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ABSTRACT

The guidelines, resulting from a series of sessions held by the American Council of Industrial Arts Supervisors, were prepared to offer direction by describing educational specifications for industrial arts in the middle school. The middle school philosophy is child-centered and uses an individual approach to meet the unique needs of early adolescence. Within this framework, the industrial arts program is concerned with common learning needed by all persons to function effectively in our industrial-technological society and the development of attitudes, interests, abilities, and skills as well as occupational information. Some performance objectives include management organization, social relations, problem solving, consumer knowledge, and safety practices. It is desirable that the program be co-educational with 100 percent participation. Facilities should stimulate learning and be adaptable for change. A suggested desirable class size is 16-20 or 18-22 students; a minimal program should provide two and one-half clock hours of weekly instruction for all students. A minimum of 75-100 square feet of open laboratory space per student is recommended by the council. Suggestions are offered for both unified arts patterns and traditional patterns of operation. Tools should not be limited to hand tools. Teacher preparation considerations include background in general education and professional/subject competence. (EA)

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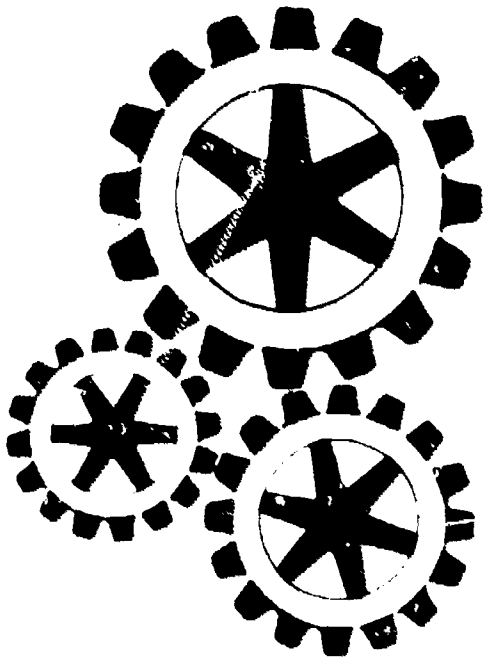

AMERICAN COUNCIL OF INDUSTRIAL ARTS SUPERVISORS
AND THE
AMERICAN INDUSTRIAL ARTS ASSOCIATION

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Industrial Arts in the Middle School

For a variety of reasons, the concept of the middle school has been gaining advocates across the nation. In the various attempts to organize the grades between the lower elementary school and the four-year high school (the middle grades) into an administrative unit, no standard pattern has resulted. Most of the information in educational literature concerns theory rather than actual practice.

Many attempts have been made to guide the direction of subject organization in the rapidly growing middle school movement. These attempts range from cooperative teaching by unification of allied subjects to merely moving the traditional programs down a grade or two. Industrial arts education, together with other special subjects, has not yet defined its role in this organizational structure. Industrial arts educators have simultaneously advocated (1) moving the junior high school program into grades 6-8, (2) establishing an advanced type of elementary school industrial arts program, or (3) creating a unified arts approach which correlates instruction and activities with home economics and art. Building costs, in some cases, have eliminated industrial arts entirely from the first phase of construction. This oversight not only overlooks the important contributions industrial arts can make toward interpreting technology, but ignores the need to provide for the development of the nonverbal abilities of each child.

These guidelines have been prepared to offer direction by describing educational specifications for industrial arts in the middle school. Certain assumptions are made based on commonalties emerging from educational patterns which have been attempted. These guidelines are broad and local requirements dictate the specifications for a given school. It is

important that the planning for industrial arts, as for all subjects, in the middle school be based on thorough study of needs and sound educational principles.

Definition of Middle School. The middle school is designed to provide an educational program in the grades between the lower grades of the elementary school and the four-year high school that meets early adolescent needs. Typical organizations are 6-7-8, 5-6-7-8, or 7-8. A span of three years suggests the best organization for providing a transition from self-contained to the semidepartmentalized or departmentalized class structure.

