DOCUMENT RESUME

ED 027 408 VT 007 771

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Symposium on Industrial Arts Education, 1968.
California State Dept. of Education, Sacramento.
Pub Date 68
Note-22p..
Available from-Bureau of Industrial Education, California State Department of Education, 721 Capitol Mall, Sacramento, California 95814 (without charge).
EDRS Price MF-$0.25 HC-$1.20
Descriptors-*Curriculum Development, *Educational Philosophy, *Federal Laws, Financial Support, *Industrial Arts, Program Administration, Program Descriptions, *Supervisory Activities

Five papers presented at six California colleges in July of 1968 are presented. "Industrial Arts and Technology" by Delmar W. Olson outlines the bases for a contemporary industrial arts program, its possible purposes, and several elements which need consideration when desiging such a program. "Contemporary Industrial Arts Programs in the United States" by Arthur J. Dudley discusses five traditional and contemporary approached to program and curriculum planning. "Implementing Promising Curriculum Changes in Industrial Arts" by Ralph C. Bohn describes two types of curriculum changes which involve either organizational patterns or educational materials and which are presently taking place. "Supervision and Administration of Industrial Arts" by Leonard W. Glisman reviews the supervisory role involving responsibility for instructional improvement, personnel administration, course development, instructional leadership, coordination, and inservice education. "Federal Funds for Industrial Arts" by Howard S. Decker outlines provisions of the Elementary and Secondary Education Act, the National Defense Education Act, and the Educational Professions Development Act. (EM)

SYMPOSIUMS ON INDUSTRIAL ARTS EDUCATION, 1968

San Diego State College, July 8; California State College at Long Beach, July 9; California State College at Los Angeles, July 9; Fresno State College, July 10; San Jose State College, July 11; and Chico State College, July 12, 1968

"Industrial Arts and Technology"

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"Contemporary Industrial Arts Programs in the United States"

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"Implementing Promising Curriculum Changes in Industrial Arts"

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"Supervision and Administration of Industrial Arts"

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Conducted Under
National Defense Education Act

CALIFORNIA STATE DEPARTMENT OF EDUCATION
Max Rafferty, Superintendent of Public Instruction
Sacramento—1968

INDUSTRIAL ARTS AND TECHNOLOGY

Delmar W. Olson

A "new" industrial arts presumes an old one. This proposal outlines a concept of industrial arts education which draws on technology for subject matter. In this position, it stands on bases so solid that no dependence on its antecedents is actually needed.

I. Bases for a New Industrial Arts

A. The primary purpose of the school in any society is to acquaint the young with the nature of the culture in which it lives and of which it is a part.

B. The American culture is distinctly, uniquely technological.

C. Therefore, it is the responsibility of the American School to acquaint the young with the nature of the technological culture.

D. With industrial arts an integral part of general education, and its subject matter characteristically technical, it is here accepted that it is the responsibility of industrial arts to acquaint the young with the nature of the technological culture. This industrial arts then, because of its primacy, becomes FUNDAMENTAL EDUCATION in the American school. With its own body of subject matter, it assumes the role of a discipline as it becomes the interpreter of technology in modern education. This is a NEW industrial arts.

E. It is the responsibility of American education that through it individual potential be discovered and developed, released, and realized.

F. The individual has a nascent potential for reasoning and problem-solving, imagining and creating, and constructing and expressing with materials. From this, comes the technology.

G. Then, it falls to industrial arts to contribute to the realization of INDIVIDUAL potential within the context of technology.

II. The New Industrial Arts: A Guiding Definition

Industrial arts is the study of technology: its origins, development, and advance; its technical, social, economic, occupational, cultural, recreational nature, and influences; through study, research, experiment, design, invention, construction, and operation with ideas, materials, processes, products, and energies; for purposes of acquainting the student with the technological culture and aiding him in the discovery and development, release and realization of his own native potential therein.

III. Technology: An Interpretation

A. Technology: the MATERIAL CULTURE: what man has done and can do with materials: a materials phenomenon.

B. Technology: the resultant of the interaction of man, mind, materials, and energies.

C. Technology: a record of ideas expressed in materials: man expressing self.

D. Technology: man controlling nature.

E. Technology: man creating his own environment on earth, in air, in space, and under sea.
F. Technology: man expressing master purpose. Man with gifts for ideation, reasoning, problem-solving, creating, constructing within an environment of materials and energies for a freeing of his kind from enslavement by nature and by lower levels of technology.
G. Technology: man making himself: man extending himself.
H. The Centricity of Technology: MAN among materials and energies.
I. The Spirit of the Technology: THERE IS A BETTER WAY: what man can conceive with materials, industry can produce.
J. Industry: the social-economic agency productive of materials development. Research and Development: the industry of discovery, productive of ideas.
K. Technology is from the Beginning: industry is now.
L. Science: the source of pure theory and principle.
Technology as the origin of science.
Technology makes science functional, useful.
Technology as scientific in origin and development.

M. Technology: a force for revolution in culture, producing cultural change and shock.

IV. The Technological Culture as Source of Subject Matter

A. The Technical Complex: typical curricular components

Materials	Machine tools	Production	Operation
Processes	Engineering	Construction	Controls
Products	Power	Industries	Records
Tools	Transportation	Facilities	Service
Machines	Communications	Consumption	Manpower

B. The Human Complex: typical curricular components

Ideation	Research	Consumption	Interpretation
Imagination	Development	Aesthetics	Occupation
Invention	Design	Organization	Safety
Innovation	Planning	Management	Health
Creation	Principles	Legislation	Recreation
Experiment	Theories	Investment	Evaluation

C. The Culture Complex: technology as a man-made force changing culture and man. Areas of impact

The historical	The political	The educative
The economic	The individual	The international
The social	The environmental	Work and leisure

V. Functions of the New Industrial Arts, as Mission, Goals, Skills, Achievement, and Content

A. Technical
B. Consumer
C. Occupational

D. Cultural
E. Recreational
F. Social

VI. Program Levels

A. The Elementary School: an introduction to the technology.
The Kindergarten: technology and the child.
The Primary Grades: technology and the home.
The Intermediate Grades: technology and the community.
The Upper Grades: technology and the world.

