of the schools had not considered the standard important, it was believed that information could be presented more effectively in table form.
### TABLE 2

**INFORMATION CONCERNING DRINKING FACILITIES PROVIDED IN INDUSTRIAL ARTS SHOPS IN SEVEN SCHOOLS IN BEAUMONT, TEXAS**

<table>
<thead>
<tr>
<th>Name of School and Phases of Industrial Arts Taught in Each</th>
<th>Is there a drinking fountain in the shop?</th>
<th>Is the fountain placed so as to give the instructor a full view of it at all times?</th>
<th>Is the fountain located where it will not cause congestion?</th>
<th>Is there a ratio of one fountain for every twenty-five students?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanical Drawing:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>David Crockett Jr. High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Dick Dawling Jr. High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Beaumont Senior High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>French Senior High</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>South Park Senior High</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>General Industrial Arts:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Park Senior High</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Woodworking Shop:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>David Crockett Jr. High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Dick Dawling Jr. High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>James Bowie Jr. High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>MacArthur Jr. High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Beaumont Senior High</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>French Senior High</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>South Park Senior High</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The information presented in Table 2 shows that a drinking fountain was provided in the shop proper in only five of the thirteen industrial arts shops included in the study; this is approximately 38 per cent. Three of the five industrial arts shops in which drinking facilities were provided for the students met the rest of the requirements of this standard. The drinking facilities were placed so as to be in full view of the instructor at all times, located where they would not cause congestion, and installed in a ratio of one for every twenty-five students. The mechanical drawing classroom in South Park High School met the portion of the standard that recommended one fountain for every twenty-five students, while the one general shop included in the study was provided with a fountain located where it would not cause congestion and provided one drinking fountain for every twenty-five students.

In Standard XIII adequate toilet facilities were considered. The standard stated that toilet facilities should be located in each industrial arts shop or in easy access to each shop. The questions relative to this standard were: Are toilet facilities located in the shop? Are toilet facilities located in easy access to the shop? If toilet facilities are located outside the shop, are they provided in a ratio of one to every ninety boys? These three questions and the answers received to them are shown in Table 3. Where the question did not apply to a particular shop, the space for the answer was left blank.
<table>
<thead>
<tr>
<th>Name of School and Phases of Industrial Arts Taught</th>
<th>Mechanical Drawing</th>
<th>Woodworking: David Crockett Jr. High, Dick Dowling Jr. High, MacArthur Jr. High, Beaumont Senior High, French Senior High, South Park Senior High, South Park Senior High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are toilet facilities located in the shop?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Are toilet facilities located in easy access to the shop</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>If toilet facilities are located outside of the shop, are they provided in a ratio of one to every ninety boys?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
With the exception of three shops, data in Table 3 revealed that all of the shops have toilet facilities located in or in easy access to them. The three shops which did not have these facilities conveniently located were located in two schools, they were the woodworking shop and mechanical drawing classroom in David Crockett Junior High School and the woodworking shop in MacArthur Junior High School. Of the ten shops where toilet facilities are provided in or near the shops, three shops have the toilet facilities located in the shop proper and seven of the shops have the facilities located in easy access to the shop. Approximately 76 per cent of the industrial arts shops included in the study met Standard XIII.

It was found that ten of the shops met the recommended standard concerning ventilation facilities. This standard stated that the ventilation facilities should provide enough fresh air to eliminate body odors and stuffiness from the room. The ventilation facilities in three of the shops did not meet this standard because of the location of the windows in the room combined with the small amount of window space provided.

In Standard XV, adequate heating facilities for industrial arts shops were considered. It was recommended that a temperature of approximately sixty-eight degrees measured sixty inches above the floor be maintained. The data obtained concerning temperature in the shops disclosed that all
the shops appeared to have adequate heating facilities. Only
one woodworking shop located in the James Bowie Junior High
School had a heating system which permitted the shop instruc-
tor to control the temperature at all times.

Standard XVI was concerned with providing adequate ex-
haust systems installed to carry off sawdust and shavings.
This investigation revealed that only one woodworking shop
and the paint and finish room for the woodworking shop located
at South Park High School was equipped with an exhaust system.
In the general shop located in the same school, an exhaust
fan had been provided for welding fumes but none had been pro-
vided for the soldering rooms. This information revealed
that only one school out of seven or less than 16 per cent
of all of the shops included in the study had been provided
with means for the removal of sawdust and shavings. Eighty-
four per cent of the shops included in the study did not meet
this standard.