Basic School Philosophy. The middle school program is child-centered and uses an individual approach to learning to satisfy the unique needs of the pre-teenager. Early adolescence is a critical time in human development. During this time, the child needs and seeks to:

- Learn to interact with his peers (peer acceptance often takes priority over adults, both parents and teachers).
- Gain independence and develop a workable dependence-independence pattern of behavior.
- Find a self-identity and establish his value system.
- Expand his intellectual ability by exploring a variety of experiences and subjects.
- Understand his changing physical body.
- Define an appropriate sex role as male and female distinctions bring societal pressures.
- Consider broad career perimeters.

The basis for middle school philosophy hinges on the freeing of pupils and teachers from restrictive administrative and course requirements and building limitations, thereby permitting freedom to explore the social and physical environment. The middle school program is seen as focusing on pre- and early-adolescent children and what is appropriate for them, based on the social, emotional, and physical difference of children approaching adolescence. Special needs of pupils are a focal point for individual course prescription.

The educational aim for each child should be to determine where he is and to guide his development as far as he can go. The "total environment approach" incorporating home, school, community, government, business, and industry is recommended.

Characteristics of Instruction for Learning. The instructional program of the middle school often includes certain of the following characteristics: (1) modified course credit systems, (2) team teaching, (3) programmed learning, (4) flexibility (schedules and laboratories), (5) nongraded, (6) independent study (individualized instruction), (7) exploratory (conceptual with hands-on experiences), (8) tutorial, (9) technology-centered, (10) transitional, and (11) variety of experiences and media.

Industrial Arts Philosophy. The industrial arts program is concerned with common learning needed by all persons to function effectively in our industrial-technological society; the development of attitudes, interests, abilities, and skills, as well as the acquisition of information about occupations and professions. The program includes problem-solving techniques, an activity approach, the interpretation of humanistic values, appreciations and understandings, and provisions for essential individual success.

Management Organization. The pupil identifies management in organizational systems when (1) serving as a member of several personnel organizations; (2) having the opportunity to participate within the system through choice at various levels; (3) functioning as a member of a large group, as a member of a small group, and by himself; (4) demonstrating ability to manage his activities; (5) working independently on problems relevant to him; (6) accepting the contributions and opinions of others; and (7) having the opportunity to develop leadership talents.

Social Relations. The pupil participates in planned activities and experiences which include the construction of articles (problem solving) which are appropriate in meeting his needs when (1) working with a group to achieve a common goal, (2) participating as a member of the personnel organization, and (3) working by himself toward his own goal.

Tools. The pupil develops skill in working with hand and machine tools when (1) identifying major tool processes, and (2) demonstrating craftsmanship commensurate with his abilities.

Materials. The pupil acquires information about a wide variety of materials when identifying and comparing materials on the basis of texture, color, plasticity, strength, and durability.

Career Information. The pupil obtains information concerning career opportunities related to class activities by (1) identifying those occupations presented to him, (2) relating to himself possible career directions, and (3) identifying major industries related to class study and activities.

Problem Solving. The pupil acquires methods of solving problems through his teacher, group, and self-selected activities when (1) demonstrating an orderly procedure in seeking solutions; (2) identifying design techniques and materials used for construction; (3) interpreting, translating, and demonstrating problem analysis and proper procedural techniques in seeking solutions; (4) organizing his experiences into new forms and evaluating those in relation to his problem; (5) applying knowledge of scientific, mathematical, mechanical, and technical principles in seeking solutions; (6) serving as a member of a group seeking solutions to problems through planning, constructing, researching, experimenting, and developing; and (7) demonstrating the ability to instruct himself by utilizing the proper media.

Consumer Knowledge. The pupil compares materials, products, design, function, and process development as it applies to consumer knowledge. He displays consumer literacy in selecting (1) developmental procedures leading to good quality, (2) functional designs, (3) materials appropriate to accomplish the task, and (4) materials and processes considered economically feasible.

