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Industrial arts education is designed specifically to help prepare individuals for meeting the requirements of a technological culture. It is an integral part of education from kindergarten through higher education which provides representative experiences in industrial skills and processes. This planned program requires special facilities which may be of these major types: unit, limited general, or comprehensive general school shops. These are selected to match the objectives of the instructional program. Such instruction is more commonly offered by regular elementary classroom teachers and specialized secondary teachers. The content of courses are presented according to levels for each major area of industrial arts. These levels are typically represented as Level I, Introductory; Level II, Basic; Level III, Intermediate; and Level IV, Advanced; and they represent levels of performance as well as knowledge complexity. Supervisors of industrial arts are concerned with one basic objective, that is, the improvement of instruction. This is accomplished by stimulating, guiding, assisting, and leading teachers to evaluate their attitudes, practices, educational activities, and teacher procedures. A list of members of the American Council of Industrial Arts Supervisors is included. (EM)

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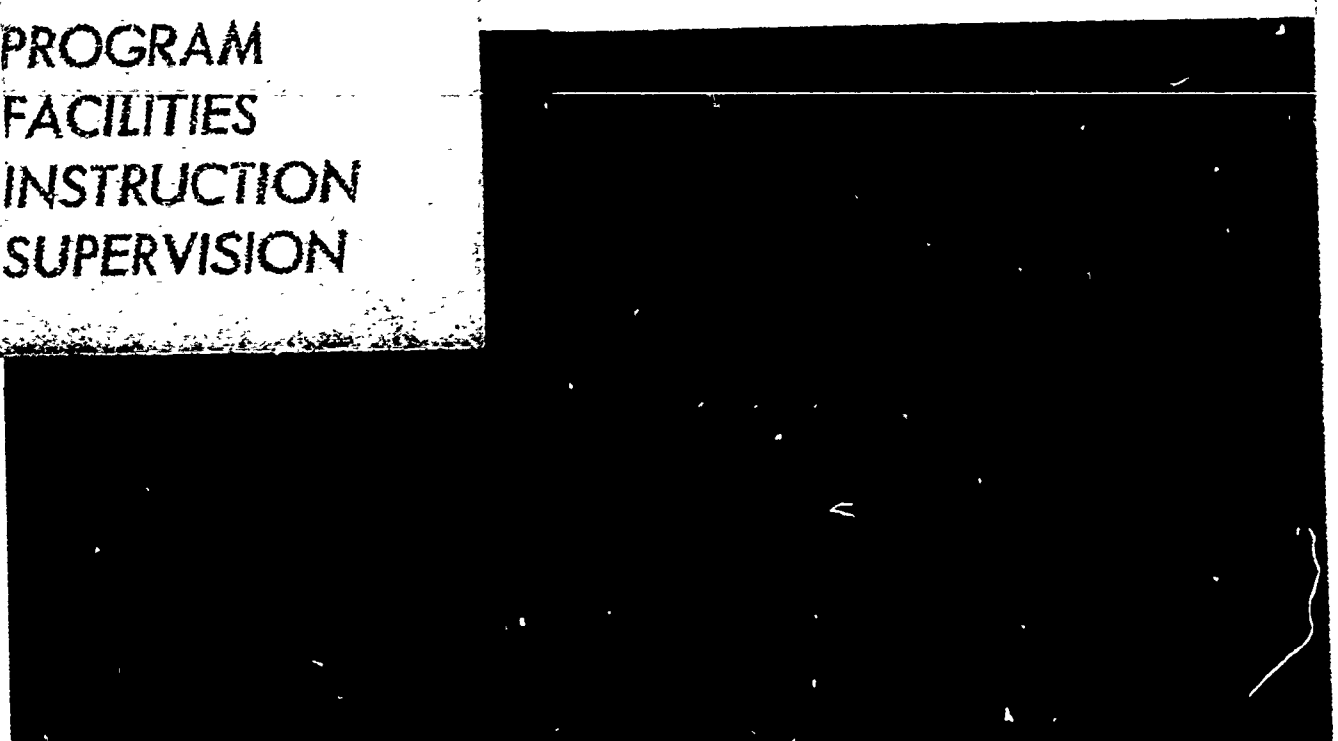

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

American Council of Industrial Arts Supervisors

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Revised Edition

INDUSTRIAL ARTS EDUCATION

Purposes * Program * Facilities * Instruction * Supervision

American Council of Industrial Arts Supervisors

American Industrial Arts Association
Washington, D.C.

A Department of the
National Education Association of the United States

Orders for and requests about this bulletin should be addressed to the Executive Secretary-Treasurer, American Industrial Arts Association, Inc., 1201 Sixteenth St., N.W., Washington, D.C. 20036

A Word About Terminology...

In this publication, the terms *industrial arts* and *industrial arts education* are used to describe that part of the total program of education concerned with providing youth an opportunity to study about and to use tools, machines, materials, and processes of industrial-technical fields. Industrial arts education is provided at the elementary school, secondary school, adult school, and college/university levels.

Industrial arts education is a *subject field.* An *area* of industrial arts is a division of the subject field and is composed of a number of closely allied activities from an industrial-technical field. As an example, metals is an area of industrial arts. A *subarea* of industrial arts is a subdivision of an area and represents a branch of an industrial-technical field. As an example, subareas such as art metal, bench metal, forging, foundry, metal machining, sheet metal, and welding are included in the area of metals.

The terms *unit, limited general,* and *comprehensive general* are used in this publication to describe three major types of shop/laboratory organization. A *unit shop/laboratory* is organized and equipped to provide instruction in a single subarea of industrial arts such as cabinet-making, metal machining, or sheet metal. A *limited general shop/laboratory* is organized and equipped to provide instruction in two or more subareas of industrial arts. A limited general shop/laboratory in the area of graphic arts includes subareas such as binding, block printing, letterpress printing, offset lithography, photography, silk-screen printing, and type setting. A *comprehensive general shop/laboratory* is organized and equipped to provide instruction in two or more areas of industrial arts such as drafting, electricity/electronics, metals, and woods.

Terms used in this publication are based upon the terminology presented in *Standard Terminology for Instruction in Local and State School Systems,* Washington, D.C.: U.S. Office of Education, 1967.

SECTION ONE

Purposes of Industrial Arts Education

"Man is a tool using animal . . . Nowhere do you find him without tools; without tools he is nothing, with tools he is all."
—Thomas Carlyle. *Sartor Resartus.* Book 1, Chapter 5

The rapid advance of industrial technology has had and will continue to have an overwhelming impact on society. Industrial ingenuity has brought about new materials, methods, and developments. Automation, increased production, scientific engineering, and changing occupational needs are indicators of dynamic technological progress. In its wake a new pattern of American family life is evolving.

Knowledge of the impact of automation on society, the decentralization of industry, the development of economic interdependence, the fundamental principles of industrial processes, and the utilization of human resources are desirable if today's citizens are to function intelligently.

Industrial arts education is designed specifically to help prepare individuals for meeting the requirements of a technological culture. The educated man of today must understand and make judgments regarding the effect of all elements of his environment. Industrial arts, as an integral part of the total program of education from kindergarten through higher education, provides unique opportunities for students to participate in representative experiences in industrial skills and processes. These experiences also apply English, mathematics, science, and other school subjects. Industrial arts assists in the discovery and development of personal aptitudes, interests, creative technical abilities, self-reliance, sound judgment, and resourcefulness through problem solving and self expression in an environment related to industry.

Experiences in industrial arts contribute to the needs of all students and should be made available at every grade level.