All of the industrial arts shops, with the exception
of the mechanical drawing classroom in South Park High School,
partially met the seventeenth standard included in the check-
list. This standard stated that an electrical outlet for
every ten feet of wall space should be provided in the shops
where portable equipment is used. In the mechanical drawing
classroom in South Park High School there was not an electri-
cal outlet of any type provided; in the other shops electrical
outlets were provided and found to be an approved type. None
of the eight heavy shops or the five mechanical drawing classrooms included in the study had electrical outlets provided for every ten feet of wall space. This indicated that twelve of the thirteen shops partially met the standard and that all of the schools involved had electrical outlets provided in some if not all of the industrial arts shops.

One standard was concerned with properly identified safety devices in the shops. The first and second questions that were asked relative to this standard were: Is there a main switch controlling all machinery in the shop? Is the main switch properly identified? It was found that five of the seven woodworking shops and the one general shop did have main switches installed which controlled all of the machinery in the shop; four of these main switches were properly identified. It was noted that out of a total of eight shops which were affected by these two questions only two of the shops did not have main switches provided. The last two questions asked in relation to the standard were: Are the switches on the machines properly identified? These questions affected seven of the woodworking shops and the one general shop and the mechanical drawing room which is equipped with a blueprint machine and located in Beaumont High School. The investigation indicated that all of the machines had properly identified switches of the approved type.

Standard XIX stated that an office for the teacher and a conference room should be provided in the shop, and that
it was desirable to have glass windows and doors in order to
give the teacher a full view of the activities in the shop.
The information obtained concerning this standard revealed
that none of the thirteen shops included in the study were
designed to provide an office for the instructor. In most
of the shops, the teacher had a desk placed without thought
or plan somewhere in the classroom or shop proper. The data
further revealed that there was no conference space or room
provided in any of the thirteen shops.

Of the thirteen shops included in the study, nine of
them met the twentieth standard concerning adequate storage
space for materials and supplies which was located in easy
access for issuing supplies to students. The four shops which
did not meet the standard were the mechanical drawing class-
rooms located in the David Crockett and Dick Dowling Junior
High Schools and the woodworking shops located in James Bowie
and MacArthur Junior High Schools. The standard also stated
that the shops should have an outside service door for deliv-
eries. It was found that six of the thirteen shops did meet
this part of the standard.

Standard XXI concerns storage space for students' pro-
jects. This standard stated that, if costs permit, a separate
locker should be provided for each student; however, if sep-
arate lockers are not available, a room or space should be
provided for each class. There were four shops in which sep-
arate storage space for student work was provided; these four
shops included the two woodworking shops at Dick Dowling Junior High and French Senior High and the one general shop and the mechanical drawing classroom located at South Park Senior High. Approximately 31 per cent of the shops were provided with separate lockers for the storage of students' projects. Of the remaining nine shops, four of them met the standard in part in that a room or space was provided for the projects of each class. Only one school did not provide storage space of any kind, and that was the woodworking shop located in James Bowie Junior High School. All of the storage areas were located in or near the shops in the twelve shops in which provision had been made for some type of storage for the projects.

Standard XXII stated that a suitable paint and finish room, dust free and with windows located on the north side to avoid direct sunshine, should be provided. Of the seven woodworking shops included in the study, four did have paint and finish rooms. Only one of these rooms was dust free, and none of them had windows located on the north side and thus avoid direct sunshine. The one general shop included in the study was the only shop in which metal work is taught, and it did not have a paint and finish room. This indicated that of the eight shops where a paint and finish room was needed, only 50 per cent of all of the shops met this part of the standard.
In Standard XXIII, it was stated that a library and planning area should be included in the industrial arts shop layout with desks or tables provided for the students. From the data obtained, it was determined that six of the thirteen shops did have library and planning areas; in all of these shops, this area was equipped with tables and chairs or desks or a combination of the two.

The necessity of a tool room or tool panels in industrial arts shops was emphasized in the last standard. This standard stated that, in the shops where they are needed, a tool room or tool panels should be provided, located easily accessible to the students, and constructed so they can be secured when not in use. This standard applied to the eight heavy shops included in the survey. Six of the seven wood-working shops had tool panels, and one shop, located in David Crockett Junior High School, had a tool room; the one general shop had tool panels. In all of these shops, the tool panels or tool rooms were located so as to be easily accessible to the students and were constructed so they could be secured when not in use. This was the only standard of the entire twenty-four standards included in the checklist which was met one hundred per cent by all of the industrial arts shops involved.