Health and Safe Practices. The pupil learns and employs safe practices in the use of tools, materials, and machines and relates safety to the home, school, and community. He develops techniques for critically evaluating safe environmental conditions and suggests changes for improvements.

The Instructional Program

The instructional program considers in its content, organization, and function that early adolescents are interested in seeking status with their peers. Often, from the pupil's point of view, social acceptance is more important than academic achievement. A well-planned co-curricular program that provides wholesome outlets is important. Some pupil characteristics developed during the study of industrial arts are leadership, citizenship, responsibility, cooperation, and success. The program must allow youngsters to work together, by themselves, and in groups in order to discover their talents, interests, abilities, and skills.

National industrial arts projects and other major curriculum developments need to be considered. It is, however, important that pupils remain foremost in thought as ideas are considered for selection and implementation.

Examples of implementation:

- Teachers work with youngsters in the laboratory, construct items related to other units of study.
- Units of instruction with commonalties, such as design, funnel through the unified arts areas.
- Introductory units designed for broad overviews in areas such as industry, research, and technology are used to study history, relationships between subjects, and characteristics of society.
- Units of instruction that couple study and application provide information relating to occupations and professions.
- Mass-production methods and industrial organization techniques are utilized.
- Separate courses are offered in (1) communications (drawing and design, graphic arts or visual graphics, and photography); (2) construction and manufacturing (wood and noncellulose material and metals); and (3) power (sources, transmission, and utilization).

Plant Requirements and Program Operation

The middle school plant is exciting to learn in, beautiful to look at, and comfortable to live in with flexibility for change. The plant must reflect not only the planned program; space allocations for playing, sitting, planning, and studying should be provided. Equipment and an area for experimentation should be an integral part of the laboratory space. Facilities for displaying work, bulletin boards, and chalkboards should be adequate and located to facilitate good utilization. It should be designed to motivate pupils to think for themselves through assistance in organization and application. The results of the educative process in the laboratory depend largely upon what teachers do. If the laboratory has an intimate atmosphere and conditions that encourage pupils to question and inquire, the opportunity and motivation are there to classify, generalize, compare, contrast, analyze, synthesize, deduce, and evaluate.

The desires of the community for a continuing spectrum in education, cultural activities, and recreation must be considered when designing and planning a new plant. The trend today for open hours and adult involvement clearly indicates public need; however, the educational welfare of the youngster must be kept of prime importance.

In planning for efficient teaching, one must strike a balance among the need for individual instruction, team teaching, large

group instruction, and economic justification. Several variables need consideration in order to define class size and teachers' needs. Important considerations in planning the industrial arts program are: (1) nature of program, (2) desired flexibility of program, (3) facilities, (4) age and ability range of students to be served, (5) teacher limitations and restrictions, (6) amount of time available for planning, (7) scheduling problems, and (8) percent of student body enrolled *(it is desirable that the program be co-educational with 100% participation.)*

Team teaching and individually prescribed instruction are examples of current practices that require considerable teacher time and flexibility of scheduling to be most effective. The nature of the middle school industrial arts program should lend itself particularly well to these instructional methods.

