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ABSTRACT

Intended to facilitate the improvement of industrial arts education in Pennsylvania, the guidelines for planning and development emphasize an interdisciplinary approach. They are aimed at professional personnel and are divided into general provisions which are applied (with changes in specific content where appropriate) to elementary, middle school, and secondary grades, higher education, and special programs for mentally and physically handicapped, academically talented, disadvantaged, and adults. The general provisions are (1) rationale and purpose of industrial arts; (2) legal and regulatory considerations, covering certification, curriculum, and school buildings; (3) students of all age levels; (4) programs in industrial materials, power technology, and visual communication, and their content, methods, interdisciplinary aspects, learners, curriculum, and facilities; (5) professional personnel, i.e., instructional, administrative, supervisory, resource, paraprofessional, and consultant; (6) learning resources, i.e., facilities, equipment, materials and supplies, and media; (7) administration, i.e., financing, scheduling, legal responsibilities, staff development, and maintenance; and (8) evaluation, internal and external. (MDW)

GUIDELINES

Industrial Arts in Pennsylvania

Division of Science and Technology
Bureau of Curriculum Services
Pennsylvania Department of Education
1974

Commonwealth of Pennsylvania
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Department of Education
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TABLE OF CONTENTS

PREFACE

The primary purpose of this publication is to facilitate the improvement of industrial arts education in Pennsylvania by providing guidelines for planning and development.

While they are directed primarily to professional personnel in education, these guidelines will also be of value to persons in the private and business sectors of society who are concerned with industrial arts education.

Persons using these guidelines are encouraged to consider them as points of departure in planning. They will not serve their intended purpose fully if they are regarded as limiting or restrictive in any sense. The guidelines should rather serve as a program base from which new, imaginative and creative programs can be launched.

In each of the six chapters ranging from elementary school programs through higher education and special programs the following topical outline is followed:

1.00 - Definition and Rationale

2.00 - Legal and Regulatory Considerations

3.00 - Students

4.00 - Program

5.00 - Professional Personnel

6.00 - Learning Resources

7.00 - Administration

8.00 - Evaluation

FOREWORD

In a country where the population is able to witness the landing of men on the moon through pictures, to prepare food by the use of ultrasonic waves and to have the quantity of technical information tripled each decade, neglecting to teach our youth about the importance of industrial technical advances will have an adverse effect upon future socioeconomics in our nation. Industrial arts is that subject area which is involved in providing the youth with knowledge about the technological environment related to industry of the past, present and future.

These "Guidelines for Industrial Arts" are designed in order that the students will be acquainted with environmental, consumer and occupational knowledges in a variety of industrial areas. An interdisciplinary approach should be utilized to bring about the understanding of this technological information; correlation with mathematics, sciences, social studies, fine arts and language arts is of primary importance for successful accomplishment of our goals. Innovative approaches to organizational and instructional patterns are encouraged on the part of the instructor in order to accommodate the expected and changing educational requirements of youth.

INTRODUCTION

Today we live in what has been commonly called a technological world. We are becoming increasingly aware of the significance of technology and its impact on human affairs--both as a creative and as a destructive force. There is a common but erroneous belief that involvement of human beings with technology is a recent development. The 20th century has been witness to technological developments that stagger the imagination and defy comprehension and which have stimulated a belated awareness of technology as a major force in society. Technology is not new. In the most primitive period of evolution people were concerned with tools--how to make them and how to use them. And from the very beginning there was cause for concern as the tools which were made could be used to fashion implements for peace or weapons for war.

While the name Industrial Arts is a 20th century invention, the philosophical basis for it derives from the characterization of the human being as a tool-using creature. Industrial arts as a school function is intended to provide an understanding of how tools, materials and processes are used to shape the environment. As one attempts to trace the history of this movement, the individual finds that the mainstream now called industrial arts has been formed by the confluence of many tributaries of diverse origins. Among these are economic necessity, social attitudes toward work, moral and religious influences, and the constantly changing demands of a developing industrial society.

The simple tool skills needed for survival in a primitive age were learned by imitation. At a later time, but long before schools were established, children were taught to work in the family; the daughters

by the mother, and the sons by the father. As occupations and trades became more specialized, a new form of work-education was needed and the apprenticeship system was developed and in many countries became a highly formalized institution. While the apprenticeship system proved to be rather successful in providing the artisans needed when most consumer items were produced by skilled craftsmen, it was inadequate to train the number of workers needed as industrial organization developed.