Special classrooms and shops/laboratories are needed to aid the teacher and students to achieve the basic purposes of industrial arts. Tools, machines, and materials are provided in specially designed facilities for use by the students, under the guidance of a qualified teacher, to meet the needs and individual purposes of the learners.

Industrial arts brings about wholesome changes in the learner by affecting his habits, attitudes, and understandings. These changes take the form of a developed interest in the man-made physical world. They are brought about by: (1) a knowledge of how materials are produced and fabricated; (2) an understanding of the place of tools, machines, and men in industrial processes; (3) the evaluation of the learner's attitude toward craftsmanship and constructive work; (4) the utilization of such work for health, recreation, and economic values; and (5) the development of a favorable attitude toward creative thinking.

One of the characteristics of industrial arts is that the problems and projects planned for or selected by the students are meaningful to them and have educational value. The students learn through these direct experiences with tools, machines, and materials, and through close working association with classmates and teachers. The application of an idea, from its inception in the mind of a learner, includes planning, designing, modifying, evaluating, laying out, cutting, shaping, fabricating, and finishing.

To provide a sound program of industrial arts, clear, realistic objectives are essential. The following four statements of purpose are unique to industrial arts:

To develop in each student an insight and understanding of industry and its place in our society. Since industry is a constructive, dynamic force in the world today, it is the responsibility of the school to provide opportunities for each student to understand this force better. Industrial arts provides significant learning experiences relating to industry in which students acquire skill in performance and knowledge of principles and theory through study and application.

To discover and develop student talents in industrial-technical fields. Students have a diversity of talents. The school's responsibility is to assist students in discovering and developing these talents. It is the responsibility of industrial arts education to identify special talents in industrial-technical fields.

To develop problem-solving abilities related to the materials, processes, and products of industry. The problem-solving approach in industrial arts involves creative thinking, and gives the student opportunity to apply principles of planning and design, construction techniques, industrial processes, scientific principles, and mathematical computations to the solution of problems.

To develop in each student skill in the proficient and safe use of tools and machines. Industrial arts provides planning, construction, and production activities which enable students to acquire industrial-technical skills. These activities offer opportunities to develop tool and machine skills commensurate with the mental and physical maturity of the student.

While these four objectives are considered basic for industrial arts, supplementary objectives may be developed for elementary school, secondary school, adult school, and college/university programs, as well as special programs for the gifted, the slow learner, and the emotionally/physically handicapped.

SECTION TWO

Program of Industrial Arts Education

Industrial arts is a vital part of every student's education. It is provided on the elementary school level, junior high school level, high school level, college/university level, and for programs serving special purposes.

Elementary School Level

Industrial arts in the elementary schools (kindergarten and grades one through six) is designed to further educational objectives and to enrich the experiences pupils have in attaining them. The activities in industrial arts place emphasis upon the planning and construction required in meeting needs that arise as pupils participate in English, mathematics, science, and social science activities. Pupils enjoy greater satisfaction and understanding by actually producing objects which they have previously tried to visualize. Abstract concepts are made more meaningful with concrete evidence. The pupils make use of skills they have acquired in other phases of the instructional program, acquire new skills, improve their ability to visualize, and in many other ways become increasingly proficient as individuals and as members of the groups to which they belong.

The planning of industrial arts experiences in the elementary schools usually is the responsibility of the classroom teacher. Methods of assisting the classroom teacher include the providing of: (1) special industrial arts training for the classroom teacher; (2) separate facilities within the school staffed with a trained industrial arts teacher; (3) services of an industrial arts teacher, consultant, or supervisor who makes scheduled visits to the classroom to help the classroom teacher; and/or (4) services of a traveling industrial arts teacher who makes scheduled trips to the school with facilities in a truck or van.

The elementary classroom teacher assumes the responsibility for integrating the industrial arts activities with the other learning experiences, taking into account interests, needs, and abilities of individuals as well as groups.

Junior High School Level

Industrial arts is an integral and often required part of the total program of education for all youth at the junior high level (grades seven and eight of elementary schools and grades seven, eight, and nine of junior high schools). Students at this grade level are usually guided through a series of introductory experiences in a variety of industrial arts areas. Included in a recommended program are crafts (industrial)[1], drafting, electricity/electronics, graphic arts, metals, power mechanics, and woods.

In a large school each of these areas may be taught in a separate shop/laboratory. These facilities are called limited general shops/laboratories, as they provide facilities for experiences in a number of closely allied activities in a single industrial arts area. For example, a metals course includes art-metal, casting, finishing, forging, heat-treating, metal-machining, metal-spinning, sheet-metal, and welding activities. Industrial arts may be taught in a comprehensive general shop/laboratory in schools with a small enrollment. A comprehensive general shop/laboratory includes activities in two or more areas such as drafting, electricity/electronics, metals, and woods. In large schools where several shops/laboratories are available, opportunities should be provided for students to spend from a half semester to a full semester in each shop/laboratory. In the small schools, where a comprehensive general shop/laboratory is used, a student should be given a variety of experiences in several areas.

Special emphasis is given in grades seven, eight, and nine to help students discover and develop their aptitudes, abilities, and interests. Provision is made for the development of a variety of skills and for opportunities for creative activities. An understanding of the industrial-technological world and its effect upon our society is developed, and information concerning the requirements of occupations and professions is provided. Activities involving the application of English, mathematics, science, and social science are inherent in industrial arts. Safe practices in the use and care of materials, tools, and equipment are emphasized. The ability to select, purchase, use, maintain, and service industrial products is stressed. The program assists in developing proficiency in a variety of basic skills.

[1]The industrial arts area of crafts (industrial) may include experences in the subareas of plastics, enameling, ceramics, metal, lapidary, jewelry, leather, carving, models, glass, fiber glass, and textiles.

High School Level

Students at the high school level (grades nine through twelve and ten through twelve) may select industrial arts as a major subject to be followed during their entire high school program. These students may have completed the basic industrial arts courses offered at the junior high school level. If they have not had this opportunity, the high school program should provide for these basic courses. High school industrial arts courses should include the following areas: crafts (industrial)[1], drafting, electricity/electronics, graphic arts, metals, power/automotive mechanics, and woods.

The well-rounded high school industrial arts curriculum includes opportunities in areas not provided at the junior high school level, plus opportunities for advanced experiences in areas previously studied. The curriculum provides opportunities for students to have comprehensive and enriching experiences that will enable them to acquire knowledges, understandings, and skills in the fundamental principles, techniques, procedures, and processes used in industry.

A detailed study of one or more industries gives students insights into research and experimentation; mass production principles; importance of interchangeable parts; quality assurance; plant organization; personnel; time study; materials handling devices; automation; importance of jigs and fixtures; the need for detailed drawings; experimental prototypes of products; and the constant effort of industry to improve quality, increase production and reduce costs.

It is recommended that students have experiences in each of the industrial arts areas available in the school before they are encouraged to select an area for concentration.

The advanced techniques developed in the high school shops/laboratories should approach the procedures used in industry. At this level emphasis is given to practices and requirments of occupations and professions relating to the specific industrial arts area. In this way advanced industrial arts work is effective career guidance, and for some students it provides opportunity for selected experiences within a chosen occupation or profession.

[1]The industrial arts area of crafts (industrial) may include experiences in the subareas of plastics, enameling, ceramics, metal, lapidary, jewelry, leather, carving, models, glass, fiber glass, and textiles. One of the subareas, such as ceramics or plastics, may become a course title and be given major emphasis.

The high school student, regardless of his major, should have the opportunity to elect industrial arts courses. The elective courses provide unequaled and challenging opportunities for scientifically or mathematically oriented students to work and experiment with new materials, processes, ideas, and designs.