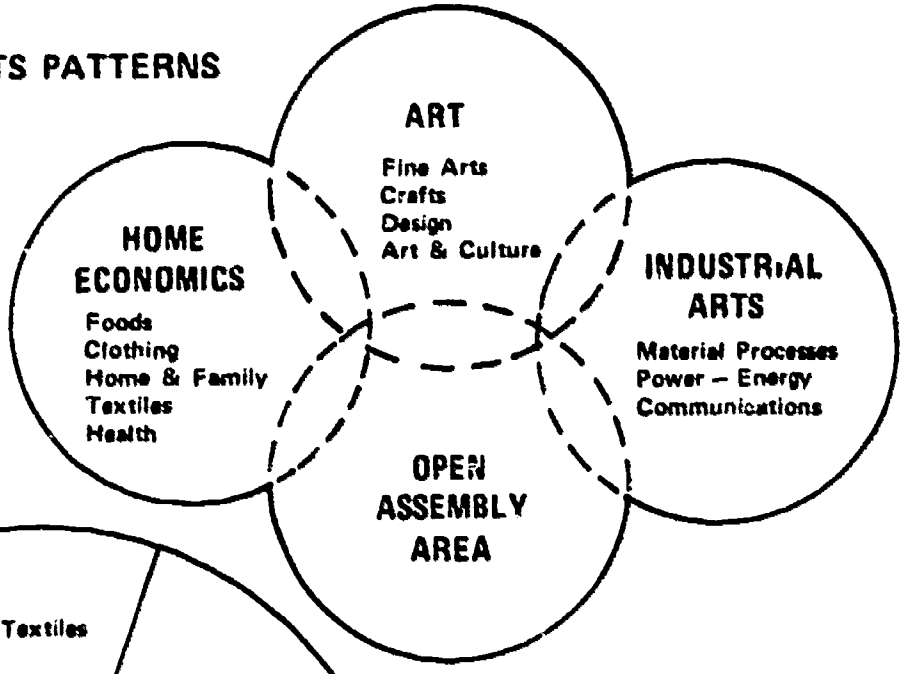
Lack of equipment and work space is a definite restrictive factor. In no case should there be more pupils than work stations. Conversely, adequate equipment and extensive audio-visual aids allow an effective teacher to gain time and flexibility with large classes.

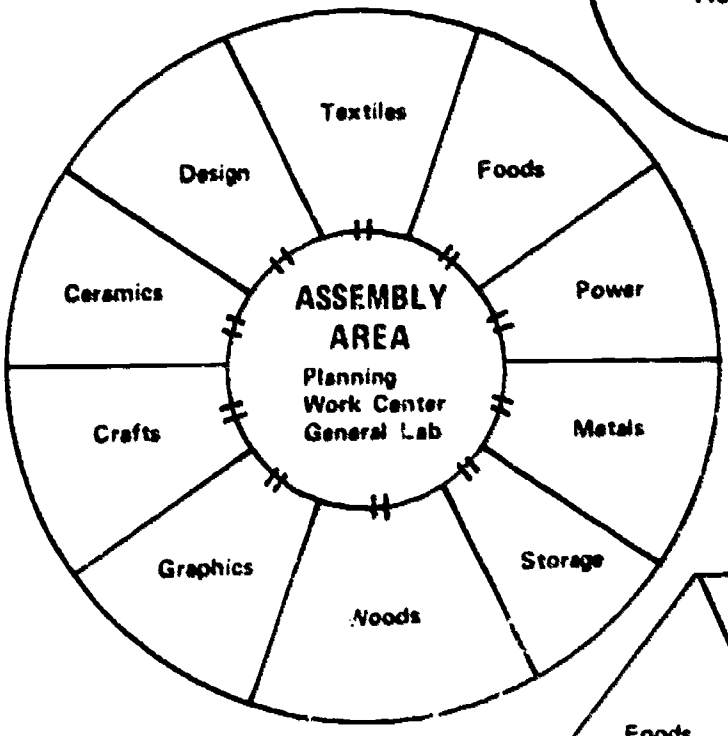
Teachers may be limited by local regulations as to length of teaching day, number of classes to be taught, and assigned duties other than teaching. They are further limited by certification regulations and individual experience and ability.