B. The Junior High School: as study of the manufacturing industries.
Grade 7: the graphic arts, paper, leather, textiles industries.
Grade 8: the ceramics, plastics, rubber, chemical, foods industries.
Grade 9: the metals, woods, tools, and machines industries.

C. The Senior High School:

Power and transportation	Industrial production
Electricity-electronics	Industrial management
Construction	Research and development
Communications	Technology and man
Services	Recreation

D. The Adult School: education is forever

Technical specialization	Refresher training
Continuing education	Recreational expression

E. The College/University: industrial arts as higher education

Technical teacher education	Recreational expression
Cultural, liberal education	Research and development

F. Special Programs:

Dropouts	Culturally deprived
Handicapped	Ungifted

VII. The New School Program: "The Main Line has Five Tracks."

A. "The unlimited:" for human potential at its greatest.
B. "The Express:" the most for the many.
C. "The Special:" for the exceptional.
D. "The 20th Century:" industrial arts recreation.
E. "The Local:" technology and man.

VIII. The Student

A. For All Students -- Boys and Girls: talent discovery and development.
B. At All Levels of Individual Potential: gifted, normal, and special.
C. At Any Level of Educational Achievement:

Elementary School	Senior High School	Collegiate
Middle School	Post High School	Dropout
Junior High School	Adult	Culturally Deprived

IX. The New Project

A. As illustrative of human control of materials through involvement of the intellectual and the manipulative
B. As solutions to technical-scientific problems
C. As utilization of maximum student potential
D. As achievement resulting in human growth and technological advance
E. As adventure in learning.

X. A New Teaching Methodology

A. The methodology as a creative pedagogy: as the continuing search for a better way to teach.
B. The methodology as liberating and leading versus conforming and confining.
C. The methodology as a revealing of student and teacher intellectual, creative potential.
D. The methodology as providing for a maximum of student and teacher growth.
E. The methodology as personalization of instruction.
F. The methodology as individualization of interests.
G. The methodology as group dynamics.

XI. The New Skill Objective

A. Intellectual
Reason as application of principle
Problem-solving as application of knowledge
Comprehension as understandings
Appreciations as values, sensitivities
Creativity as expression of imagination in materials, processes, machines, systems

B. Manipulative
The hand as an extension of the mind
Construction as ideas in form
Operation as control
Control as mastery of process
Manipulation as means, as achievement
Mastery as release

XII. The New Teacher: The "Gifted Generalist"

Educator	Organizer	Craftsman
Scholar	Counsellor	Researcher

XIII. Industrial Arts and the World of Work

A. As a study of the nature of work
B. As a study of the purposes of work

C. As occupational exploration
D. As preparation for work
E. Industrial arts as work

XIV. Industrial Arts and the World of Leisure

A. Leisure as a resultant of technological development
B. Leisure as the emerging culture base
C. Leisure as the goal of work
D. Technology as means to recreation
E. Industrial arts as recreation
F. The post-industrial society

XV. Industrial Arts in Higher Education

A. As cultural, liberal
B. As teacher education
C. As recreation
D. For industrial orientation
E. For research and development
F. For international industrialization
G. For international culture control
H. For national and international leadership

XVI. Industrial Arts International: Industrial Arts as

A. General, fundamental education
B. Preparation for industrialization
C. Preservation of cultural heritage
D. Education for consumership
E. Planned technological development

XVII. Educational Dimensions of the New Industrial Arts

A. Industrial arts as a discipline, a body of knowledge
B. Industrial arts as a means to stimulating and nurturing human growth and development
C. Industrial arts as a system for exploring, utilizing, understanding, interpreting, and advancing the technology for educational values.

CONTEMPORARY INDUSTRIAL ARTS PROGRAMS IN THE UNITED STATES

Arthur J. Dudley

Industrial arts on the national scene currently takes a variety of forms to achieve its purposes. These forms are influenced by local leadership, college and university spokesmen, or by state-level personnel. In approaching a discussion of "Contemporary Industrial Arts Programs in the United States," I believe it is necessary to establish some basic premises to insure our overviews will remain in perspective.

The first premise that needs to be defined is that equal emphasis be given to reporting respective programs for it is not my purpose to rank or rate the identified approaches or directions. In fact you may not agree with the prime categories, but it appears that on a national basis our segment of the profession needs to separate fact from fiction and separate content from methodology.

A second premise is that we will direct our attention to total programs, defining their goals as simply as possible, with no reference to course titles or descriptions. In fact, it would be naive to attempt a definition of course combinations that would be universally acceptable. There also will be no reference to the levels of learning such as distinctions of elementary or secondary groupings. This decision is based on the belief that a program of industrial arts education is a total experience that should be available at all levels in varying degrees.

A third premise, carrying with it a risk of oversimplification, would be that a series of general headings can be used to characterize the major thrusts in programs that are being implemented.

The implementation phase of industrial arts education programs highlights a fourth premise, that our discussion will be directed to a review of major-known operational programs. This approach in no way detracts from the numerous professional experimental efforts that will add to our total fund of knowledge about the educational process.

A final premise is that all industrial arts programs consist of two basic elements that are brought into different perspective in the programs. One of these is the study phase involving desirable knowledges, facts, learnings and/or problem-solving techniques that are supportive to the industrial arts discipline. The other is the experience or application aspect resulting in meaningful activity for the student.

One of the philosophical points that we have identified is that historically industrial arts education is defined as being general education to interpret our industrial society for youth. This is a posture that often is refuted by the actual nature of programs that are developed.