The data concerning the present housing facilities provided for industrial arts in seven schools located in Beaumont, Texas, have been presented and analyzed in the
light of recommended standards set forth in the checklist. It should be noted that the aforementioned standards were developed from the current recommendations concerning adequate housing facilities for industrial arts as stated by authorities in the field of schoolhousing.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This was a study to determine whether or not the housing facilities provided for the industrial arts programs in the Public Schools of Beaumont, Texas, met the current recommendations concerning housing facilities as stated by authorities in the field of schoolhousing. These authorities included such individuals as Gordon O. Wilber, Arthur B. Mayes, and Carl H. Casberg; and standards developed and recommended by the American Association of School Administrators, National Council on Schoolhouse Construction, and by individuals who have written articles on the subject which have appeared in the different issues of The American School and University.

Chapter I introduced the study and presented the need for information concerning adequate housing facilities for industrial arts in relation to the facilities already provided due to the remodeling and new construction work that has been planned for the schools since the increase in school enrollments made expansion necessary.

In Chapter II, the current recommendations concerning adequate housing facilities for industrial arts as stated by
each of the authorities selected for the study were presented and discussed. The recommendations were studied for meaning and duplication and a composite set of recommendations was compiled and presented.

Chapter III was concerned with the development of evaluative criteria in the form of a checklist to be used for recording and studying the data secured concerning the present housing facilities provided for industrial arts programs. This checklist contained twenty-four standards and included those items considered necessary with respect to adequate facilities. A group of questions were developed and presented with each standard which made inquiry concerning each of the standards. Each of the schools included in the study was visited and the checklist was applied to each school.

In Chapter IV, a critical analysis was made of the data concerning the present housing facilities provided for industrial arts programs in the schools included in the survey. The data were analyzed in the light of the recommended standards contained in the checklist and developed and presented in Chapter III.

Conclusions

When the data obtained concerning the present housing facilities for the industrial arts programs in the Public Schools of Beaumont, Texas were analyzed, the following
conclusions evolved from the study:

(1) The present housing facilities provided for the thirteen industrial arts shops in the public schools in Beaumont, Texas partially met the recommended standards for adequate schoolhousing.

(2) The location of eleven of the thirteen industrial arts shops satisfactorily met the recommended standard concerning location.

(3) Ten of the industrial arts shops met the standard with respect to providing a minimum of sixty square feet of working space per student.

(4) Twelve of the industrial arts shops were rectangular in shape which is recommended; one of the industrial arts shops was square; the layout of six of the twelve shops had proportions of 1:1\(\frac{1}{2}\) or 1:2.

(5) The floors in seven of the eight industrial arts shops classified as heavy shops were made of concrete and special footings for heavy machinery had been provided in each of them.

(6) Of the five mechanical drawing rooms, two had floors made of hardwood and three had floors made of concrete.

(7) All of the industrial arts shops were equipped with some type of artificial lighting, and all but one of the mechanical drawing classrooms had diffused lighting.

(8) The recommended minimum of thirty foot candle power of light was provided in six of the seven woodworking shops.
and in the one general shop; in the areas where precision work is done, the lighting in six of the eight shops classified as heavy shops met the recommended standard which specifies a minimum of fifty foot candle power of light.

(9) Only one of the five mechanical drawing classrooms met the recommended standard which specifies a minimum of fifty foot candle power of light where precision work is done.

(10) Eleven of the thirteen industrial arts shops had ceilings which are twelve feet or more in height.

(11) Six of the thirteen industrial arts shops met the standard concerning the ratio of window area which should be equal to one fifth of the floor area of the shop.

(12) Demonstration areas with adequate seating facilities were provided in ten of the industrial arts shops.

(13) A demonstration bench was provided in nine of the shops; for instructional purposes, only two of the shops had portable blackboards.

(14) Twelve of the industrial arts shops had an adequate number of exits and outside doors located so as to be easily accessible to the students; eight of the thirteen industrial arts shops had service doors for loading and unloading materials, supplies, and projects.

(15) Seven of the thirteen industrial arts shops were equipped with washing facilities and met the recommended standard concerning washing facilities.
(16) In only five of the thirteen industrial arts shops included in the study were drinking facilities provided in the shop proper for the students.

(17) In ten of the industrial arts shops toilet facilities were in the shop or in easy access to the industrial arts shop.

(18) Of the thirteen industrial arts shops included in the study, ten of them met the recommended standard concerning ventilation facilities.