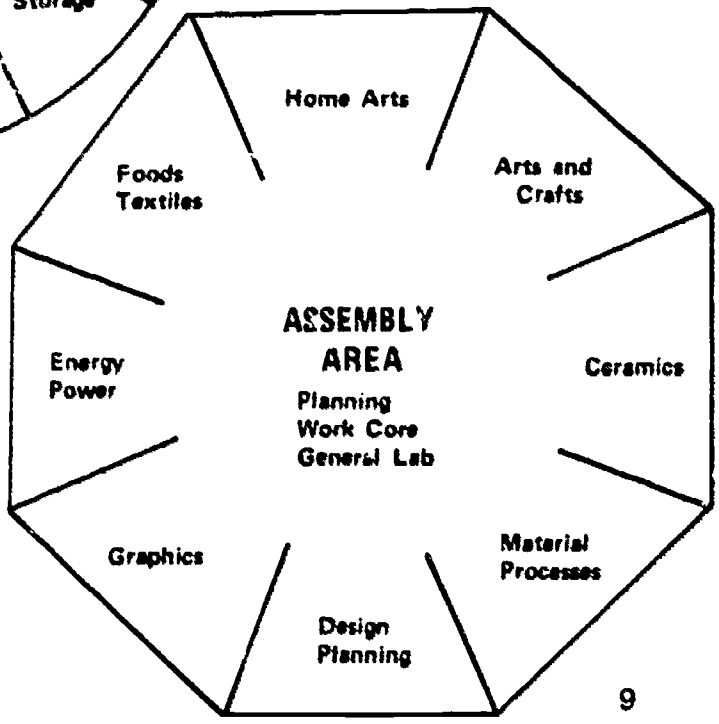
Scheduling problems involve such considerations as the length of the school day, length of class period, number of periods per week industrial arts is offered, number of pupils to be served, ability of youngsters, and length of time they will spend in industrial arts. In view of these variables and with consideration for the current trend toward smaller classes, it appears that 16 to 20, or 18 to 22 would be a desirable middle school industrial arts class size (industrial arts unit). A minimal program should provide two and one-half clock hours of instruction per week for all youngsters at the introductory level, with larger amounts of time available as the child progresses in the system. In order to accomplish this, one teacher is recommended for every 180 to 200 pupils. Teachers should have at least one daily preparation period. Cooperative teaching demands that preparation times be together.

If the practical, unified, or related arts approach is used, the program should involve both boys and girls, offering blocks of time equivalent to 45 to 60 minutes daily at each grade level. Scheduling should be flexible enough to allow for pursuit of individual interests. Under no circumstances should a combined program be undertaken without a considerable amount

UNIFIED ARTS PATTERNS







of preplanning time and daily scheduled planning time – time when team teachers can plan together free from other responsibilities. Staff inservice training is highly desirable.

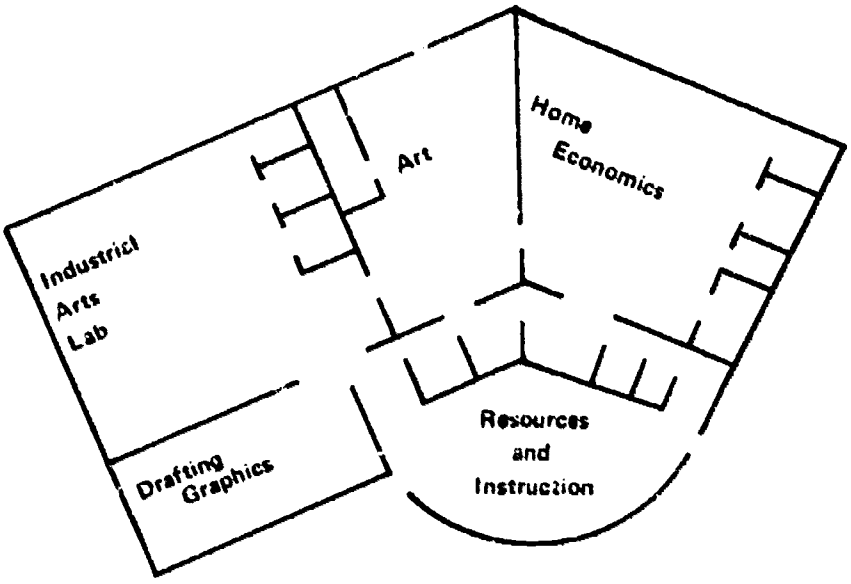
Physical arrangement of building space is very important in influencing educational change; sharing, cooperating, and innovating are directly related to the amount of time teachers can spend together. Closed areas tend to create isolated programs. It is very important that areas of instruction be open and located adjacent to each other. The "out-back" location of the industrial arts area will not bring about the desired balance in program needed by today's youth.