Many of our programs have their origins in a trade-analysis approach. It would seem this is an outgrowth of our early history of evaluation involving an intent to be "practical." In a sense, it represents the thinking of many early industrial arts educators who had their origins and training in vocational education. Such a trade-analysis approach for program development focuses attention on the production of articles with a limited concern for related learnings of an

organized nature. This approach is being mentioned first because it is the most prevalent in the observable programs. In essence, production of articles is the basis for the identification of operations and processes involving tools and materials. Once the operations and processes needed for production are classified, a series of demonstrations are organized to fulfill the constructive aspect. Often the teacher demonstration of tool and material aspects evoke some interest in supportive related instruction. The emphasis is on things rather than concepts. The justification of this approach leans heavily on student activity, almost at any cost, as being the most desirable and often exclusive outcome. I believe that many industrial arts educators are proponents of this analysis technique because of the high visibility of results in articles produced and the implied tool skill development.

Our rural society often accepts this approach in lieu of occupational education because geography and funds do not provide the needed specialized trainings. If this is the reality, special care needs to be taken to maintain a perspective of purpose and levels of learning.

Closely allied with the trade-analysis emphasis is the materials and forces school of thought. In this category of program, a structure is based on the inherent content relating to materials and/or forces, their production, application, fabrication, and utilization. The curriculum design primarily is based on a structure of knowledge about and the utilization of these materials or forces. Consideration is given to the problems and processes of an industrial nature representative of our industrialized society. A characteristic of this orientation is that an attempt is being made to achieve a breadth of education and experience through contact with a variety of media. The proponents of a fundamental materials orientation submit that an enriched experience is achieved by the student through exposure to a number of activities. The ultimate achievement of the student would depend on his experiencing a full series of selected activities in materials usage. In many instances, this resolves itself into a limitation of such areas as electricity, metals, and woods. If this type of curricular base is accepted, the scope of activities would seem endless if we are to consider materials such as chemicals, synthetics, ceramics, plastics, fibres, or forces including hydraulic, steam, combustion, and others. A characteristic of a materials/forces orientation is that many programs tend to pyramid the students' experiences to the end that occupational goals appear to be the prime consideration. We often hear descriptions that outline a pyramidal effect culmination in an in-depth study that does not seem consistent with the breadth and general education philosophy that often is stated as a primary goal.

The variety of materials/forces offering is characteristic of programs in many of our urban centers. In the cities, these usually are programs of occupational education but there also is the interest of administrators and teachers in maintaining the highest possible retention of students in the home school with the result that in-depth courses emerge.

The search for academic respectability by industrial arts educators has led many to design programs that have a highly technical orientation. This appears to be a search for a rationale relating to the recognized technological development of our society. It is intended to serve a particular segment of the population, usually those with a commitment to engineering-high-ability-technician aspirations. In general, the emphasis is on ideation, problem solving, research and development techniques, and study. The activity and experimentation that is identified often

appear to assume a subordinate role in the process. This curricular pattern appears to be in vogue among the high-aspirations level population associated with the suburban section of our society.

A continuing search for breadth of industrial arts offering has led a number of school districts to explore an interdisciplinary approach. The primary intent in this instance is to relate industrial arts education to several other disciplines as a means of reinforcing learnings in each. The usual pattern is to establish common learnings, and in many instances, a common facility for industrial arts, home economics, music, science, or combinations. In essence, each subject matter specialty submerges its interests to the attainment of a greater, broader goal than the subject itself. It also may be a curricular organization, mainly involving planning of instruction, to reinforce learning in the arts, both fine and industrial. In certain instances, school personnel have pooled their efforts in relating mathematics, science, and/or English to aspects of industrial arts. In such an operation, great care must be taken to maintain a balance of service. It requires an unusually cooperative staff to assure continued progress and development of instruction. Basic to success is an administrative commitment to funding, recruitment of staff, and supervisory practices that alleviate personnel problems. Such programs are found in districts with both the financial support and imaginative leadership. There appears to be a high incidence of mortality in programs caused by the break up of teams due to changes in staff.

An emerging curricular pattern influencing many programs is the conceptual approach. It is here that educators are developing a rationale, supportive of the general education concept, that industrial arts learnings and experiences should relate to the structure of our society. The concepts may relate to sociological aspects evolving from a study of man and his tasks. The organization of instruction and activity is based on man's role as a builder, communicator, producer, transporter, developer, organizer/manager, and as a craftsman. Anthropology may be the basis for organization of content and program as content reflects a study of mankind, the impacts of tools and machines, power and energy, communications, and transportation.

In both instances, the use of a sociological pattern or the identification of elements relating to anthropology, the nature of man's institutions or his patterns of development are central to the curricular pattern that results. The study and interpretation of the individual's role in a technological society fascinates many when they analyze instructional content. A human development aspect is basic to some curricular patterns which center on the child and his growth as an individual.

In contrast to a pattern focusing on sociological or anthropological aspects, another conceptual approach embodies a curricular structure relating to existing industrial organization systems. An industrial analysis concept focuses attention on industrial and labor relations, production, finance, engineering, and marketing.

Another conceptual development pattern classifies instructional units in relation to a total body of industrial knowledge as -- the theory of practice, a knowledge of practice, and the principles of practice. As a summation of results in conceptual development, attention appears to be directed to group activities and line-production experiences as a replacement for the custom-built article.

Any one of the subdivisions of conceptual development represent an attempt

to establish principles rather than detail of process or emphasis on material aspects. The emergence of programs embodying conceptual aspects at present are rather widely dispersed. It is evidence of a maturation of professional personnel on a national basis. It is indicative of improved dialogue, strengthening of undergraduate and graduate education, new financial resources, and sharing of ideas through educational associations, journals, and leadership development institutes.