(19) In all of the industrial arts shops some type of heating facilities was provided but in only one shop was there controlled heating.

(20) Only one shop, a woodworking shop, was provided with an exhaust system for removing the sawdust and shavings; this same shop also had an exhaust fan installed in the paint and finish room to remove the fumes and dust. The one general shop included in the study provided an exhaust fan for the removal of welding fumes.

(21) In twelve of the thirteen industrial arts shops the electrical outlets were of an approved type; one of the mechanical drawing rooms had no electrical outlets installed in the room.

(22) Six of the eight industrial arts shops classified as heavy shops had main switches which control all of the machinery in the shop, and four of the six main switches were properly identified; all of the machines in the heavy
shops and one blueprint machine had properly identified switches of the approved type.

(23) An office for the teacher and conference room were not provided in any of the thirteen industrial arts shops.

(24) In nine of the thirteen industrial arts shops storage space had been provided for materials and supplies, and seven of the nine heavy shops were provided with outside service doors; all storage areas were located in easy access to the students.

(25) In twelve of the shops some type of storage space had been provided for student projects; three of the shops, however, did not meet the recommended standard, and one shop had no storage space at all.

(26) Four of the seven woodworking shops had a paint and finish room; none of these rooms however, had windows located on the correct side of the room. One of the paint and finish rooms was equipped with an exhaust fan to keep it dust free.

(27) A library and planning area had been provided in six of the thirteen shops included in the study.

(28) The eight heavy shops had tool panels or tool rooms which are easily accessible to the students and were constructed in a manner so that they can be secured when not in use.
Based upon the foregoing conclusions presented, it is believed, that although most of the industrial arts shops included in the study meet the majority of the recommended standards concerning adequate housing facilities either partially or completely, there is still room for many improvements to be made.

Recommendations

The following recommendations are offered and these recommendations are based upon the results of this analysis made and the recommended standards included in the study:

(1) With respect to the location of the shops, it is recommended that the MacArthur Junior High School provide some type of covered passageway to connect the industrial arts shop to the main building.

(2) It is recommended that the administration study the student enrollment in all of the industrial arts shops with respect to providing at least sixty square feet of working space per student.

(3) The lighting facilities and condition in the mechanical drawing classrooms should be checked and tested by authorized personnel in order to determine improvements which are necessary to provide adequate lighting.

(4) In approximately 50 per cent of all of the shops, the window area should be increased to meet the recommended standard of at least one square foot of window space to each five square feet of floor space.
(5) Adequate drinking facilities should be provided in all of the industrial arts shops.

(6) Adequate washing facilities should be provided in all of the industrial arts shops.

(7) Provisions should be made for heating facilities in order that the room temperature can be controlled by the shop instructor in each industrial arts shop.

(8) Exhaust systems should be installed in all of the industrial arts shops.

(9) A properly identified main switch which will control all of the machines should be installed in each shop.

(10) An office for the teacher and a conference room should be provided in each of the industrial arts shops.

(11) Adequate space should be provided for the storage of students' projects in each shop.

(12) A paint and finish room equipped with an exhaust system and proper lighting of an approved type should be provided in each shop where needed.

(13) A library and planning area should be provided for each industrial arts shop.
APPENDIX

A Checklist for Analyzing the Housing Facilities Provided for Industrial Arts Programs

Name of School___________________________________________________________

Location____________________ Date____________________

Phase of industrial arts taught__________________________________________

Checked by____________________________________________________________

The following checklist contains recommended standards for housing facilities in industrial arts programs. After each standard there are questions which make inquiry concerning each particular phase and implication of the standard concerned.

The checklist was developed from a composite set of recommended standards based on the recommendations of authorities in the field of schoolhousing, and was developed to serve as a means for analyzing the housing facilities provided for industrial arts programs.

Standard I

The industrial arts shop should be located in a wing of the main building or in a separate building easily accessible for delivery of materials and supplies; if the shop is located in a separate building, covered passageways should be provided to connect it with the main building; and heavy shops such as woodwork and metal classes are best located on the ground floor, with light shops such as mechanical drawing and electrical classes placed on upper floors; an industrial arts shop should never be placed in the basement of a school building.
1. Is the industrial arts shop located in the wing of the main building? Yes (__) No (___)

2. Is the industrial arts shop located in a separate building? Yes (__) No (___)

3. If the shop is located in a separate building, are connecting passageways provided? Yes (__) No (___)

4. Is the shop located so it is accessible for the delivery of materials and supplies? Yes (__) No (___)

5. Is the shop located on the ground floor? Yes (__) No (___)

6. Is the shop located in the basement of the building? Yes (__) No (___)

7. Is the shop located on an upper floor? Yes (__) No (___)

Standard II

There should be a work area of sixty to seventy-five square feet of floor space provided for each student in the industrial arts shop.