High school industrial arts offers creative opportunities involving an understanding of the principles of design, an application of orderly planning, judgment in the selection and use of materials, and skills in the use of tools and machines.

The high school student is a consumer of goods and services and is interested in specific consumer information that is inherent in the industrial arts program. Through this program the student can acquire information that will assist him in being a contributing member of our society, and can have experiences that will enable him to recognize good craftsmanship and well-designed commercial products.

In addition, industrial arts electives offer an unequaled opportunity for students to develop leisure-time interests and skills so necessary for a well-rounded life in an era of short work weeks and time-saving devices.

College/University Level

The industrial arts program at the college level (the junior college and the senior college/university) has four basic functions: (1) providing broad, general education courses for all college students, (2) offering specific service courses for other college majors, (3) preparing industrial arts teachers, and (4) providing professional technical training for industry.

On the junior college level, industrial arts courses may be offered to meet many of the same functions as those courses included in the first two years of a college/university. The teacher preparation program will, by necessity, be limited to those activities considered appropriate for the first two years of college. Both the general education courses and the service courses of the junior college program may be quite similar to the lower-division offerings of the college/university. In institutions offering industrial arts teacher education, understandings of the philosophy and objectives of all education must be developed. In addition to these education requirements, the future industrial arts teacher develops an appreciation and understanding of the objectives of the program by participating in industrial arts classes. Skills are developed in the proper and safe use of hand

and machine tools. Within the industrial arts curriculum, study of the industrial world as well as an understanding of the materials and processes of industry are covered. College industrial arts departments provide and practice sound methods of teaching and effective shop/laboratory organization and management.

Special Purposes

Industrial arts education is an integral part of the educational program at the various levels previously described. However, there are a number of programs of special education where industrial arts serves additional vital purposes. Industrial arts is uniquely adaptable to a type of instruction which provides for individual differences. These special classes require industrial arts teachers with special training.

Mentally gifted individuals particularly need and should have educational experiences that give them insight and understanding regarding industrial processes, knowledge, and skill so necessary if they are to be literate concerning our technological civilization. Mentally gifted students who excel in an understanding of industrial processes and manipulative skills as well as other learnings are in a position to make ingenious application of the skills and information acquired in industrial arts.

For the slow learner, educational experiences become increasingly meaningful as he participates in shop/laboratory activities in which emphasis is plac n "learning by doing." For some, the experiences in industrial arts may become the means through which many of the other school subjects are taught. Through participation in the industrial arts program, the morale of the slow learner may be improved through successful accomplishment.

For the physically handicapped, industrial arts experiences provide practical and effective motivation as well as mental and manual therapy essential to the rehabilitation and adjustment of an individual. These experiences help teachers evaluate the degree of impairment and the extent of the individual's capacity for social and economic activities.

Industrial arts in the adult education program offers opportunities for adults to further their interests in various areas. The program provides instruction that will assist individuals in developing worth-while avocational interests, in organizing home workshops, in making and repairing useful household articles, and in discovering personal interests and aptitudes which might prove to be of occupationl value.

SECTION THREE

Facilities for Industrial Arts Education

Industrial arts is a planned program of educational experiences requiring special facilities. The three major types of shop/laboratory organizations for the teaching of industrial arts are the unit, the limited general, and the comprehensive general.

The Unit Shop/Laboratory

An industrial arts shop/laboratory equipped for a single subarea of instruction such as cabinetmaking, metal-machining, or sheet-metal activities is the unit shop/laboratory. The major function of this type of organization is to provide a concentration in one industrial arts subarea. The chief limitation of this type of shop/laboratory is its scope. Unit shop/laboratory organization requires a separate facility for each subarea of industrial arts.

The Limited General Shop/Laboratory

An industrial arts facility equipped to provide instruction in two or more subareas of a single industrial arts area is the limited general shop/laboratory. Examples of limited general shops/laboratories are: graphic arts which includes instruction in subareas such as bookbinding, linoleum block printing, offset lithography, photography, presswork, silkscreen printing, and type setting; metals which includes instruction in subareas such as art metal, bench metal, forging, foundry, metal machining, sheet metal, and welding; and woods which includes instruction in subareas such as cabinetmaking, furniture reproduction, model making, patternmaking, upholstery, wood carving, wood finishing, and other activities related to the area of woods. Limited general shop/laboratory organization makes it possible to offer a more varied program of instruction in each facility.

The Comprehensive General Shop/Laboratory

A comprehensive general shop/laboratory is organized to provide experiences which have been selected from a wide va-

riety of activities in two or more areas of industrial arts. The selected activities are usually conducted in one shop/laboratory under one teacher. An example of a comprehensive general shop/laboratory is general industrial arts which may have provisions for instruction in several areas, such as drafting, electricity/electronics, metals, and woods. The comprehensive general shop/laboratory approach requires sufficient equipment to provide adequately for experiences in the areas and subareas represented.

Bases for Facility Selection

The organization of each industrial arts facility is influenced directly by the nature of the instruction and the stated objectives of the program. If the major objective is to provide a broad, introductory type of program with emphasis on experiences and understandings related to industry, the facility should provide opportunities for experiences in a number of industrial arts areas. Where instruction is given in a number of different areas, the facility is organized as a comprehensive general shop/laboratory. When the major objective is to provide a more concentrated emphasis, the course content is limited to a single area of industrial arts. A facility organized for instruction in a single area is a limited general shop/laboratory.

The selection of the kind of program and the type of facilities is influenced by community interests and determined by the number of students enrolled in the school and the potential enrollment in industrial arts classes. The industries of the community will have some influence on the content of the program. For example, if the major industries in a community are concerned with electricity and electronics, greater emphasis probably will be placed on electrical/electronic activities in the school. If the school is located in a rural district, the industrial arts activities may reflect the needs and interests of this type of community. However, curriculum and facilities should be flexible enough to provide for the changing needs caused by changes in a community.

Industrial arts is usually a part of the required curriculum at the junior high school level. Therefore, facilities should be available for broad, introductory activities. The shop/laboratory organization would be comprehensive general or limited general. In the advanced elective courses, the facilities are organized and equipped to meet the more mature needs of the students.

At the high school level, a school in a small community may not have sufficient enrollment to justify a series of limited general shops/laboratories. It may be more feasible to provide a comprehensive general shop/laboratory. In larger high schools, usually the industrial arts facilities consist of several limited general shops/laboratories. Regardless of the organization, the facilities should provide for beginning and advanced levels of activities. The facilities should be designed to serve programs for high school students that provide experiences of greater depth and complexity and with a higher degree of concentration in one area. In these facilities, activities and classroom procedures are planned to reflect more nearly the practices found in industry.

SECTION FOUR

Instruction in Industrial Arts Education

In the elementary school (kindergarten and grades one through six), industrial arts is an integrated part of the program and is usually provided by the regular classroom teacher. On the junior high school level (grades seven and eight of elementary schools and grades seven, eight, and nine of junior high schools) and on the high school level (grades nine through twelve and ten through twelve) instruction in industrial arts is provided in appropriate facilities by teachers with specialized training.

Elementary School Level

Industrial arts activities in the elementary schools place emphasis upon planning and construction that are required in meeting needs that arise as pupils engage in activities relating to English, mathematics, science, social science, and other fields.

In many cases, the classroom teacher has responsibility for conducting the elementary school industrial arts program. In assuming this responsibility, the teacher should take the pupils' interests, needs, and abilities into consideration. The teacher should make provisions in the program to meet both individual and group requirements.

Junior High School Level

Grades seven, eight, and nine form a transitional period between the elementary school and the high school. In the seventh grade the student encounters, perhaps for the first time, more than one classroom teacher. This change is an important step in the educational life of boys and girls. Industrial arts is usually offered as a separate subject in a shop/laboratory taught by a teacher with specialized training.