Schools of industry had been tried in several European countries as early as the 16th century but it was in the period following the industrial revolution that such schools really flourished and became known as Mechanic's Institutes, Technical Institutes, and Vocational Schools.

While the evolution from family industries and apprenticeships to the trade school movement apparently had one central theme, namely the training of workers, there were other significant benefits inherent in the family industries and the apprenticeships which tended to be eroded away in the trade school movement.

Certainly in the home, as parents instructed their children in the various domestic and occupational skills, they were equally concerned with their moral, spiritual and cultural growth. This concern for the total development of the adolescent was also evident in the apprenticeship system in which responsibility was transferred from the parent to the master craftsman. The craftsman was held accountable not only to the parent, but also to the guilds for the education, conduct and health of those apprenticed to him. The indentures of apprenticeship furnish excellent evidence of the integrative nature of craft training. The trade schools however, taught the student only the skills of a trade

and to some extent the related principles of science, mathematics and grammar.

This distinction is made because it sharpens the focus on another of the tributaries which helped to form industrial arts. This has to be with special attitudes toward work. Such attitudes have varied considerably in different places at different times. On the one hand, a kind of intellectual snobbery frequently relegated those who worked with their hands to a lesser place in society. On the other hand, among various peoples there was a strong underlying current with religious overtones that seemed to assume that work is related to virtue and that to become skilled in a craft or trade has values that transcended the more direct and obvious practical application.

Thus it is easy to understand that when shop work was introduced into the schools it was for a variety of reasons. Educational programs with such names as Manual Training, Practical Arts, Manual Arts, Vocational Education, or simply School Shop were introduced in many schools in Europe and the United States. They were promoted for a number of different reasons which were rarely understood by those who were not directly connected with the programs. The educational literature of the first half of this century abounds with the rhetoric and sometimes bitter debate of the proponents of one view or another, of the purpose of teaching shop work in the schools. There is no value in repeating these arguments here but it must be recognized that vestiges of all of these early influences are a part of the heritage of industrial arts. We must not, however, allow the past to cloud our thinking as we plan for the programs of industrial arts for the future.

Industrial Arts today is regarded as a study of technology. The purpose stated in broad terms is to have the students understand the technological culture and to assist them in finding their own place in that culture. To some, such a statement may appear meaningless. People have tended to look for one, tidy definition of Industrial Arts. There appears to be no such easy answer. Specific objectives will vary according to the age of the learner, nature of the community, and other social and economic factors. Each of the sections of this publication includes an appropriate statement of specific objectives applicable to that particular section.

Industrial arts, and probably all of education, if it is to serve society more fully than it has, must learn to shun the single, simple solution to a complex problem. Flexibility, appropriateness and creative imagination must be the key words of program planning.

We cannot know in precise terms what the problems of tomorrow will be. This should not deter us; the unpredictable adds zest to learning and living.

GUIDELINES FOR INDUSTRIAL ARTS IN PENNSYLVANIA

CHAPTER I - General Provisions

CHAPTER I-General Provisions

1-000.0 Rationale for Industrial Arts

The case for any educational endeavor rests ultimately with the validity of certain basic assumptions. In the case of industrial arts, it is assumed that it is worthwhile for human beings to understand and be able to manage their environment.

Those elements which compose the physical environment which all human beings share can be divided into two general classes--natural and people-made. Study of the natural environment has a well-established place in the school science programs. The study of the people-made physical environment, which in the broadest sense, is a study of technology is seemingly of equal importance but its significance as total education and hence a part of the overall school curriculum has only recently begun to be understood.

Industrial arts is an organization of experiences designed to assist in the formation of concepts and development of insights into technology. These experiences are intended to have the learner participate actively in the conceiving, designing, planning and producing goods, using materials common to daily life. Further experiences are planned to enable students to gain an understanding of the sources and applications of power which is a vital part of technology, and finally there are experiences which are designed to have the learner gain an appreciation of the various modes of visual communication. Thus the experiences are grouped in three general categories called industrial materials, power technology and visual communications.

1-100.0 Purpose of Industrial Arts

The experiences described above (1-000.0) are designed to have the students understand the technological culture of which they are a part and to assist them in finding their place in that culture. Industrial arts provides a broad-based understanding of industry and technology as part of the total education of all youth. The following five objectives may be considered basic for industrial arts as a whole but supplementary objectives in keeping with local conditions should be developed by individual school districts for the students of the various grade levels.