The conceptual aspect of program seems to be strongest in those school districts with multiple teacher staffs in an educational climate that imposes a minimum of regulatory restrictions providing the possibility for experimentation and innovation. The school districts evidencing this direction usually are within the sphere of influence of a college, university, or enlightened industrial complex that encourages their activity through professional and financial support.

It has been my purpose to reduce nationwide program definitions to some common denominators. It further is my hope that such an analysis will serve the profession by establishing a perspective on general directions. I believe a basic classification of approaches will tend to remove the cult of identifying curricular organization with personalities and/or institutions. An ultimate outcome of our collective effort should be improved communication of purpose to our colleagues, to parents, students, and taxpayers for the improvement, extension and progress of industrial arts education.

IMPLEMENTING PROMISING CURRICULUM CHANGES IN INDUSTRIAL ARTS

Ralph C. Bohn

Industrial arts teachers have become increasingly aware of the widening gap between industry and the manner in which it is represented in the school. The knowledge explosion, which is engulfing education with subject matter content, has produced revolutionary changes in industry. These changes have nurtured a growing dissatisfaction with existing industrial arts programs. In an effort to modify and update curriculum offerings, groups and individual members of the profession are preparing a variety of curriculum materials. These materials include total curriculum revisions, new methods and approaches to content organization and presentation, and the development of complete and partial teaching systems.

Curriculum changes may be divided into two broad classifications: (1) changes in organizational patterns, and (2) changes in educational materials.

Changes in Organizational Patterns

This group contains all the research studies and individual plans for reorganizing the course offerings and course patterns in industrial arts. Even though more than ten of these patterns can be identified, many can be grouped together for our consideration. As a result, four patterns will be briefly considered. These include the two major research projects being conducted at Stout State University and Ohio State University, research and development programs, and industrial technology (applied arts and sciences).

American Industry Project (AI): Stout State University. This project is based on the study of industry -- and industry is defined as "An institution in our society which, intending to make a monetary profit, applies knowledge and utilizes natural and human resources to produce goods or services to meet the needs of man." The objectives of the program are (a) to develop in the student an understanding of industry, and (b) to develop in the student the ability to solve problems.

In an effort to bring this broad and inclusive area under control, the study group adopted a concept approach to the study of industry. They defined a concept as "A psychological construct resulting from a variety of experiences (detached from the many situations giving rise to it) fixed by a word or other symbol, having functional value to the individual in his thinking and behavior." The project has been built around a structure of American Industry which identifies 14 major concepts:

Energy	Marketing	Physical Facilities
Processes	Industrial Relations	Finance
Materials	Purchasing	Public Interest
Production	Research	Transportation
Management		Communication

These 14 concepts were further broken into subconcepts which were used to identify elements of the revised curriculum. At the present time, instructional units at three levels of secondary school industrial arts are being developed:

Level 1 -- a broad foundation for the understanding of industry.

Level 2 -- an in-depth study of each of the major conceptual areas.
Level 3 -- research and experimentation in one or more of the conceptual areas.

Industrial Arts Curriculum Project (IAPC): Ohio State University. At the onset of this project, a number of assumptions were made regarding industrial arts education. They were:

(a) It is just as important to study the man-made world as it is to study the natural world.
(b) Industry, which creates the man-made world, is an important part of society.
(c) Man has been and remains curious about industry.
(d) Industrial arts is "A study of industry and an essential part of the education of all."

The study group's first step was to identify a portion of the total body of man's knowledge as "industrial technology." The subject matter of industrial arts was taken from this body of knowledge.

Industry was defined as that sub-element of the economic structure responsible for changing the form of materials to man's needs. Industrial technology, then, became the knowledge used to satisfy man's needs for industrial goods. It was found that man uses this knowledge in two principal activities -- construction and manufacturing.

These two activities are being analyzed and built into instructional programs for junior high school industrial arts. As these programs are developed, they will include the planning and preparation of an instructional teaching system, including all needed instructional materials.

Research and Development Programs (R&D). This approach is presented as a method rather than as a reorganization or new pattern of instruction. In use, content is selected from the broad study of industry and technology. The major contribution of this approach is twofold. First, it changes the emphasis of instruction from "teaching about things" to "teaching people." It is very easy to lose sight of the humanistic value of industrial arts and become engrossed in materials and processes.

Second, it establishes a structure where students are encouraged to experiment and learn instructional content as they solve problems or work towards an understanding of a major area of industry. As students work towards the solution of industrial problems, they must employ the tools and materials of industry. In this way, they learn how to discover new information, as well as learning about the materials and processes of industry.

Industrial Technology. This approach has already been described by Delmar Olson. Many of the programs emphasizing the application of art and science to industrial materials and processes are variations and modifications of this broad approach.

One of the major contributions to this approach is the emphasis of the "why" of industrial materials, processes, communications, and mechanisms. Understanding of the use of science and creativity become an important function of industrial arts.

Changes in Educational Materials

This group contains the changes being made in instructional materials available for enrichment and modification of industrial arts offerings. These include teaching systems, demonstration units, visual presentation aids, and the integrated instructional system.

Teaching Systems. Teaching or student experiment systems will probably be identified as this decade's greatest influence in producing curriculum reform and modification. For many years, the project has been considered inadequate as an educational tool to meet the wide variety of instructional needs. The teaching system has been designed to supplement or, in some cases, replace the project as the laboratory media for learning.

The teaching system has had its greatest development in the area of electricity/electronics. Within this subject area, the teacher is able to choose from a wide variety of systems, one of which should be suitable to his teaching situation. In addition, teaching systems have been developed in pneumatics, hydraulics, and automotive electricity. In the years ahead, members of the profession will almost certainly produce systems to implement both the American Industry Project and the Industrial Arts Curriculum Project. Also, other subject areas, such as power mechanics, have teaching systems in various stages of development.