Students in the industrial arts program at the junior high school level are guided through a series of introductory experiences. Two to six semesters may be used for introductory courses. In large schools where several limited general shops/laboratories

are available, opportunities should be provided for students to spend from a half semester to a full semester in each of these facilities. After the student has gained a broad background in the available instructional areas, he then may elect industrial arts courses that extend his experience by gaining further information and skill. In the small school, where a comprehensive general shop/laboratory is used, a student should be given a variety of experiences in several areas of industrial arts.

High School Level

In the high schools, students have progressed to an age where they are interested in and need experiences considerably more extensive and complex than those provided in previous industrial arts classes. A high degree of accuracy and effective use of exact measurements are stimulated by more complex projects. Students in the high school industrial arts program may have completed the basic courses offered at the junior high school level. If they have not had this opportunity, the high school program should provide for these basic courses.

All students, regardless of their career goals, can receive many worth-while educational experiences from industrial arts. The avocational opportunities, the construction activities necessary around the home, the consumer information about products of industry, and the skill in the use of tools and materials are all necessary. Just as at the junior high school level, the high school industrial arts program provides for practical applications of the other fields of learning.

In high school, the student is encouraged to pursue the interests stimulated by his introductory courses and to take further work in as many industrial arts areas as possible. In grades eleven and twelve the content of industrial arts courses tends to concentrate on certain subareas.

In large high schools, each area of industrial arts may be taught in a separate facility called a limited general shop/laboratory. In small high schools a single facility called a comprehensive general shop/laboratory may be used to provide experiences in several areas.

Organization and Management

Organization of the industrial arts shop/laboratory in grades seven through twelve is a responsibility of the teacher, working cooperatively with the school administration. This facet of the instructional program requires: (1) the systematic layout

of the physical plant for effective instruction, (2) the selection and purchase of equipment, (3) the development of instructional procedures, (4) the issuance and control of tools and supplies, (5) the maintenance of records, (6) the operation of an adequate safety program, and (7) the utilization of a personnel system based upon student participation.

In a good plan of shop organization (1) the participation of students in shop management provides for the development of social skills and a better understanding of democratic processes; (2) the clean, well-organized, conveniently arranged facility affords an effective learning environment; (3) the well-planned routine procedures within the shop require only a minimum amount of the teacher's time, leaving a maximum amount of his time for other phases of instruction; and (4) the well-organized instructional program provides an adequate amount of instruction and activity.

Good shop/laboratory management involves student participation in the operation of the facility. The three main purposes of student participation in the management are: (1) to train the student for leadership and followership, (2) to provide students with an opportunity to explore industrial procedures, and (3) to relieve the teacher of routine duties.

An effective personnel system should be organized so that it provides opportunity for every member of the class to participate. Each student must be aware that the plan has an educational purpose and that he is important to its proper function.

The student personnel system of shop/laboratory management should involve job assignments on a rotating basis. Typical responsibilities in which students may assist the teacher are: (1) planning the shop/laboratory organization, (2) checking tools at the beginning and end of each class, (3) inspecting work stations for orderliness, (4) issuing supplies during the class period, (5) operating the safety program, (6) checking finishing areas for orderliness, (7) managing the facility library, and (8) serving on clean-up detail.

Safety Instruction and Evaluation

Industrial arts teachers are urged, for the protection of their students, their own protection, and the protection of their school systems, to exercise every precaution to make certain that students are not involved in accidents. These precautions should include the elimination of unreasonable physical hazards and

the provision for appropriate instruction in safe practices students must use in their industrial arts activities.

Two important safety factors in an industrial arts program are: (1) the safe condition of the shops/laboratories and equipment and (2) the safe use of these facilities. Safe practices are emphasized through explaining and demonstrating the correct, safe procedure to follow in using tools, machines, and materials. The teacher should explain how certain safe practices of the shop relate to other daily activities of the student, both in and out of school. The industrial arts teacher must make safety training and education an integral part of every task performed in the school shop. A plan in which safety instruction is geared to the activities and the correct use of the equipment in the industrial arts shop will (1) help the student to work more efficiently, (2) cause the student to become aware of safety practices that apply to his daily living in and out of school, and (3) aid in protecting the teacher and school system from legal actions claiming negligence.

A well-planned program of safety should include safety instruction and a method of evaluating the students' understanding of this instruction. Appropriate safety tests given to all students will: (1) make it possible for the teacher to evaluate his safety instruction, (2) cause each student to acknowledge his understanding of the safe way to work in an environment of tools and machines, and (3) furnish written proof that safety instruction has been given.

SECTION FIVE

General Descriptions of Content for Courses

The general descriptions of content for courses are presented according to levels for each major area of industrial arts. The levels are identified as Level I, Introductory; Level II, Basic; Level III, Intermediate; and Level IV, Advanced. These represent "levels of complexity" and suggest a progression in content from broad to more specific experiences in which skill in performance and knowledge of principles and theory are acquired through study and application. Levels I through IV are not necessarily course titles.

The way in which the information furnished in each of these levels is used depends upon the extent of the industrial arts program in a particular school or school system and the organization of the system. Factors to be considered are: (1) number of grades, (2) time-length of courses, (3) number of areas of industrial arts covered, and (4) enrollments in these areas. The content presented in the descriptions of the four levels could be provided in any number of courses. Level I and Level II may be used as course content for grades seven and eight of elementary schools and grade seven, eight, and nine of junior high schools. Basic, Level II course content along with Level III and Level IV may be used for grades nine through twelve and ten through twelve of high schools. In the material that follows, descriptions are given for four levels in each area.

The general descriptions of content for courses in the industrial arts areas of crafts (industrial), drafting, electricity/electronics, graphic arts, metals, power/automotive mechanics, and woods are presented in four levels. In Level I, students are *introduced* to an area through a variety of experiences and activities. In Level II, students *develop* tool and machine skills in several subareas. In Level III, students are provided with opportunities to acquire *extensive* knowledge and skills and are encouraged to select certain subareas for emphasis. In Level IV, students *concentrate* in one or more subareas. Technical infor-

mation, safety instruction, and career guidance are integral parts of the course content at each of these levels. Many aspects of course content are common to all four levels within an area and also may be common to the four levels of all areas.

Industrial Arts: Crafts (Industrial)

Level I, Introductory.

An introduction to crafts (industrial) is provided through a variety of experiences and activities involving plastics, enameling, ceramics, metal, lapidary, jewelry, leather, carving, models, glass, fiber glass, and textiles. The correct and safe use of tools, machines, and materials is emphasized. Certain machines and operations are introduced by teacher demonstrations. Students develop desirable attitudes toward safety and shop/laboratory management through class participation. They are oriented in the relationship of the course content of crafts (industrial) to the other subjects in the school curriculum. Attention is given to the selection, use, and manufacture of materials of industry used in the instructional program through student activities, discussions, and teacher demonstrations. Technical, general, and career information is provided. Students make a number of useful articles involving a variety of tools, materials, and processes. Experiences in planning, designing, and drawing are integral parts of the instructional program.

Level II, Basic.

The development of tool and machine skills is stressed in the use of materials and processes covered in the subareas of plastics, enameling, ceramics, metal, lapidary, jewelry, leather, carving, models, glass, fiberglass, and textiles. Emphasis is placed on developing safe work attitudes in the shop/laboratory and relating these to everyday living. Students participate actively in the operation and management of the shop/laboratory. Attention is given to the development of skill, accuracy, judgment, and craftsmanship. Technical abilities and interests are discovered and information concerning occupations and professions is provided. Activities correlated with class discussions, demonstration, and study provide for the application of English, mathematics, and science. Students have an opportunity to select, design, plan, and construct appropriate articles.