1-101.0 To develop literacy in a technological civilization--in a technological society one must be able to communicate in the language of industry, technology and science.

1-102.0 To develop an insight and understanding of industry and its place in our society--as 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. Industrial arts provides significant learning activities in which students acquire knowledge and skill in performance through study and application.

1-103.0 To discover and develop student talents--the school's responsibility is to assist students in discovering and developing their talents. Industrial arts helps students identify special abilities through manipulative and research experiments.

1-104.0 To develop problem solving abilities related to a variety of tools, materials, processes and products--the problem solving approach in industrial arts involves creative thinking and gives students opportunities to apply principles of planning and design. Constructive techniques, industrial processes, scientific principles and mathematical computations are applied to achieve solutions to problems.

105.0 To develop skill in the 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.

1-200.0 Legal Basis

The legal basis for industrial arts education is: The regulations of the State Board of Education provide for industrial arts in Chapter 7. Statutory Authority for these regulations are found in the Act of March 10, 1949, P. L. 30, as amended sections 1511, 1512 and 1605 and the Act of April 9, 1929, P. L. 177, as amended, Section 1302.

1-201.0 Certification of Teachers

1-201.1 Chapter 10 - "Certification of Personnel"

1-201.2 Teacher Education Bulletin #69-1 (January 1, 1969)

1-202.0 Chapter 3 - "School Buildings" -- the regulations of the State Board of Education

1-203.0 Curriculum (refer to 1-200.0)

1-300.0 Students

Industrial arts education should be provided for all public and private school students. Included in this area of education are college students and adults.

1-400.0 Program

The industrial arts programs at various levels are designed for specific purposes. These programs include broad content areas such as industrial materials, power techn .ogy and visual communications.

1-401.0 Definitions

1-401.1 Industrial Materials--is a study of materials as they exist in their natural environment and how these materials are transformed through extraction, fabrication, manufacturing and construction into people-made consumable products within the program. Activities provide experiences fundamental to good conservation practices, experimentation, testing, use and analysis of materials.

1-401.2 Power Technology--is a study of fuels, energy and controls essential for the production of power, its application to such fields as communications, transportation and manufacturing within the industrial arts program.

1-401.3 Visual Communications--is the process of understanding and being understood through the sense organs of sight. Visual communications in industrial arts includes studies related to graphic arts, photography and drafting.

1-402.0 Content--Industrial arts courses for the middle school, secondary school and higher education include three curriculum areas: industrial materials, power technology and visual communications. Industrial arts for students in special programs and elementary schools also derive content from these three curriculum, with particular emphasis on integration of this content to social studies, mathematics, science, language arts and other appropriate units of study.

1-402.1 Industrial Materials

1-402.11 Research and development
1-402.12 Materials Testing
1-402.13 Manufacturing processes
1-402.14 Construction techniques

1-402.2 Power Technology

1-402.21 Energy Sources
1-402.22 Working fluids and gaseous forces
1-402.23 Energy converters
1-402.24 Transmission

1-402.25 Electronic communications
1-402.26 Controls and instrumentation
1-402.27 Electrical, electronic and mechanical power applications
1-402.28 Transportation systems

1-402.3 Visual Communications

1-402.31 Technical drawings and graphic representation
1-402.32 Technical illustration, symbolism and color
1-402.33 Photographic, autographic reproduction processes
1-402.34 Design and problem solving applications

1-403.0 Methods

The method of instruction will depend upon the nature of the program. Methods will be of a variety of types. Instruction of individuals, small groups and large groups will be common to all levels. The following methods are most frequently used:

1-403.1 Individualized instruction
1-403.2 Large group instruction
1-403.3 Small group instruction
1-403.4 Programmed computer assisted instruction
1-403.5 Lectures and demonstrations
1-403.6 Team teaching
1-403.7 Seminars
1-403.8 Multi-media presentations
1-403.9 Utilization of community resources

1-403.91 Field trips
1-403.92 Resource person (guest speaker)
1-403.93 Exhibits
1-403.94 Forums

1-403.941 Laboratory experiences
1-403.942 Experiments and research
1-403.943 Problem solving techniques
1-403.944 Projects (individual or group)
1-403.945 Line production

1-404.0 Interdisciplinary aspects

Industrial arts by its very nature involves learning experiences and activities closely associated with other subject areas. Organization and planning for interdisciplinary studies involves special consideration:

1-404.1 Instructional Personnel

1-404.11 Coordination of instructional personnel involved in analogous areas (electronics, photography, etc.)