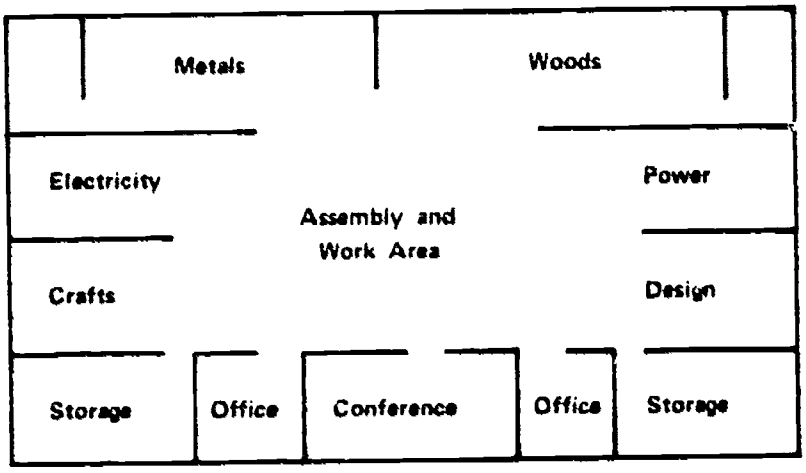
There is a general agreement among industrial arts educators that the kinds and numbers of instructional laboratories (spaces) should be planned to accommodate student-oriented educational activities or programs rather than attempt to fit a program into spaces. In order to house not only the basic program but an enriched one as well, decisions must be made as to number, kinds, size, type (open or closed), and what areas of instruction might be combined to fit local situations. These decisions should be developed cooperatively with teachers, supervisors, administrators, and parents, based on the objectives and philosophy of the local area. The amounts, kind, variety of instructional equipment, materials, spaces, and their locations should be a continuous part of the planning. Aspects that need consideration are (1) hands-on experiences over a broad spectrum of activities, (2) cooperation with other subjects in areas of related learnings, (3) location of resource center, and (4) newer methods of organizing industrial arts content (such as production, manufacturing, and construction; visual communication; power; and technology).

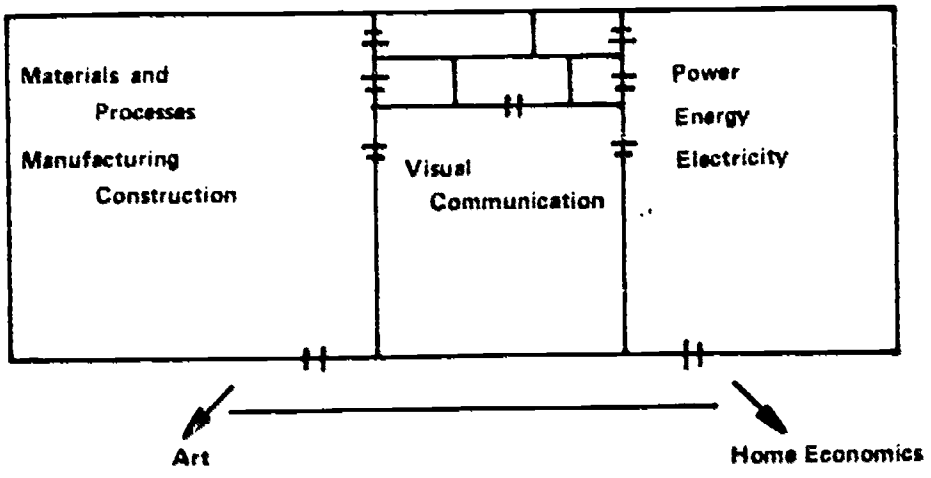
It is immediately evident that there are vast differences in the kinds of activities available and that each major area requires space. Each area listed may need to be subdivided for special needs.