Level III, Intermediate.

Students acquire extensive knowledge and skills through the use of tools and machines in activities involving plastics, enameling, ceramics, metal, lapidary, jewelry, leather, carving, models, glass, fiber glass, and textiles. Accuracy and neatness are stressed. Students are encouraged to select certain subareas for emphasis. Special attention is given to the development of attitudes concerning safety, good working relationships, and economical use of time and material. Opportunities to explore worth-while leisure-time activities are provided. Emphasis is placed on technical information and the application of English, mathematics, and science. Career guidance is an integral part of the instruction offered. Students plan and design their projects, figure costs involved, and assist in ordering material.

Level IV, Advanced.

Students are encouraged to concentrate in one or more of the subareas of crafts (industrial). Emphasis is placed on the problem-solving approach to acquiring skill through using tools and materials and applying English, mathematics, and science. Instruction in using and servicing complex machines and equipment is provided. The latest industrial techniques and materials are introduced. Students are encouraged to design articles and to experiment with materials and processes of industry. Detailed information concerning the requirements of and opportunities in occupations and professions related to the subareas included in crafts (industrial) is provided. Both individual and group projects are encouraged.

Industrial Arts: Drafting

Level I, Introductory.

An introduction to drafting is provided through a variety of experiences and activities. Sketching, the use of drawing instruments, and the reading of drawings are basic requirements. The correct use of tools is emphasized. Certain skills and processes are introduced by teacher demonstrations. Students share responsibilities for the organization and management of the facility and class. They are oriented in the relationship of the course content of drafting to the other subjects in the school curriculum. Students are introduced to the importance of draft-

ing in industry through student activities, discussions, and teacher demonstrations. Technical, general, and career information is provided. Added interest is developed through drawing activities which have an appeal to youth. Students are encouraged to use ingenuity in the development of ideas on paper. They make a number of useful drawings involving a variety of tools, materials, and processes. Experiences in planning and designing are integral parts of the instructional program.

Level II, Basic.

The development of pencil and instrument skills in technical sketching, machine design, pictorial representation, architectural drawing, furniture design, sheet metal layout, electrical/electronic planning, tool design, and topography is stressed. Emphasis is placed on developing good work habits in the class and their relationship to everyday living in school and community. Students participate actively in the operation and management of the class. Attention is given to the development of accuracy, skill, judgment, and techniques. Technical abilities and interests are discovered and information concerning occupations and professions is provided. English, mathematics, and science are applied through drafting activities correlated with class discussions, demonstrations, and study. Students have an opportunity to select, design, plan, and reproduce appropriate drawings.

Level III, Intermediate.

Students acquire extensive knowledge and skills through the use of instruments and machines in technical sketching, machine design, pictorial representation, architectural drawing, structural design, furniture design, sheet metal layout, electrical/electronic planning, tool design, topography, and drawing reproduction. Accuracy and neatness are stressed. Each subarea is specifically identified and students are encouraged to select certain subareas for emphasis. Special attention is given to the development of good working relationships and the economical use of time and material. Opportunities are provided to participate in activities involving production methods and processes. Emphasis is placed on technical information and the application of English, mathematics, and science. Career guidance is an integral part of the instruction offered. Students select, design and plan appropriate drawings.

Level IV, Advanced.

Students are encouraged to concentrate in one or more selected subareas of drafting. Emphasis is placed on the problem-solving approach in acquiring skill through using instruments and applying English, mathematics, and science. Instruction in using complex machines and equipment is provided. The latest industrial techniques and materials are introduced. Students are encouraged to design articles and to experiment with tools, materials, and processes of industry. Detailed information is provided concerning the requirements of and opportunities in occupations and professions related to drafting. Both individual and group projects are encouraged. The time involved in completing a job is given attention. Methods of obtaining accuracy in quantity production are studied and used.

Industrial Arts: Electricity/Electronics

Level I, Introductory.

An introduction to electricity/electronics is provided through a variety of experiences and activities in the subareas of magnetism, light, heat, elementary electronics, simple appliance repair, power sources, power transmission, and basic circuits. The correct and safe use of tools, instruments, and machines is emphasized. Certain machines and operations are introduced by teacher demonstrations. Students share responsibilities for the organization and management of the shop/laboratory. They are oriented in the relationship of the course content of electricity/electronics to the other subjects in the school curriculum. Students are introduced to the importance of the electricity/electronics industry, and its products and services are related to the home and community through student activities, discussions, and teacher demonstrations. Technical, general, and career information is provided. Added interest in electricity/electronics is developed through projects which have an appeal to youth. Students make a number of useful articles involving a variety of tools, materials, and processes. Experiences in planning, designing, and drawing are integral parts of the instructional program.

Level II, Basic.

The development of tool and machine skills is stressed in the use of materials and processes covered in the subareas of

magnetism, light, heat, elementary electronics, simple appliance repair, power sources, power transmission, and basic circuits. Emphasis is placed on developing safe work habits in the shop/laboratory and their relationship to everyday living in school and community. Students participate actively in the operation and management of the shop/laboratory. Attention is given to the development of skill, accuracy, judgment, and craftsmanship. Technical abilities and interests are discovered and information concerning occupations and professions is provided. Activities correlated with class discussions, demonstrations, and study provide for the application of English, mathematics, and science. Students have an opportunity to select, design, plan, and make appropriate electrical/electronic devices.

Level III, Intermediate.

Students acquire extensive knowledge and skills through using tools, instruments, and machines and through constructing and operating electrical/electronic devices, wiring electrical circuits, repairing appliances, and using test equipment. Accuracy and neatness are stressed. Subareas of electricity/electronics are specifically identified and students are encouraged to select certain subareas for emphasis. Special attention is given to the development of habits concerning safety, good working relationships, and economical use of time and material. Opportunities are provided to participate in activities involving production methods and processes. Emphasis is placed on technical information and the application of English, mathematics, and science. Career guidance is an integral part of the instruction offered. Students plan and design projects, figure costs involved, and assist in ordering material.

Level IV, Advanced.

Students are encouraged to concentrate in a selected subarea or subareas of electricity/electronics. Emphasis is placed on the problem-solving approach in acquiring skill through using tools, instruments, and machines and applying English, mathematics, and science. Instruction in using and servicing complex machines and equipment is provided. The latest industrial techniques and materials are introduced. Students are encouraged to design electrical/electronic devices and to experiment with tools, materials, and processes of industry. Detailed information concerning the requirements of and opportunities in occupations and

professions related to electricity/electronics is provided. Both individual and group projects are encouraged. The time involved in completing a job is given attention. Methods of obtaining accuracy in quantity production are studied and used.

Industrial Arts: Graphic Arts

Level I, Introductory.

An introduction to graphic arts is provided through a variety of experiences and activities in photography, silk screen, block printing, composition, offset lithography, letterpress printing, binding, intaglio, thermographic printing, and rubber stamp making. The correct and safe use of tools and machines is emphasized. Certain machines and operations are introduced by teacher demonstrations. Students share responsibilities for the organization and management of the shop/laboratory. They are oriented in the relationship of the course content of graphic arts to the other subjects in the school curriculum. Attention is given to the selection, use, and manufacture of materials and equipment of industry used in the instructional program. Students are introduced to the importance of the graphic arts industry and its products as related to the home and community through student activities, discussions, and teacher demonstrations. Technical, general, and career information is provided. Added interest is developed through projects which have an appeal to youth. Students make a number of useful articles involving a variety of tools, materials, and processes. Experiences in planning, designing, and drawing are integral parts of the instructional program.