1-404.12 Coordination of personnel in supportive service areas in and between industrial arts and other curriculum areas.

1-404.2 Learners

1-404.21 Students are selected, advised and taught by industrial arts specialists.

1-404.22 Students are assisted in selection of supporting courses to enrich industrial arts experience.

1-404.23 Students from other subject areas are given assistance in planning industrial arts activities which enhance learning in other subject matter fields.

1-404.3 Curriculum (Some of the following items may not apply due to the organization and level of the industrial arts program)

1-404.31 Teaching of other disciplines within any given industrial arts course

1-404.32 Studying a discipline in terms of a technical area

1-404.33 Integration of disciplines (interdisciplinary approach) as a total education package

1-404.34 Studying technology as a means of enabling one to understand and control his environment (industrial arts as a form of liberal education)

1-404.4 Facilities-Interdisciplinary Use--Industrial arts facilities shall be available to students enrolled in other subject areas for the purpose of experimentation and development of activities.

1-500.0 Professional Personnel

The personnel involved in industrial arts programs shall meet all applicable state certification provisions under Chapter 10 of the Regulations of the State Board of Education in Pennsylvania. See Chapter 5-500.0 for further specific regulations for industrial arts in Higher Education.

1-501.0 Instructional Personnel--Instructional personnel shall meet the state certification provisions and demonstrate the necessary competencies for the specific level involved.

1-502.0 Administrative Personnel--shall meet the same minimal qualifications as instructional personnel. They shall perform such tasks as the following:

a. First level administrative decision making
b. Preparation and administration of departmental budgets
c. Liaison responsibilities between administration and instruction staff
d. Coordination of the administrative functions of the department or division
e. Recommendation, selection and evaluation of professional staff and matters of promotion, dismissal, etc.
f. Performance of other administrative functions as assigned

1-502.1 Qualifications

1-502.11 At all levels, except higher education, administrative personnel shall meet the state certification requirements at the Instructional II level.

1-502.12 Administrative personnel should hold the Master's Degree in industrial arts education.

1-502.13 Administrative personnel shall have completed five years of successful teaching in industrial arts subjects.

1-502.2 Recommendation--It is recommended that schools with two or more industrial arts teachers have a person designated as department head, area head or master teacher and this person shall be responsible for performing necessary or assigned duties related to industrial arts.

1-503.0 Supervisory Personnel--Personnel in this category shall meet the same minimal qualifications and be capable of performing the same tasks as instructional personnel. Supervisors are most frequently employed as department chairmen or coordinators of special curriculum areas. In addition they perform the following special tasks:

a. Provide leadership for the development, evaluation and revision of curriculum and courses of study.
b. Assist the administrative personnel in selection and evaluation of staff and para-professional personnel.
c. Coordinate advisement of students within their specialized areas.
d. Assume leadership in organizing and administering laboratories and equipment for the instructional program.

1-503.1 Qualifications--At all levels except higher education, supervisory personnel shall meet the state certification requirements and hold a "Supervisory Certificate" in industrial arts education.

1-503.2 Recommendation--It is recommended that those school districts with two or more secondary schools shall have a person to provide supervisory functions for the industrial arts program.

1-504.0 Resource Personnel--The continuous changes in technological society necessitate specialists who can provide professional services in support of the program. Personnel who contribute their time or are hired for these services, will not necessarily posses the same academic or professional preparation or perform the same services as described for instructional personnel.

1-504.1 Para-professional--Personnel who posses technical competencies for a laboratory area, but lack professional or academic qualifications of regular instructional personnel. Such individuals assist instructional personnel in the laboratories.

1-504.2 Consultants--Personnel who serve on a short-term limited basis and posses appropriate qualifications for their assignment. They will usually serve in an advisory capacity related to their special area of expertise.

1-600.0 Learning Resources

Appropriate learning resources for industrial arts programs should include laboratories, specialized classrooms (large and small group), individualized instructional areas, facilities for programmed learning, appropriate offices for counseling and advisement and areas to conduct research, experimentation, planning, etc.

1-601.0 Facilities--The highly specialized and technical nature of courses offered within industrial arts programs require facilities that meet approved minimum standards for safety and instructional utilization as outlined in Chapter 3 of the Regulations of the State Board of Education of Pennsylvania. Such facilities include:

1-601.1 Technical laboratories for providing instructional experiences in visual communications, power technology and industrial materials.