Demonstration Units. The development of teacher demonstration units is more extensive than the development of systems. The pneumatic and hydraulic units can be used as teaching systems or demonstration units. Also available are demonstration engines for power mechanics, electrical and electronic circuit boards and components, instrumentation panels, material testing devices, machinability panels, and glass or plastic refrigeration units. These units are valuable aids to teachers as they attempt to describe and demonstrate the more complex mechanisms and materials of modern industry.

Visual Presentations. A wide variety of overhead projection materials and closed loop films, designed specifically for classroom use, have become available during the past few years. Overhead projection materials are available for nearly every area of industrial arts. Closed loop films are being planned and developed for most instructional areas.

Integrated Instructional System. The development of teaching systems, demonstration units, and visual materials has led to the development of the integrated instructional system. This is one of the newest approaches to teaching and is the natural product of technology in education.

Essentially, the integrated instructional system is the joining of a wide variety of teaching aids and devices into an integrated instructional package. A typical package might include a textbook, teaching system, student manual, project suggestions or plans, demonstration units, overhead projection transparencies, closed loop films, and a teacher's manual. Each segment of the system would be planned and designed to compliment the complete assembly. A teacher might put the total system to use or select the components which best meet his needs. He might use one segment, such as closed loop films, for reinforcement or review for the slower students.

Present systems are not as complete as the one suggested. However, the

direction of the profession is to make more educational materials available for teacher selection and use. It is hoped that these materials will enrich instruction and permit more time for experimentation, rather than providing a comfortable and repetitive program.

Programmed instruction was intentionally omitted up to this point. I'm sure the future will find programmed instruction available and used at all levels of instruction. It has a logical place within the integrated instructional system. However, at the present time, it is in the stage of "hardware development." Each new piece of programmed instruction equipment is more versatile and able to provide broader instructional programs.

As development stabilizes and instructional programs are developed for industrial arts, programmed instruction will become an important part of the integrated instructional system.

Implementing Changes in Existing Programs

Existing programs of industrial arts can profit from both the curriculum changes in organizational patterns and in educational materials.

Each of the two research groups working on curriculum projects, as well as those suggesting programs based on their own philosophies, would prefer that you adopt their instructional programs. As the two research groups continue their work, they will have complete sets of instructional materials available, permitting adoption and implementation of their curriculum plans.

If, however, you prefer to update your present program, there are numerous changes that can be made as a result of the progress in curriculum development.

Program Breadth. All programs presented up to this point have a number of characteristics in common. The two most important are (1) increased program breadth, and (2) closer representation of industrial practices. Both of these can be implemented at a gradual rate, and to the extent desired.

For example, many junior high and senior high programs are limited to just a few areas. A typical program might include courses and facilities for drafting, woods, and metals. While these are important areas, they fall far short of the broad use of industrial materials and processes, and the breadth of current graphic communications. Also, the technical areas involving energy and power, as identified in the American Industries Project, are not included. This existing program could be expanded within existing facilities, as follows:

1. Metals -- integrate units in electricity/electronics and power mechanics. These two areas are usually compatible with existing metals programs and facilities.
2. Woods -- integrate units in industrial materials and processes. Materials testing, properties, and use are compatible with existing wood programs and facilities.
3. Drafting -- integrate many of the newer methods of industrial communications, including photo-reproduction, microfilming, and others.

The other concepts of the American Industries Project, such as finance, research, purchasing, and industrial relations can also be integrated into these three

programs.

Naturally, any segment of this breadth program can be included or eliminated. The development of educational materials makes the inclusion of some of these areas easier. Introduction may be gradual, as follows:

1. Verbal and visual -- use of overhead projection transparencies.
2. Demonstrations, textbooks, and student workbooks.
3. Student experiment system and/or projects.

The same three laboratories -- drafting, woods, and metals -- can be modified after the Industrial Arts Curriculum Project. Again, the modification can be as extensive or as limited as desired.

Problem Solving and Understanding. All levels of students are able to profit from problem-solving activities. The emphasis of the Research and Development Programs is on developing individual abilities through the process of "inquiry into the unknown," rather than memorization. This method of instruction can be adopted in existing programs on a limited basis, or as extensive as the teacher wishes. Also, the understanding and the why involved with each unit of instruction can be emphasized.

Changing Body of Knowledge. The Industrial Arts Curriculum Project identified industrial arts as an organized and unified body of knowledge. It is not a static body of knowledge, but one that is continually being modified and expanded. As a result, course offerings can't be static but must continually keep pace with current industrial practices.

This aspect is not easy to implement. It requires each teacher to remain aware of the progress of his instructional area, and implement curriculum changes whenever appropriate.

Concepts. The concept approach can be applied to existing programs. The basic concepts of industry change gradually. The need to cut industrial materials will remain. The methods of cutting with a sharp edge, or with heat, may vary considerably. By understanding the total structure of concepts and sub-concepts of industry, the student will better understand why and where changes take place, and fit new processes into existing patterns.

Upgrading Instruction. The extensive development of teaching systems, demonstration units, and visual presentation materials provides many opportunities to upgrade existing programs. Each teacher should accept the responsibility of keeping abreast of the development of educational media for his subject area.

Also, the research projects within the profession are progressing well. Each of us should remain cognizant of the progress being made by watching for articles in our journals, and attending programs sponsored by local colleges and our local, state, and national associations.

SUPERVISION AND ADMINISTRATION OF INDUSTRIAL ARTS

Leonard W. Glismann

It takes a thick skin to be a supervisor. Every time he enters a school building or an industrial arts laboratory he is bound to encounter a barrage of questions and gripes . . . and even a few alibis. He's the outsider. The very fact that the supervisor has come to the school means that he has an interest in the industrial arts program. He is a friend, an individual dedicated to the problems and challenges of industrial arts. His job is to care enough to hear what the teacher has to say . . . at stake is the effectiveness of their human relations. Then, he must demonstrate he has something to offer and establish that he is not a threat/or to imply a reflection on the teacher's ability.