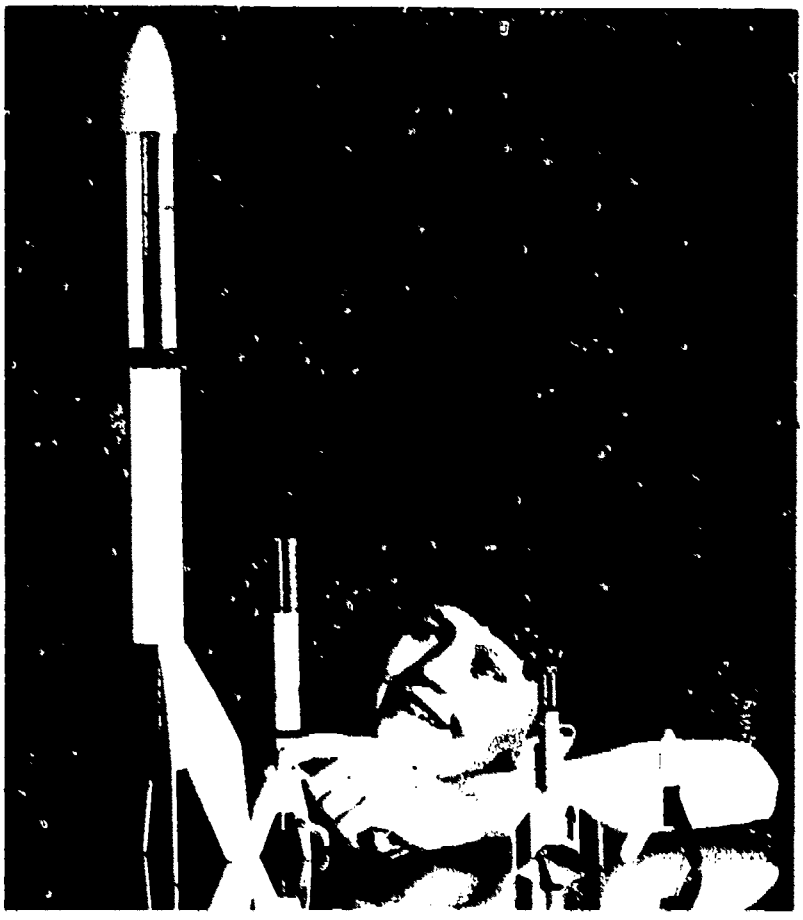
If the unified or related arts approach is planned, the area of square footage encompassed in the building design should equal the sum of all the areas if they were to be built as separate facilities. A minimum of 75 to 100 square feet of open laboratory space per student is recommended by the American Council of Industrial Arts Supervisors. An additional 20% over and above the working area for storage should be provided. The space used for storage should not reduce the recommended 75 to 100 square feet required for each student.

TRADITIONAL PATTERNS









Equipment for Industrial Arts Facility

The tools and equipment used in the industrial arts laboratory have two very important functions. The obvious function, of course, is the shaping of materials. The other function, one which is far more crucial, is that of "shaping" students. The following questions are but a few that the teacher of middle-school students must ask himself when selecting equipment to fulfill the objectives of an educational program to meet the needs of today's youth: Is its function consistent with the objectives of the middle school? Will the piece of equipment literally be a tool that will develop the student's mental as well as manipulative skills? Will it help him construct the things he has the ability to conceive? Are the tools and machines compatible in size with the students?

Since the industrial arts program in the middle school is a general education program designed to make all learning real and meaningful, it must be understood that mental skills rather than physical skills are the primary objective. The tools and equipment selected must assist the teacher in offering a program where creative problem-solving is constantly occurring; where excitement and enthusiasm in and out of the laboratory are the rule rather than an occasional occurrence; where pupils are allowed to use a variety of tools and equipment; and where the development of individual pupils takes precedence over the completion of class lessons or the attainment of specific manipulative skills. Equipment should be available for activities such as designing, experimenting, inventing, constructing, and testing.