1-601.2 Large group instruction areas complete with appropriate audio-visual facilities.

1-601.3 Small group instruction, counseling and seminar rooms complete with dial-retrieval, individualized and programmed instruction capabilities.

1-601.4 Individual office space for private study, counseling, research and planning by professional staff and students.

1-601.5 Central and individualized storage areas appropriately located with access to laboratory and classrooms for control and distribution of technical equipment and materials.

1-602.0 Equipment--To provide for industrial arts programs, equipment must be selected and installed commensurate with the highly technical nature of the specialized curriculum offerings. Factors relating to safety, size, location and function are described in Chapter 3 of the Regulations of the State Board of Education in Pennsylvania and such other publications, rules and regulations which are periodically provided by the Pennsylvania Department of Education.

1-603.0 Materials and Supplies--The content of industrial arts is varied as described previously. This content requires extensive use of tools, materials and supplies to perform those activities or experiences fundamental for enhancing the learning situation. It is essential that attention be given to courses within the broad clusters of industrial materials, power technology and visual communications. Materials necessary, (but not limited to) would include:

1-603.1 Woods - lumber and other forest products
1-603.2 Ceramics - clay, glass and other ceramic products
1-603.3 Metals - ferrous and non-ferrous metals
1-603.4 Paper and paper products
1-603.5 Synthetic products, including plastics
1-603.6 Animal products including leather
1-603.7 Fuels and lubricants
1-603.8 Fibers - natural and people-made
1-603.9 Electronic components and mechanisms

1-604.0 Media--The breadth and diversity of the curriculum and courses of study for industrial arts programs requires more than the traditional textbook-oriented methodology. It is imperative that multi-media be utilized extensively. This would include, but not be limited to, such equipment as:

1-604.1 Overhead projectors
1-604.2 8, 16, and 35 MM projectors
1-604.3 Screens and projection surfaces

1-604.4 T V monitors
1-604.5 Video and audio tape recorders
1-604.6 Dial-access wet study carrels
1-604.7 Programmed instructional materials and equipment
1-604.8 Recorders and transcribers
1-604.9 Photographic equipment and library material

1-700.0 Administration of the Program

The administration of industrial arts programs in elementary, middle and secondary schools, including programs for exceptional children, is a local school district responsibility. Administrative functions include responsibilities for financing, scheduling and supervising the programs. Insuring compliance with legal responsibilities and providing for staff development, clerical assistance and maintenance of the facilities require the attention of district and building administrators. In higher education the administration of industrial arts is usually the function of a department or division of a college or university. Information on personnel for administering the industrial arts programs is treated in section 1-502.0. Specific areas involved with the administration of the program include the following:

1-701.0 Financing--Due to the nature of the facilities, materials, equipment and supplies used in the industrial arts program, it is imperative that sound administrative procedures be developed which will provide for accountability.

1-701.1 Budgeting procedures will vary between school districts throughout the Commonwealth but will include cost analysis by students enrolled by course within the program.

1-701.2 Inventory--To provide for inventory and control of industrial arts laboratories, it is essential that sound practices similar to those employed in industry be pursued. These will include but not be limited to:

1-701.21 Appropriate inventory forms
1-701.22 Inventory control for daily, monthly and annual accountability
1-701.23 Recordkeeping and inventory analysis involving long and short range planning

1-701.3 Purchasing procedures vary from one institution to another as determined by function or purpose. Due to the extensive use and multitudinous numbers of items purchased, it is essential that each institution develop and use some purchasing and requisitioning procedures. Specifically this should include such things as:

1-701.31 Requisition forms for internal use
1-701.32 Bid preparation sheets
1-701.33 Supplier quotation forms

1-701.4 Depreciation--equipment used in laboratories frequently receives abnormal wear as compared to that in industry. This is due to the experimental aspects of a training program and the many inexperienced operators in the program. Normal depreciation factors in education, when compared to industrial conditions, frequently do not parallel each other. It is essential that depreciation curves be projected for each piece of equipment and budgetory allocations be set aside for replacements commensurate with such projection.

1-702.0 Scheduling--Industrial arts programs, because of their unique function in the teaching of highly technical content, tend toward a need for versatility and flexibility. Included should be considerations for scheduling practices to meet individual student needs. These would include but are not limited to:

1-702.1 Flexible modular scheduling of students averaging 20 but not exceeding 24 students per laboratory, or breaking of class sections into three or four sub-groups where limited facility and equipment necessitates this administrative practice.