Supervisors must face the fact that only with the teachers' cooperation can there be any payoff from the visitation. In effect, they are duty bound to do all they can to arrive at new and better methods for improvement of instruction.

The secret lies in realizing that the supervisor is not and cannot be expected to be an expert on all conditions and subjects. He is not bound by the traditional practices of the school. He can evaluate "sacred cows" no one else in the school would dare touch. The supervisor sees things from a new dimension as an outsider.

But, that is only one side of the coin. For, only the acquired knowledge developed out of the experiences of the teacher in the industrial arts laboratory can the teacher translate the supervisor's recommendations into a working reality.

In industrial arts, attempts have been made to separate the characteristics of administrative and supervisory services but the usual outcome has been ineffectual. The purpose for defining roles is to make sure that responsibilities are carried out. Often when responsibility is not noted down, no one assumes it, especially if it is something no one likes to do.

The title supervisor, consultant, or specialist applies to the leadership responsibilities for the improvement of instruction. The administration sometimes recognized as the management function may be considered subordinate to the supervisory function.

As a distinct profession, supervision is a comparative newcomer among educational occupations but a rapidly growing one. This profession is especially important in these times for supervisors are change agents in the schools. The major task of supervision is the facilitation of growth and development in teachers and students. It has the crucial task of feeding into the bloodstream of education the best information and practices available.[2] This plainly implies that the teacher is the most important member of the team. And, the supervisor of industrial arts furnishes aid to the teacher to meet his needs, therefore, promoting more effective and efficient teaching and learning. The change that will have an impact on industrial arts is a teacher change. Only when teachers change will we see a great improvement in industrial arts and that improvement will be in laboratory and classroom instruction.

The quality of the faculty is the most essential factor in changing and improving instruction. Teachers who are concerned about their behavior will be

more intellectual and will be more interested in remaining that way. However, we cannot expect any teacher to remain intellectually alive when we put him within the four walls of an industrial arts laboratory and leave him alone the rest of his industrial arts career. When he is 45, he will know what he learned when he was 21, minus what he has forgotten in the intervening years. I know that many teachers say, "If you want us to do a good job, just leave us alone." But, in my opinion, the greatest barrier to good instruction has been the four walls of the laboratory.

The tremendous expansion of knowledge requires a selection of knowledge. No educational system can be devised to encompass all that is known. There was more learned last week than we can use in a year. The best curriculum requires the good of the past plus the good of the present to make the good of the future. Supervisors and teachers must select that knowledge which in their best judgment has the most worth, fully realizing that today's facts may be tomorrow's folklore.

The ever-changing demands made on education today require the skills and talents of many people. These numerous and complex demands can be met only through team effort.[7]

"Regardless of the type or organization used in supervision, the trend is toward democratic procedure. The ultimate values to be derived from group thinking and planning are being recognized more and more. Efforts should be made by those formulating policies to utilize the resources of every individual." [3]

At this point, it seems appropriate to ask: What does supervisory activity contribute to education:

"We act essentially upon faith that supervision is effective. This faith arises from our experiencing of supervision and not essentially from research data sources. Rather, our faith projects a rationale that says: Some teachers are continually changing-growing toward better teaching. They seem to be able to find a way to develop almost 'in spite of' their environments. No matter how rigid the school policies are or how static the administration may be, such teachers seem to prosper. Perhaps these teachers are the creative ones and/or probably this behavior is an integral part of their personality. We recognize this type of person and we bemoan the fact that there are too few teachers like this.

"If all teachers could grow in this way, there might be no need for in-service programs. The reality of the situation is that the majority of our teachers do not display a noticeable built-in professional-growth mechanism. Like the population at large, there seem to be relatively few self-educating people in education." [2]

To supervisors and department chairmen, it is this last group that one must direct the efforts. Also in times of change, when new conditions and problems cannot be easily solved by yesterday's procedures, the importance of supervision becomes a major concern.

In a society impregnated by new technologies and by sweeping social and political changes, the industrial arts programs of our country need supervisors with the skills, ingenuity, and administrative and leadership abilities of the highest order. The continued program of industrial arts education rests with these administrative and supervisory officials.

The supervisor serves a staff function -- sometimes directing by carrying out delegated responsibilities, on other occasions consulting and assisting.

Boards of education usually recognize two types of supervision: A city-wide, regional, or state supervisor of industrial arts or a departmental supervisor. Responsibilities of these supervisors may be classified as follows:

Personnel Administration. The first responsibility of the supervisor, as of all educators, is to assist those people who are responsible for recruiting, selecting, and assigning teachers. The hiring of an intelligent teacher, who understands human nature, who is well trained, and who can motivate and challenge students, in my opinion, is the primary responsibility of all supervisors.

Course of Study Development. Curriculum development and instructional progress are inseparable. Basic in curriculum development are the teaching-learning opportunities which are provided in the classroom and laboratory. In other words, the curriculum guide is not something developed aside and apart by the supervisor who then transmits it to the school where it is implemented by someone else. To separate curriculum and instruction violates the basic concept that curriculum consists of all the learning opportunities which are provided by the school.

Instructional Leadership. The supervisor is an instructional leader also. He keeps abreast of new methods, materials, and equipment. His knowledge of content and method enables him to give specific help.

Coordination and Articulation. The supervisor plays an important role in articulation and coordination. There must be continuity from grade to grade and level to level. This is especially important as schools move more and more into program innovations. Each new curriculum proposal has implications for grade levels other than those specifically involved. For example, The Technical Drawing Curriculum Study, a high school program has great significance for the junior high school introductory drawing program. Likewise, an introductory welding program in the junior high school has significance for the senior high school programs. Articulation is exceedingly important in today's planning.