Level II, Basic.

The development of tool and machine skills is stressed in the use of materials and processes covered in the subareas of photography, silk screen, block printing, composition, offset lithography, letterpress printing, binding, intaglio, thermographic printing, and rubber stamp making. Emphasis is placed on developing safe work habits in the shop/laboratory and their relationship to everyday living in school and community. Students participate actively in the operation and management of

the class. Attention is given to the development of accuracy, skill, judgment, and craftsmanship. Technical abilities and interests are discovered and information concerning occupations and professions is provided. Shop/laboratory activities correlated with class discussions, demonstrations, and study provide for the application of English, mathematics, and science. Students have an opportunity to select, design, plan, and make appropriate articles.

Level III, Intermediate.

Students acquire extensive knowledge and skills through the use of tools and machines in photography, silk screen, block printing, composition, offset lithography, letterpress printing, binding, intaglio, thermographic printing, and rubber stamp making. Accuracy and neatness are stressed. Each subarea is specifically identified and students are encouraged to select certain subareas for emphasis. Special attention is given to the development of habits concerning safety, good working relationships, and economical use of the time and material. Opportunities are provided to participate in activities involving production methods and processes. Emphasis is placed on technical information and the application of English, mathematics, and science. Career guidance is an integral part of the instruction offered. Students plan and design their projects, figure costs involved, and assist in ordering material.

Level IV, Advanced.

Students are encouraged to concentrate in one or more selected subareas of graphic arts. Emphasis is placed on the problem-solving approach in acquiring skill through using tools and materials and applying English, mathematics, and science. Instruction in using and servicing complex machines and equipment is provided. The latest industrial techniques and materials are introduced. Students are encouraged to design articles and to experiment with tools, materials, and processes of industry. Detailed information concerning the requirements of and opportunities in occupations and professions related to graphic arts is provided. Both individual and group projects are encouraged. The time involved in completing a job is given attention. Methods of obtaining accuracy in quantity production are studied and used.

Industrial Arts: Metals

Level I, Introductory.

An introduction to the area of metals is provided through a variety of experiences and activities in sheet metal, art metal, welding, forging, casting, metal machining, heat treating, metal spinning, enameling, etching, and finishing. The correct and safe use of hand tools and machines is emphasized. Safe work habits are stressed. Certain machines and operations are introduced by teacher demonstrations. Students share responsibilities for the organization and management of the shop/laboratory. They are oriented in the relationship of the course content of metals to the other subjects in the school curriculum. Attention is given to the identification, selection, use, and manufacture of materials of industry used in the instructional program. The students are introduced to the importance of the metals industry and its products as related to the home and community through student activities, discussions, and teacher demonstrations. Technical, general, and career information is provided. Added interest in metals is developed through projects which have an appeal to youth. Students make a number of useful articles involving a variety of tools, materials, and processes. Experiences in planning, designing, and drawing are integral parts of the instructional program.

Level II, Basic.

The development of tool and machine skills is stressed in the use of materials and processes covered in the subareas of sheet metal, art metal, welding, forging, casting, metal machining, heat treating, metal spinning, enameling, etching, and finishing. Emphasis is placed on developing safe work habits in the shop/laboratory and their relationship to everyday living in the school and community. Students participate actively in the operation and management of the shop/laboratory. Attention is given to the development of accuracy, skill, judgment, and craftsmanship. Technical abilities and interests are discovered and information concerning occupations and professions is provided. Shop/laboratory activities correlated with class discussions, demonstrations, and study provide for the application of English, mathematics, and science. Students are given an opportunity to select, design, plan, and make appropriate articles.

Level III, Intermediate.

Students acquire extensive knowledge and skills through the use of tools and machines in sheet metal, art metal, welding, forging, casting, metal machining, heat treating, metal spinning, and finishing. Accuracy and neatness are stressed. Each subarea is specifically identified and students are encouraged to select certain subareas for emphasis. Special attention is given to the development of habits concerning safety, good working relationships, and proper use of time and material. Opportunities to participate in activities involving production methods and processes are provided. Emphasis is placed on technical information and the application of English, mathematics, and science. Career guidance is an integral part of the instruction offered. Students plan and design their projects, figure costs involved, and assist in ordering material.

Level IV, Advanced.

Students are encouraged to concentrate on welding and metal machining or one or two of the following subareas: sheet metal, art metal, forging, casting, heat treating, and metal spinning. Emphasis is placed on the problem-solving approach in acquiring skill through using tools and materials and applying English, mathematics, and science. Instruction in using and servicing complex machines and equipment is provided. The latest industrial techniques and materials are introduced. Students are encouraged to design articles and to experiment with tools, materials, and processes of industry. Detailed information is provided concerning the requirements of and opportunities in occupations and professions related to metals. Both individual and group projects are encouraged. The time involved in completing a job is given attention. Methods of obtaining accuracy in quantity production are studied and used.

*Industrial Arts: Power/Automotive Mechanics**

Level I, Introductory (Power Mechanics).

An introduction to power mechanics is provided through a variety of experiences and activities in production, transmission, and use of power covering the subareas of natural, steam, mechanical, explosive, electrical, hydraulic, pneumatic, solar, and thermal power. Students are given opportunity to learn the important uses made of power in industry by participating in activities and discussions and observing teacher demonstrations. These experiences also help them to acquire technical, general, and career information. Students are oriented in the relationship of the content of power mechanics to that of the other subjects in the school curriculum. Interest is developed through projects which appeal to youth. A variety of tools, materials, and processes is used by students to make useful articles. The correct and safe uses of tools and machines are emphasized. Certain machines and operations are introduced by teacher demonstrations. Opportunities for experiences in planning, designing, and drawing are provided as integral parts of the instructional program. Students share responsibility with the teacher for the organization and management of the shop/laboratory.

Level II, Basic (Power Mechanics).

In power mechanics, knowledge is acquired through participation in class discussions, demonstrations, and study; skills are acquired through the use of tools, materials, and processes in production, transmission, and use of power covering the subareas of natural, steam, mechanical, explosive, electrical, hydraulic, pneumatic, solar, and thermal power. Provision is made for students to develop accuracy, judgment, and craftsmanship and to have the advantages of participation in experimental and other creative activities. Special attention is given to helping students discover their technical abilities and interests and to

*The industrial arts area of power mechanics is presented as Level I and Level II; however, four levels of power mechanics may be provided. Content of power mechanics may be used to develop courses in power mechanics per se, serve as introductory courses to automotive mechanics, and/or augment courses in automotive mechanics. It is recommended that courses in power mechanics should not be offered below grade nine.

obtaining information concerning occupations and professions. Students have opportunity to design, plan, and complete appropriate articles of their choice. Both individual and group projects are encouraged. English, mathematics, and science are applied in solving meaningful problems. Safe work habits in the shop/laboratory and their importance in everyday living are emphasized. Students participate actively in the operation and management of the shop/laboratory.

Level III, Intermediate (Automotive Mechanics).

The fundamentals of automotive mechanics are provided through a variety of experiences and activities. The correct and safe use of tools and machines is emphasized. Certain machines and operations are introduced by teacher demonstrations. The development of tool and machine skills is stressed in the use of materials and processes covered in the subareas of engines, power trains, chassis, electrical systems, fuel systems, bodies, and accessories. Opportunities are provided to practice manipulative skills and technical operations on actual components of automobiles and other powered units. Students share responsibilities for the organization and management of the shop/laboratory. They are oriented in the relationship of the course content of automotive mechanics to the other subjects in the school curriculum. Technical, general, and career information is provided. Students are introduced to the importance of the automotive industry as related to the home and community. Added interest is developed through activities which have an appeal to youth. Emphasis is placed on developing safe work habits in the shop/laboratory and their relationship to everyday living in school and community. Attention is given to the development of skill, accuracy, judgment, and craftsmanship. Shop/laboratory activities correlated with class discussion, demonstrations, and study provide for the application of English, mathematics, and science.