1-702.2 Mini- and micro-course teaching which effectively lend themselves to specialized areas of industrial arts with particular emphasis upon line production techniques, and research and experimentation, group projects, unit studies and professional observation or orientation.

1-702.3 Individual and independent study may occur as:

1-702.31 Independent studies in specialized areas
1-702.32 Programmed instruction for demonstration of competency
1-702.33 Research and experimentation
1-702.34 Open laboratory

1-703.0 Legal Responsibilities--Teaching of industrial arts at the various levels within the public schools involves working with materials, tools and equipment of a hazardous nature. This necessitates provisions for safety of the program participants and conditions of liability in the event of accidents. Specific details for enforcement are available through personnel in the Pennsylvania Department of Labor and Industry. In recent years increasing attention has been given to these matters including legislation pertaining to:

1-703.1 Eye safety devices (House Bill 159, Act 116 of 1965 School Law)

1-703.2 Fire regulations in areas of known dangers

1-703.3 Safety and control devices on machines and power tool equipment

1-703.4 Control and exhaust of dust and noxious fumes (School Building-Chapter 3, Section 3-6423)

1-703.5 Provisions for the enforcement of the industrial safety laws of the Commonwealth

1-703.6 Model Rocketry (Act 155 of 1970, Standards for the Use of Model Rockets)

1-703.7 Safety Precautions and Recommendations Involving the Use of Lasers in Schools, School Administrators Memorandum No. 553-10/5/72.

1-704.0 Staff Development--Changing technologies require constant updating and improvement of the instructional staff. This is particularly true since much of the content for industrial arts at various levels is drawn from the socioeconimic, technological and cultural problems of our society. It is essential that continuous staff development programsbe implemented which could include the following:

1-704.1 Curriculum development workshops or seminars to include representative personnel from: government, education, business, industry, management, labor and community

1-704.2 Staff studies and intro-departmental research directed toward program evaluation and improvement.

1-704.3 Encouraging pursuit of professional development leading to advanced academic degrees

1-704.4 Participation in professional association activities

1-704.5 Participation in industrial and community affairs and activities

1-704.6 Working with staff members in other disciplines through studies and workshops

1-705.0 Clerical Assistance--the versatility and scope of the curriculum patterns; the need for extensive record keeping and the handling of quantities of materials, tools and supplies necessitates clerical assistance for this program. Services required would include:

1-705.1 Typing of curriculum and evaluation materials, courses of study and lesson plans

1-705.2 Preparation of orders, requisitions and the keeping of inventory records of the various supplies, tools and equipment unique to the functioning of this program

1-705.3 Preparation and handling regular correspondence, as well as correspondence with outside companies on matters relating to instructional materials, tools, supplies and equipment

1-706.0 Maintenance Procedures--Laboratory organization and management is quite similar in nature to the elements found in an industrial environment. This requires extensive use of staff time (instructional and non-instructional) to perform such services. Normally student laboratory assistants, non-instructional staff and para-professionals are called upon to provide services related to maintenance problems. The instructional staff is responsible for development and administration of such effective maintenance programs. Included would be such items as:

1-706.1 Development of a policy for equipment and physical plant maintenance

1-706.2 Development and use of forms for reporting and keeping records of maintenance tasks

1-706.3 Schedules for preventive and remedial maintenance of equipment

1-706.4 Laboratory revisions as necessitated through changes in the instructional program

1-800.0 Evaluation

As in all other educational programs, industrial arts makes consistent and frequent use of various evaluative tools and instruments. These are considered to be an essential part of the learning experiences for students and are therefore integrated into the program throughout the entire course of study. Included would be the following general categories:

1-801.0 Internal Evaluation--Use of tests, measurements and other instruments to measure achievement as part of the instructional program. This would include such areas as:

1-801.1 Evaluation of the students

1-801.11 Self evaluation
1-801.12 Peer evaluation by individuals

1-801.13 Group evaluation of individuals
1-801.14 Group evaluation of groups
1-801.15 Individual evaluation of groups
1-801.16 Instructor evaluation of individuals and groups

1-801.2 Evaluation of teacher, course, curriculum and program

1-801.21 By students
1-801.22 By the instructor
1-801.23 By peer staff members
1-801.24 By administrative staff

1-802.0 External Evaluation--The external evaluation of the instructional program can be most effectively conducted through one or more of the following methods:

1-802.1 Former students and/or graduates of the program

1-802.2 Advisory councils consisting of community representatives from government, education, labor, management, industry, business and community services

1-802.3 Industrial arts specialists consisting of college and university professors, personnel from the Pennsylvania Department of Education and Industrial Arts Supervisors.