1. Is there a minimum of sixty square feet of floor space per student provided in the shop? Yes (__) No (___)

Standard III

The industrial arts shop should be rectangular in shape with proportions of 1:1½ or 1:2.

1. Is the shop rectangular in shape? Yes (__) No (___)

2. Does the shop have proportions of 1:1½? Yes (__) No (___)

3. Does the shop have proportions of 1:2? Yes (__) No (___)

Standard IV

The floor should be constructed of hardwood with special footings provided for heavy machinery.
1. Is the floor constructed of hardwood? Yes (___) No (___)

2. Are special footings provided for heavy machinery? Yes (___) No (___)

**Standard V**

Diffused artificial lighting should be installed in the industrial arts shop to supplement natural lighting so the correct amount of foot candle power of light can be maintained.

1. Is the shop equipped with artificial lighting? Yes (___) No (___)

2. Is the artificial lighting diffused? Yes (___) No (___)

**Standard VI**

Thirty to forty foot candle power of light should be provided for the industrial arts shop, with fifty or more foot candle power of light for mechanical drawing and other work areas where precision work is done.

1. Is there a minimum of thirty foot candle power of light in the shop proper? Yes (___) No (___)

2. Is there a minimum of fifty foot candle power of light in shop areas where precision work is done? Yes (___) No (___)

3. Is there a minimum of fifty foot candle power of light in the mechanical drawing room? Yes (___) No (___)

**Standard VII**

The height of the industrial arts shop ceiling should range from a minimum of twelve feet to a maximum of fourteen feet.

1. Does the ceiling in the shop measure twelve feet or more? Yes (___) No (___)

**Standard VIII**

The window area of the industrial arts shop should equal one square foot of window space for every five square feet of floor space.
1. Does the square feet of window space equal one fifth of the square feet of floor space in the industrial arts shop? Yes (___) No (___)

**Standard IX**

A demonstration area should be provided with a demonstration bench, portable blackboard, and seating area for students.

1. Is there a demonstration area provided for the shop? Yes (___) No (___)

2. Is a demonstration bench provided in the demonstration area? Yes (___) No (___)

3. Is a portable blackboard provided in the demonstration area? Yes (___) No (___)

4. Are seating facilities provided in the demonstration area? Yes (___) No (___)

**Standard X**

Exits and outside doors which are easily accessible should be provided in the industrial arts shop; one of the outside doors in the shop should be large enough for loading and unloading projects, supplies, and equipment.

1. Is there an adequate number of exits for the shop? Yes (___) No (___)

2. Is there an outside door large enough to load and unload projects, supplies, and equipment? Yes (___) No (___)

3. Are the exits and outside doors located where they are easily accessible? Yes (___) No (___)

**Standard XI**

Adequate washing facilities with hot and cold water should be provided in the industrial arts shop.

1. Are washing facilities provided in the shop? Yes (___) No (___)

2. Is there a ratio of one washing station for every ten students? Yes (___) No (___)
3. Is hot and cold water provided in the shop?  
   Yes (__)  No (__)  

Standard XII

There should be an adequate number of drinking fountains  
installed in each industrial arts shop; placed in full  
view of the instructor; and located so as not to cause  
congestion.

1. Is there a drinking fountain located in the shop?  
   Yes (__)  No (__)  

2. Is the fountain placed in the shop so as to give the  
   instructor a full view of it at all times?  
   Yes (__)  No (__)  

3. Is the fountain located where it will not cause  
   congestion?  Yes (__)  No (__)  

4. Is there a ratio of one fountain for every seventy- 
   five students?  Yes (__)  No (__)  

Standard XIII

Adequate toilet facilities should be located in each  
industrial arts shop or in easy access to each shop.

1. Are toilet facilities located in the shop?  
   Yes (__)  No (__)  

2. Are toilet facilities located in easy access to the  
   shop?  Yes (__)  No (__)  

3. If the toilet facilities are located outside the  
   shop, are they provided in a ratio of one to every  
   ninety boys?  Yes (__)  No (__)  

Standard XIV

Adequate ventilation facilities should provide enough  
fresh air to eliminate body odors and stuffiness from  
the room.