Level IV, Advanced (Automotive Mechanics).

Students are encouraged to concentrate on specific repair jobs in subareas such as engines, power trains, chassis, brakes, bodies, fuel systems, electrical systems, and accessories. Precise workmanship and neatness are stressed. Special attention is given to the development of habits concerning safety, good working relationships, and care and use of precision equipment. Opportunities to work in "job shop" situations are provided. Students

diagnose malfunctioning parts, plan the repair process, estimate costs, and assist in ordering parts and components. Emphasis is placed on solving problems through the skillful use of tools and machines and the application of English, mathematics, science, and knowledge from previous jobs and lessons. Instruction in using and servicing complex machines and equipment is provided. The latest industrial techniques involving the use of parts and components are introduced. Detailed information concerning the requirements and opportunities in occupations and professions related to automotive mechanics is provided. Both individual and group projects are encouraged. The time involved in completing a job is given attention. Methods of obtaining accurate and economical repair are studied and used.

Industrial Arts: Woods

Level I, Introductory.

An introduction to the area of woods is provided through a variety of experiences and activities in cabinetmaking, wood finishing, wood turning, and upholstery. The correct and safe use of tools and machines is emphasized. Certain machines and operations are introduced by teacher demonstrations. Students share responsibilities for the organization and management of the shop/laboratory. They are oriented in the relationship of the course content of woods to the other subjects in the school curriculum. Attention is given to the selection, use, care, and manufacture of materials and tools used in the instructional program. Students are introduced to the importance of the woods industry and its products as related to the home and community through student activities, discussions, and teacher demonstrations. Technical, general, and career information is provided. Added interest in woods is developed through selected, appropriate projects which have an appeal to youth. Students make a number of useful articles involving a variety of tools, materials, and processes. Experiences in planning, designing, and drawing are integral parts of the instructional program.

Level II, Basic.

The development of tool and machine skills is stressed in the use of materials and processes covered in the subareas of cabinetmaking, carpentry, wood finishing, patternmaking, wood

turning, and upholstery. Emphasis is placed on developing safe work habits in the shop/laboratory and their relationship to everyday living in school and community. Students participate actively in the operation and management of the shop/laboratory. Attention is given to the development of skill, accuracy, judgment, and craftsmanship. Technical abilities and interests are discovered and information concerning occupations and professions is provided. Activities correlated with class discussions, demonstrations, and study provide for the application of English, mathematics, and science. Students have an opportunity to select, design, plan, and construct appropriate articles.

Level III, Intermediate.

Students acquire extensive knowledge and skills through the use of tools and machines. Accuracy and neatness are stressed. Each subarea of woods is specificially identified and students are encouraged to select certain subareas for emphasis, such as upholstery, cabinetmaking, wood turning, wood finishing, patternmaking, and carpentry. Special attention is given to the development of habits concerning safety, good working relationships, and economical use of time and material. Opportunities are provided to participate in activities involving production methods and processes. Emphasis is placed on technical information and the application of English, mathematics, and science. Career guidance is an integral part of the instruction offered. Students plan and design their projects, figure costs involved, and assist in ordering material.

Level IV, Advanced.

Students are encouraged to concentrate in a selected subarea or subareas of woods. Emphasis is placed on the problem-solving approach in acquiring skill through using tools and machines and applying English, mathematics, and science. Instruction is provided in using and servicing complex machines and equipment. The latest industrial techniques and materials are introduced. Students are encouraged to design articles and to experiment with tools, materials, and processes of industry. Detailed information is provided concerning the requirements of and opportunities in occupations and professions related to woods. Both individual and group projects are encouraged. The time involved in completing a job is given attention. Methods of obtaining accuracy in quantity production are studied and used.

SECTION SIX

Supervision of Industrial Arts Education

Supervisors of industrial arts are concerned with one basic objective: the improvement of instruction. Supervision in the schools is educational leadership which stimulates, guides, assists, and leads the teaching staff to evaluate their attitudes and practices as well as their educational activities and teaching procedures. Supervisors and teachers work cooperatively in developing programs, determining policy, and solving a variety of problems. Every effort is made to develop each teacher to his highest potential.

Most of the larger school systems and state departments of education in the United States have one or more full-time supervisors of industrial arts education. Smaller school systems provide for supervision of industrial arts through part-time supervisors, district departmental chairmen, or school department chairmen.

One of the major purposes of the American Council of Industrial Arts Supervisors is to bring about the improvement of instruction by encouraging local and state school systems to provide specialized supervision in the field of industrial arts education.

In 1967, the American Council of Industrial Arts Supervisors conducted its second nationwide study to determine the major "Duties of Industrial Arts Supervisors." The questionnaire used in this study contained six sections: "Administrative and Executive Duties," "Professional Improvement," "Instructional Program," "Equipment and Supplies," "Housing," and "Evaluation of Courses/Programs." The results of this study, which show the importance and advantages of specialized supervision, follow.

Administrative and Executive Duties

Duties performed by 85 to 100 percent of the supervisors: (1) provide assistance to administrators in the interpretation and initiation of industrial arts programs; (2) review books,

publications, periodicals, and other instructional aids; (3) attend and participate in school, community, and professional meetings and conferences; (4) receive visitors; (5) make appropriate professional and community contacts; (6) receive and interview sales representatives; (7) assist in coordination of industrial arts programs on the elementary, junior high school, and high school levels; (8) assist in the recruitment of industrial arts teachers; (9) attend staff executive meetings; (10) conduct visitation tours; and (11) correlate industrial arts supervisory activities with those of other supervisors in order to promote an integrated, coordinated educational program.

Duties performed by 70 to 85 percent of the supervisors: (12) write articles for newspapers and professional publications; (13) prepare and edit bulletins or newsletters to keep teachers and administrators informed on practices, policies, and happenings in the field of industrial arts; (14) interview prospective teachers; (15) conduct orientation program for new teachers; (16) keep teacher-education institutions and available industrial arts teachers informed of position openings; and (17) assist in the assignment of industrial arts teachers.

Professional Improvement

Duties performed by 85 to 100 percent of the supervisors: (1) interchange ideas and information between teachers; (2) hold group meetings; (3) visit as many industrial arts teachers as possible during each year—(Note) Most supervisors make unannounced (73%) and unscheduled (70%) visits. Also make requested (which are scheduled) visits (92%); (4) encourage teachers to attend college/university summer sessions and other professional improvement activities; (5) conduct individual teacher conferences; (6) encourage and assist teachers to conduct needed research; (7) evaluate the services of industrial arts departments and individual teachers; (8) encourage teachers to write articles for professional publications; (9) arrange for industrial arts displays and exhibits; and (10) promote participation in local, state, and national awards programs.

Duties performed by 70 to 85 percent of the supervisors: (11) report in writing or orally to principal the conclusions reached by the visit; (12) make written or oral report to teacher concerning conclusions reached in visit; (13) submit written or oral report to individual requesting visit; (14) introduce experimental industrial arts procedures and courses in selected

schools; (15) work closely with industrial arts teacher-education institutions; (16) conduct research to improve industrial arts program; (17) recommend teacher transfers and advancement; (18) plan and provide place and facilities for in-service training classes; and (19) visit each industrial arts teacher at least once a year.