1-802.4 Professional or accrediting associations

1-802.5 Parents

GUIDELINES FOR INDUSTRIAL ARTS IN PENNSYLVANIA

CHAPTER II - Elementary School Industrial Arts

CHAPTER II-Elementary School Industrial Arts

2-000.0 Rationale

Elementary schools are committed to developing the full potential of all children. Each child brings to the learning situation a unique profile of development which has resulted from the sum total of his past experience. Educators must expand the experiences of children to bring them into fuller contact with the culture in which they are growing up. Elementary school industrial arts activities contribute in two principle ways to the educational development of children. First, they provide increased understanding of how people produce, distribute, consume and dispose of the products and services which technology has made available to them. Secondly, industrial arts activities provide children with direct contact with a wide variety of material things which broaden their experience base and assists them in dealing with abstract ideas in many areas of the curriculum.

2-100.0 Purposes--Four purposes of elementary school industrial arts are:

2-101.0 Enrichment--industrial arts makes school a more rewarding experience for children by helping them to understand better the technological culture in which they are growing up.

2-102.0 Stimulation--the motivational aspects of direct experiences with material things extend beyond the industrial arts activities to other areas of study.

2-103.0 Integration--though enriching and stimulating in themselves, industrial arts experiences are most useful in helping children to integrate knowledge gained in many subjects into broad concepts which have meaning to them.

2-104.0 Application--retention of knowledge and skills gained in all areas of study is enhanced when children have opportunities to apply what they have learned in concrete situations provided through industrial arts experiences.

2-200.0 Legal Basis

Refer to 1-200.0

2-300.0 Students

Refer to 1-300.0

2-400.0 Program

The program of elementary school industrial arts is designed to further the attainment of educational objectives derived from the goals of the elementary school.

(1) Activities with tools, materials and technical processes are planned to motivate, enrich, integrate and evaluate concepts in language arts, science, social studies, mathematics and other areas of the curriculum. (2) Such activities may also promote fuller understanding of the physical and material world. (3) Children discover their own interests and abilities and have opportunities to explore their own ambitions regarding the world of work. (4) Children learn to appreciate craftsmanship in others and recognize the dignity of all useful work.

2-401.0 Content--The content of the industrial arts activities is determined through the cooperative efforts and interaction of the classroom teacher, the learners and the industrial arts consultant.

2-402.0 Methods--Refer to 1-402.0

2-403.0 Interdisciplinary Aspects--Refer to 1-403.0

2-500.0 Professional Personnel-Refer to 1-500.0

2-501.0 Instructional Personnel--Elementary school industrial arts instruction may be provided by the elementary classroom teacher, the industrial arts consultant, or by teams of both. Each should possess the following attributes to a degree comensurate with their relative roles:

(1) An understanding of child behavior, needs and interests. (2) Familiarity with the elementary school curriculum (3) Knowledge about trends and issues in elementary education including elementary school industrial arts. (4) Knowledge about technology, industry and their social functions. (5) The ability to introduce children to a wide variety of experiences with tools, construction methods, materials, graphics and power. (6) Experience in industrial arts activities for elementary school children.

2-501.1 The elementary school teacher should establish goals derived from the developmental and curriculum needs of the children in the class. The classroom teacher should be aware of the assistance that may be requested for the implementation of the industrial arts activity related to the successful attainment of these goals.

2-501.2 The industrial arts consultant at the local level shares instructional leadership. Including the following functions:

2-501.21 Working with the elementary classroom teacher and members of supportive staffs to establish industrial arts as an integral part of the curriculum.

2-501.22 Coordinating the efforts of the teachers and administrators to improve instruction and enrich the curriculum with industrial arts experiences.

2-501.23 Making available materials, tools, audio visual media and any other instructional aids necessary for the successful completion of the planned activities.

2-501.24 Assisting the classroom teacher, when requested to do so, with the instructional activities planned.

2-501.25 Providing a program of in-service education for elementary school teachers.

2-501.26 Working to improve inderstanding of elementary school industrial arts.

2-501.27 Supporting an on-going program of subjective and objective evaluation.

2-502.0 Administrative Personnel-- School board members and administrators of an elementary school industrial arts program must be well informed if the program is to be a success.

2-502.1 Understand the functions, potential, responsibilities, organization and costs of the entire elementary school industrial arts program.