In order to meet these objectives, it is important that equipment selection not be limited to hand tools. With the wide variety of home-shop equipment available today, the school cannot afford to provide program activities that are not current. Activities must be commensurate with today.

No attempt is made to itemize tools and machines since this will vary from one school situation to another. However, a few helpful hints are offered for selecting equipment to be used by the middle school pupil. Most hand tools should be slightly smaller than adult size. Such items as aviation snips, block planes, and small machinist's hammers are more useful to the smaller pupils. The machines should not be the smallest available. In most cases, good quality, medium sized equipment is easier and safer for the pupil to use. Equipment of good quality usually eliminates many maintenance problems for the teacher.

Workbenches and machines should be lower than those used in the secondary schools. However, shorter pupils can often be assisted by small, portable platforms to raise them to the proper level. These platforms can be constructed in a variety of sizes to accomodate the wide range of student heights. The teacher must know what contribution he is to make to the total development of the pupil. He must then determine how he can best make this contribution in his local situation. Then, and only then, will he be able to make a wise selection of equipment for the program.[1]

[1]Your attention is called to the American Industrial Arts Association publication: *A Guide for Equipping Industrial Arts Laboratories* (general shop portion), Copyright 1967, Washington, D.C. 20036, NEA stock 641-21290 ($4.75 per copy).

Teacher Preparation

Teacher preparation is a vital part of any program. It has often been said that the teacher is the program. With this in mind, it is important that consideration be given to performance as it relates to individuals. They should exhibit a love for children, cheerful disposition, security, respect for self and others, experience, and knowledge, with the desire to relate all learning to meet children's needs. They should have the ability to organize and manage activities, ability and desire to change as change may be necessary, subject competence, and teaching methods and techniques.

Industrial arts is that part of the total field of education that provides unique opportunities for students to participate and explore and to apply mathematics, science, language arts, art, and other school subjects in a technology-centered laboratory.

The program is designed to assist pupils in the discovery and development of personal aptitudes, interests, creative

abilities, self-reliance, sound judgment, and resourcefulness through problem solving and self-expression.

Therefore, a teacher preparation program should provide for the student who desires to teach in the middle school a broad background in (1) general education (language arts, social sciences, history of technology, natural science, mathematics, art and music, and psychology); (2) professional education (educational psychology, adolescent psychology, philosopy of education, school health, curriculum organization and management, growth and development, methods of teaching, and student teaching in the middle school); (3) industrial arts education (course construction and evaluation, developing general industrial arts programs, and general shop activities); and (4) unit of studies in industrial arts (electricity, graphic arts or visual graphics, woods, power, computer orientation, metals, plastics, crafts, drawing and design, and space technology).

Conclusion

The middle school offers a real opportunity for more effective learning. It offers the opportunity to provide a program which was not possible in the separate subject-type organization of the high school.

The industrial arts program should be examined not from an analysis of the content, but from an understanding of the transcending child. These are critical years in the total educational sequence because children make major decisions here which affect their continued education and hence their adult lives.

It is in these years that pupils decide whether to continue or drop out of school, develop an interest in learning or reject that which is academic or intellectual. It is in these years that children develop a self-image, become more independent, and question the dominant adult role. Anything done to provide a better program of education for children at this age, whether it be through the establishment of middle schools or improving programs within existing schools, is worthy of consideration.

If middle schools are becoming the pattern in your school system, then you as a supervisor and educator need to inspire and involve industrial arts personnel in the initial planning and implementation of industrial arts programs with enthusiasm and empathy. Keep in mind that for the most part learning has been oriented for the verbal and symbolic and that poor provisions have been provided for developing the nonverbal abilities of each child. Since each child brings a unique profile to the learning situation, a profile constructed from past experiences, we must recognize that individual levels of development exist; *i.e.*, personal characteristics, values, self-concepts, attitudes, knowledge, and psychomotor skills. Our major task then becomes one of developing a balanced educational system.

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