1. Do the ventilation facilities in the shop appear  
   to be adequate?  Yes (__)  No (__)  

Standard XV

Adequate heating facilities should be provided and a tem- 
perature of approximately sixty-eight degrees measured  
sixty inches above the floor should be maintained.
1. When outside conditions demand that the shop be heated, is there a controlled temperature of approximately sixty-eight degrees fahrenheit sixty inches above the floor? Yes (___) No (___)

Standard XVI

An adequate exhaust system should be installed in the industrial arts shop to carry off sawdust and shavings.

1. Is the woodworking shop equipped with an exhaust system to carry off sawdust and shavings? Yes (___) No (___)

2. Is there an exhaust system in the metal shop to remove or carry off fumes from welding? Yes (___) No (___)

3. Is there an exhaust system in the metal shop to remove or carry off fumes from soldering? Yes (___) No (___)

4. If a paint and finish room is provided, is it equipped with an exhaust fan? Yes (___) No (___)

Standard XVII

An electrical outlet for every ten feet of wall space should be provided in the industrial arts shop area where portable equipment is used.

1. Are electrical outlets provided where needed? Yes (___) No (___)

2. Are electrical outlets of an approved type? Yes (___) No (___)

3. Are electrical outlets provided for every ten feet of wall space in the industrial arts shop area where portable equipment is used? Yes (___) No (___)

Standard XVIII

Properly identified safety devices should be provided in the industrial arts shop.

1. Is there a main switch controlling all machinery in the shop? Yes (___) No (___)
2. Is the main switch properly identified? Yes(____) No (____)

3. Are the switches on the machines of an approved type? Yes (____) No (____)

4. Are the switches on the machines properly identified? Yes (____) No (____)

Standard XIX

A teacher's office and conference room should be provided in the shop area. Glass windows and doors are desirable to give the teacher a full view of the activities in the shop.

1. Is a teacher's office provided for the shop? Yes (____) No (____)

2. Is the teacher's office located in the shop area? Yes (____) No (____)

3. Are glass windows and doors provided to give the teacher a full view of shop activities? Yes (____) No (____)

4. Is there a conference room provided for the shop? Yes (____) No (____)

5. Is the conference room located in the shop area? Yes (____) No (____)

Standard XX

Storage space for materials, with an outside service door for deliveries, should be provided in each industrial arts shop; this area should be located where it is convenient for issuing supplies to students in the classroom.

1. Is there storage space for materials and supplies? Yes (____) No (____)

2. Is there an outside service door for unloading supplies and materials? Yes (____) No (____)

3. Is the storage space located for convenience in issuing supplies to students? Yes (____) No (____)
Standard XXI

Separate lockers should be provided for storage for students' projects and equipment; if costs will not permit, a room or space should be provided for the unfinished projects of each class; all lockers and storage space should be located in or near to the industrial arts shop.

1. Is separate storage space provided for each pupil? Yes (__) No (__)

2. Is there a room or space provided for storage of projects of each class? Yes (__) No (__)

3. Is there a room or space provided for storage of projects of all classes? Yes (__) No (__)

4. Is the storage space located in or near the shop? Yes (__) No (__)

Standard XXII

A suitable paint and finish room should be provided for the industrial arts shop; the room should be dust free; windows should be on the north side to avoid direct sunshine.

1. Is a paint and finish room provided for the woodwork shop? Yes (__) No (__)

2. Are the windows located on the north side to avoid direct sunshine? Yes (__) No (__)

3. Is the room dust free? Yes (__) No (__)

4. Is a paint and finish room provided for the metal shop? Yes (__) No (__)

5. Are the windows located on the north side to avoid direct sunshine? Yes (__) No (__)

6. Is the room dust free? Yes (__) No (__)

Standard XXIII

There should be a library and planning area included in the industrial arts shop layout, with desks or tables provided for the students.
1. Is a library and planning area provided for the shop? Yes (_) No (_)

2. Are tables or desks provided for the students? Yes (_) No (_)

Standard XXIV

A tool room or tool panels should be provided in all industrial arts shops where they are needed.

1. Is there a tool room provided for the shop? Yes (_) No (_)

2. Is the tool room located easily accessible to the pupils? Yes (_) No (_)

3. Is the tool room so arranged that it can be secured when not in use? Yes (_) No (_)

4. Is there a tool panel provided for the shop? Yes (_) No (_)

5. Is the tool panel located so as to make the tools easily accessible to the students? Yes (_) No (_)

6. Is the tool panel so arranged that the tools may be secured when not in use? Yes (_) No (_)
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