In-Service Programs. In-service training to help teachers keep abreast of advances in knowledge both in the industrial arts areas and the broad areas of learning and teaching theories is becoming more and more essential. These plus the countless proposals for curriculum change and innovation, the varied types of instructional materials that are now on the market, and the rapidly changing methods of instruction require the knowledge, understanding, and skill of a curriculum supervisor. The supervisor adds the dimension of depth so essential in modern education.

As the title implies, the departmental supervisor functions within a department in a school. At the present status, industrial arts supervision must rely upon the leadership of the outstanding teachers in each community.[6] And if the pattern is consistent, men like you attending summer sessions or who will take a day off during the summer to attend professional meetings are the persons who are the better industrial arts teachers and the likely candidates that will fill the leadership roles back home. This is the "grass roots" leadership-development program elucidated in the "Duties of Industrial Arts Supervisors" study presented in the AIAA Convention Proceedings of the American Industrial Arts Association, Philadelphia, 1967.[1]

Industrial arts seems to have a small number of curriculum specialized supervisors. Yet mounting school enrollment, along with an increasing complexity of subject matter, has created the need for more supervision and more departmentalization.

In many schools, there is emerging the position of department head, chairman, supervisor, or teacher specialist. Regardless of the title, it is a part of an expanding pattern of supervision.[5] The purpose of the departmental specialist is to augment the leadership of the school principal and the curriculum supervisor in the improvement of instruction which (1) decentralizes further the curriculum improvement effort in order to meet local school-community needs more effectively, (2) utilizes more fully the leadership potential of outstanding career teachers, and (3) provides, in each school, a curriculum improvement council.

A clearer picture of the role of the industrial arts department chairman is enumerated to show some of his specific duties:

(a) Plans with the principal and faculty to review curriculum and instructional needs and established priorities for the year.
(b) Assumes responsibility for planning in-service or other types of activities to help teachers meet priority needs.
(c) Works with general curriculum supervisors to keep abreast of new trends and techniques and to get their help and guidance in developing projects.
(d) Assumes leadership in making recommendations of textbooks, supplies, and equipment.
(e) Helps new teachers with planning, facility organization, and instruction.
(f) Assists teachers in using new materials.
(g) Assists teachers in diagnosing and prescribing what might be done to meet student needs.
(h) Assists teachers in analyzing what they are doing in their courses and suggests ways to improve when needed.
(i) Communicates new techniques and ideas to teachers through classroom demonstrations.
(j) Assists teachers in setting up and keeping individual student records.
(k) Teaches classes occasionally to permit teachers to visit other schools.
(l) Assumes a leadership role in the school's curriculum council.
(m) Helps the principal and teachers interpret the school program to parents.
(n) Keeps abreast of local, regional, and national research findings, for research affects school practices.
(o) Demonstrates, by example, the fact that good teachers are personally dedicated to education.

While supervision is not a natural and logical ultimate attainment for all ambitious industrial arts teachers, it should be pointed out that the supervisors usually come, and should come, from the ranks of industrial arts.

It is important at this point, to underscore that many persons who are doing outstanding work as teachers do not become equally successful as supervisors. "To be a teacher of boys and girls is a noble occupation for which some men are eminently fitted, and in which they are happily engaged. The supervisor job is not easier; it is simply different. For a limited number of outstanding teachers who are able to deal with men as well as they have dealt with boys, it is a worthwhile plan to obtain the necessary additional preparation for service as a supervisor." [4]

Real improvement in industrial arts education will come through the improvement of instruction -- when teachers view themselves and what they do objectively. For, it is they who work directly with students and control the laboratory. The only change that will have a great impact on industrial arts education is a teacher change which will result in an improvement in instruction.

In most of the cases where one identifies an excellent program of industrial arts, one usually finds that there is a good industrial arts supervisor in the background. Good supervision alone cannot build good programs, but it is a necessary part and even more significant helps eliminate the very poor programs.

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FEDERAL FUNDS FOR INDUSTRIAL ARTS

Howard S. Decker

To review for you all of the federal programs which provide financial assistance to industrial arts in the elementary and secondary schools would take much more time than is allotted and, therefore, I shall limit my remarks to five major national legislative acts.

On April 11, 1965, President Lyndon B. Johnson signed Public Law 89.10 (Elementary and Secondary Education Act), which is the greatest single commitment ever made for the improvement of education in the elementary and secondary schools of this nation. For the fiscal year 1967, $1.2 billion was allocated to Title I of this Act. Title I is designed to encourage and support the establishment, expansion, and improvement of special programs including the construction of school facilities where required to meet the special needs of educationally deprived children of low income families. Even the most extreme groups in our society have hesitated to criticize the commitment of the federal government to improve the educational needs of this disadvantaged group.

Under the provisions of Title I of the Elementary and Secondary Education Act, two typical industrial arts projects funded have been: (1) The project in Maine, which provided instruction and equipment for industrial arts classes. Class sizes in this district were almost double the approved maximums and the objective of the funded project was to reduce the pupil-teacher ratio in automotive mechanics, electricity, metals, and woods. And (2) the project in Bangor, Wisconsin, an enrichment program, included field trips to neighboring cities, industries, and cultural and recreational centers. An industrial arts work-study program was set up in cooperation with local businesses and industries.

ESEA, Title III, has to do with the improvement of the quality of elementary and secondary school programs and to develop and establish exemplary programs designed to serve as models for the regular school curriculum. Most of the specialized instruction for the teaching of subjects which are not normally taught in the schools at the present time have also been supported.

Under the provisions of ESEA, Title III, industrial arts education has received support for mobile electronics laboratories involving the conversion of a federal surplus bus and, in addition, a rather large project in supplemental service to school districts in central and northern New Mexico. This project has involved the employment of an industrial arts coordinator, and mobile units in power mechanics and electronics have been developed in order to present industrial arts courses in the sparsely populated areas of that state. This project has involved over 3,500 teachers and about 140,000 students in all subject areas.