Instructional Program

Duties performed by 85 to 100 percent of the supervisors: (1) encourage teachers to use new industrial products and procedures; (2) distribute material concerning educational, occupational, and professional information; (3) implement/help in implementing the courses of instruction or course outlines; (4) keep teachers informed of current industrial arts literature; (5) assist teachers to adapt instructional material; (6) assist in the development and publication of instructional guides (including courses of instruction and course outlines) for all industrial arts areas; (7) keep teachers informed of effective teaching procedures; (8) assist in establishing/maintaining an industrial arts safety program; (9) hold individual and group conferences for consideration of instructional problems; (10) review instructional material from other school systems; (11) keep instructional material up-to-date; (12) compile tentative course outlines and courses of study; (13) assist committees composed of teachers (supervisors/teacher educators) in developing instructional material; (14) assist in textbook studies preparatory for adoption; and (15) make use of committees composed of teachers (supervisors/teacher educators) in developing instructional material.

Duties performed by 70 to 85 percent of the supervisors: (16) compile and distribute lists of available audio-visual aids.

Equipment and Supplies

Duties performed by 85 to 100 percent of the supervisors: (1) advise in the purchasing of equipment and supplies; (2) assist in setting up standards for equipment and supplies; (3) recommend changes, repairs, and replacements; (4) recommend acceptable types and makes; and (5) assist in preparing specifications.

Duties performed by 70 to 85 percent of the supervisors: (6) prepare standard lists for equipment and supplies; and (7) supervise/assist in installation of equipment.

Housing

Duties performed by 85 to 100 percent of the supervisors: (1) advise and assist in planning the construction and remodeling of shops/laboratories with school board, superintendent, principal, teachers, and architect; (2) plan shop/laboratory layouts; (3) make recommendations on lighting, heating, and ventilation; and (4) prepare/assist in preparing preliminary plans and estimates for construction and remodeling.

Evaluation of Course/Program

Most supervisors (88%) evaluate industrial arts courses/programs. However, more than half of the supervisors (52%) usually do *not* rate teachers for the superintendent/principal. Evidence used in the evaluation of a teacher/course/program follows: (1) general appearance of shop/laboratory; (2) condition of shop/laboratory tools and equipment; (3) evidence of good student-teacher relationship; (4) teaching procedures used; (5) safety devices and safety rules employed; (6) instructional aids used; (7) appearance of teacher; (8) teacher's use of English; (9) extent to which outcomes are met; (10) mannerisms of teacher; (11) ventilation and lighting; (12) teacher's lesson plan; and (13) records of student progress.

American Council of Industrial Arts Supervisors

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Joe O. Luke, Salt Lake City, Utah, 2

Daniel H. Malia, Newton, Massachusetts, 2
Morton Margulues, Bound Brook, New Jersey
Earl Marihart, Dubuque, Iowa, 1
Francis C. Martin, Malden, Massachusetts
Homer A. Mattson, Omaha, Nebraska, 2
Winifred A. Mayfield, Austin, Texas, 2
Earl C. McCurdy, Montreal, Quebec, Canada, 1
William E. McKell, Salt Lake City, Utah, 1, 2
Robert A. Mercuri, North Haven, Connecticut, 2
Jeremiah Millane, Jr., Holyoke, Massachusetts
Leo Millea, Jr., Lunenburg, Massachusetts, 2
Stephen Mindock, Colorado Springs, Colorado
James W. Mizener, Downers Grove, Illinois
Darrell Moore, Des Moines, Iowa
Allen E. Morris, Calgary, Alberta, Canada
Herbert H. Mosman, Pittsfield, Massachusetts
Ernest A. Muller, Columbia, South Carolina, 2
Joseph Murri, Philadelphia, Pennsylvania
Lewis L. Murry, Mentor, Ohio, 2
Allan B. Myers, Baltimore, Maryland
Norman L. Myers, Sacramento, California

Raymond V. Nord, Minneapolis, Minnesota, 1, 2

Leonard T. Oass, Silver Springs, Maryland
Carl A. Olson, Jr., Wellesley, Massachusetts

A. E. Pagliarini, St. Paul, Minnesota
Grady R. Palmer, Clarksdale, Mississippi
Edward Paloney, Gary, Indiana
Forest Penny, Pittsburg, Kansas
Sterling D. Peterson, Minneapolis, Minnesota, 1, 2
Samuel Powell, Atlanta, Georgia, 2
Joseph A. Prioli, Hingham, Massachusetts

John S. Radder, Jr., Stratford, Connecticut, 2
Jack E. Reynolds, Sacramento, California, 1, 2
James O. Reynolds, Dayton, Ohio, 2
W. Lyle Roesler, Helena, Montana

Stanley J. Rose, London, Ontario, Canada, 2
Harry Rosenbaum, Norfolk, Virginia, 1, 2
B. John Ross, Albany, New York
Russell Rubrecht, East Orange, New Jersey, 2
M. J. Ruley, Tulsa, Oklahoma, 1, 2

David P. Sampson, Shrewsbury, Massachusetts
Howard Sasson, New York, New York, 2
Kenneth L. Schank, Racine, Wisconsin, 1
Marshall L. Schmitt, Washington, D.C., 1, 2
Ira E. Schwartz, Smithtown, New York
Edward Schwartzkopf, Lincoln, Nebraska, 1
Herbert Siegel, New York, New York, 1, 2
Sol Silverman, Washington, D.C.
Dmitri Slobodian, Livonia, Michigan
Warren G. Smeltzer, Towson, Maryland
Alfred P. Smith, Indianapolis, Indiana, 1, 2
Fred M. Smith, Burlington, Iowa
James H. Smith, Springfield, Massachusetts, 2
John J. Smith, Trenton, New Jersey, 1, 2
Ralph V. Steeb, Tallahassee, Florida, 1, 2
Leonard F. Sterry, Madison, Wisconsin
Bragg A. Stockton, Dallas, Texas, 1, 2
Thomas J. Straka, Kent, Washington
Hilding O. Sundberg, Hamden, Connecticut, 1, 2
George R. Sutherland, Truro, Nova Scotia, Canada, 2
Rodger Swan, Lancaster, New Brunswick, Canada, 2
Daniel G. Swanson, Bloomington, Illinois, 2
Stanley E. Sweet, Clearwater, Florida, 1

David O. Taxis, Los Angeles, California, 1, 2
Marshall O. Tetterton, Richmond, Virginia
Eberhard Thieme, Rochester, New York, 1, 2
Ronald B. Thomas, Charleston, West Virginia, 2
Charles H. Turnquist, Detroit, Michigan

Robert J. Ullery, Albany, New York

Adrian VanZweden, Wayne, New Jersey, 2

LeRoy E. Wallis, Portland, Oregon
Thomas J. Walsh, Jr., Levittown, Pennsylvania, 2
Howard J. Warren, Salinas, California, 1, 2
Glenn D. Warrick, Long Beach, California, 1, 2
Arthur B. Weener, New York, New York, 1
Donald Wendy, Bowling Green, Kentucky
Edward S. Weston, New York, New York, 2
Carl J. White, Baltimore, Maryland, 1, 2
William A. Whitehouse, Toronto, Ontario, Canada
Paul M. Wighaman, Harrisburg, Pennsylvania
George B. Wilkinson, Philadelphia, Pennsylvania, 2
William J. Wilkinson, Wallingford, Pennsylvania, 1
Robert L. Woodward, Sacramento, California, 1, 2

Earl R. Zimmerman, Harrisburg, Pennsylvania, 2
Joseph E. Zupancic, Columbus, Ohio, 1, 2