ESEA, Title IV, has provided a broad base for the support of research and development programs designed to insure that the quantitative increases in education are accompanied by vastly improved quality. Industrial arts has been supported under this Act through the industrial arts curriculum project at Ohio State University which received an initial grant of $126,420 through Title IV. In addition, the State University of New York at Oswego received $67,112 for an extensive field study, an industry project, which became part of the preparation of industrial arts majors.

There is much more to say about the ESEA. However, I trust that I have illustrated to you that industrial arts teachers are receiving federal support for their activities under the auspices of this Act.

A second major educational legislative act is entitled the National Defense Education Act. As many of you know, it has been less than two years since industrial arts was included in the two major categories of this Act. Early in 1965, industrial arts became eligible for federal funding under Title XI of the NDEA. The first year, five Institutes were funded under this Act; the following summer, 29 were funded; and during this current summer, 30 Institutes exclusively devoted to the in-service training of industrial arts teachers are currently underway.

Both Dr. Paul Manchak, the immediate administrator of the industrial arts institute program, and Dr. Donald Bigelow, the Director of the Division of Program Administration, have remarked that industrial arts is number one in three important categories in this Institute program:

(1) Industrial arts Institutes have the highest number of inquiries and firm applications from teachers in that subject matter. Industrial arts teachers are quick to take advantage of opportunities to improve their continuing education.

(2) Dr. Bigelow reports that industrial arts as a subject field is the area in which the participants in the Institute program have taken the time to express their appreciation of the opportunity to attend a summer Institute program. An industrial arts teacher is courteous.

(3) Dr. Manchak reports that industrial arts participants in the summer Institute program have the greatest number of dependents. An industrial arts teacher is virile.

NDEA, Title XI, is now a thing in the past. It has been replaced by the Education Professions Development Act which will be discussed later in this presentation.

In October, 1966, industrial arts became one of the 10 critical areas of NDEA, Title III. At the same time, the authorization for this bill was increased by the sum of $10 million.

The foundation of the NDEA, Title III, program is the state plan, contract, or agreement between the state and the U. S. Office of Education for the operation of the programs which the state has designed to strengthen instruction in these critical subjects. The chief state school officer and the state legal officer attest to the plan on behalf of the state. The NDEA Guidelines describes the objectives of industrial arts as:

"To develop in each student an insight and understanding of industry and its place in our culture

"To discover and develop talents of students in the technical fields and applied sciences

"To develop technical problem-solving skills related to materials and processes

"To develop in each student a measure of skill in the use of the common tools and machines."

Under the provisions of NDEA, Title III, a state plan has been approved in most of the 50 states, and the remaining states are moving quickly to include industrial arts as one of the critical subjects. This year, many millions of federal dollars will be spent throughout our nation to equip industrial arts facilities under the provisions of this Title.

The Education Professions Development Act is the most recent federal legislation which has a direct effect on industrial arts education. Essentially this new Act has been designed to bring together in one bureau of the U. S. Office of Education all of the separate provisions for the training of educational personnel directly connected with the elementary and secondary school systems. While Title XI of the NDEA no longer exists, the Institute program which provided so much service to the industrial arts teachers in the field is still in effect.

The following excerpts from a letter received by the American Industrial Arts Association from Donald Davies, Associate Commissioner and Chief of the Bureau of Educational Personnel Development illustrates this point:

April 19, 1968

Dear Howard:

I came to the Office of Education in late March to head the new Bureau of Educational Personnel Development, which was created to administer and coordinate the Education Professions Development Act and other programs in OE that have to do with educational manpower and training.

As you know, the new legislation is much broader and more flexible than earlier legislation. All the categories have been removed. This new flexibility has created a good deal of concern on the part of people in those fields which were covered specifically by categorical legislation -- civics, economics, English, English for speakers of other languages, modern foreign languages, geography, history, social sciences, industrial arts, reading, and educational media, guidance and counseling, etc.

There are many who are also concerned that emphasis on the subject-matter preparation of teachers will be diminished.

The purpose of this letter is to put on record my position and the Bureau's and the Office of Education policy on these matters of concern.

First, the Institute program is not dead, either in 1969 or in the foreseeable future. For 1969, we are firmly committed to suggest Institutes in the same fields and at approximately the same level as we funded in 1968. After 1969, we are committed to continuing the Institute effort, with those modifications suggested by the experience that the field has had over the years, by evaluations of the effectiveness of programs, carried on for the sponsoring college,

and by changing manpower needs. We don't believe that training institutions should be forever bound to one format for institutes or fellowship programs. We want to encourage the thoughtful examination of both existing and new approaches.

As you can see, this letter indicates that industrial arts will continue to receive strong support for the in-service training of practicing teachers in the field through the new Education Professions Development Act. Year-long fellowships, formerly conducted under Title V of the Higher Education Act will be continued.

In addition, this Act makes it possible to provide the necessary training for the upgrading of persons holding degrees other than in industrial arts in order that they qualify for industrial arts certification.

Because of the Acts limited budget, it is impossible to envision the full implications for industrial arts. However, I personnaly feel that the outlook is extremely rosy.

Other federal acts which directly affect the industrial arts teacher are: the Adult Education Act of 1966, the Manpower Development and Training Act, the Economic Opportunity Act, the Laws Affecting Appalachia, and, of course, the Higher Education Act. Title VI of this Act makes possible the purchase of equipment and minor remodeling to industrial arts departments at the over 220 colleges and universities offering industrial arts instruction.

In summary, industrial arts can take advantage of all federal funding programs of a general nature and is categorically mentioned in the important National Defense Education Act. It is excluded only from that categorical legislation designed to promote special subject areas such as the Vocational Act of 1963 and the HR 6736, and the Educational T. V. Act.