2-502.2 Be cognizant of the competencies required of each individual in the program.

2-502.3 Encourage the participation of all elementary classroom teachers in pre-service and in-service experiences in elementary school industrial arts.

2-503.0 Supervisory Personnel--Refer to 1-503.0

2-504.0 Resource Personnel--Refer to 1-504.0

2-600.0 Learning Resources

The organization of elementary school industrial arts fall into several general categories. Many of the programs will be conducted by the regular classroom teacher utilizing portable tools and equipment; others will involve specifically trained elementary school industrial arts consultants who, in cooperation with other teachers of the schools, direct the work in laboratories or special facilities.

The following approaches may be used separately or in combination:

2-600.1 Traveling teacher program with mini-laboratories located in the elementary schools. The activity is usually integrated with other subject areas such as social studies, science, language arts, math and music through tool skills, experiments, problem solving and the study of industrial processes. The classroom teacher has, or may have, the assistance of an industrial arts consultant. The consultant may be scheduled or he may be called upon when his assistance is required.

2-600.2 Mobile laboratory programs are staffed by industrial arts consultant. This program is generally utilized in rural areas where schools are far apart. The industrial arts consultant plans the work cooperatively with the classroom teacher.

2-600.3 Central laboratory programs exist where the students visit the industrial arts consultant. The consultant has the responsibility to direct, in cooperation with the classroom teachers, a balanced industrial arts program for a student or a group of students. The consultant directs the activities, the classroom teacher cooperates in planning the work and assists in the activities.

A regular schedule for classes may be established or activities may be offered as needs arise.

2-601.0 Facilities

2-601.1 The traveling consultant programs may use the regular classroom or an adjoining area for a laboratory. For the working surface the desks may be placed together and a piece of plywood or hardboard used to protect the surface of the desks. A portable or mobile tool panel should be on hand in each elementary school. Additional storage space for materials and projects may be desirable.

2-601.2 The mobile laboratory may serve as a self-contained unit, or the tools and equipment may be moved into other work areas. Traveling consultant and mobile unit programs must have a central area for materials preparation and bulk storage.

2-601.3 The central laboratory is a planned area permanently established for the elementary school industrial arts activities. In addition to the children in the school in

which the central laboratory is located, others may be transported from other schools.

2-602.0 Equipment--The tools and equipment for the traveling consultant and for the mobile unit should be portable and may be utilized in several learning situations.

Saw horses can be used either as work stations or for supporting materials. The portability and versatility of the saw horse makes it an important item.

The folding work surface is a portable, hinged working area capable of providing room for large projects or providing work stations for several children. The surface is normally attached to students' desks by portable vises. The desks automatically make each surface the proper working height for the elementary students and at the same time provide sturdy support.

The tools and equipment for the central laboratory will be determined by the nature of activities planned.

2-603.0 Materials and Supplies--The more frequently used materials, such as wood, fastening devices, finishes, metals, plastics and abrasives may be requisitioned. Other materials may be purchased as the need arises.

Additional materials may be procurred from local sources or brought in by the children. (Refer to 1-603.0)

2-604.0 Media--Refer to 1-604.0

2-700.0 Administration--Refer to 1-700.0

2-701.0 Financing--When new construction is anticipated, the inclusion of an elementary school industrial arts program should be considered.

2-701.1 Budgeting--A minimum amount per pupil determined locally based on the extent of the program should be provided for supplies to conduct the program. Two thirds of the total amount budgeted should be used for standard expendable materials such as: Fasteners for wood, paper, metal, etc. Also adhesives, bulk supplies such as wood, cardboard, ceramic clay, metal and small hand tools. These materials should be requisitioned prior to the beginning of the school year. The remaining third of the funds budgeted should be placed in a special account for the purpose of direct purchasing during the school year from local companies on a charge account basis. Since

many of the activities grow out of the on-going elementary curriculum it is impossible to determined in advance all the materials that will be required.

2-701.2 Inventory--Refer to 1-701.2

2-701.3 Purchasing--Refer to 1-701.3

2-701.4 Depreciation--Refer to 1-701.4

2-702.0 Scheduling--Refer to 1-702.0

2-703.0 Legal Responsibilities--Refer to 1-703.0

2-704.0 Staff Development--Refer to 1-704.0

2-705.0 Clerical Assistance--Refer to 1-705.0

2-706.0 Maintenance Procedures--Refer to 1-706.0

2-800.0 Evaluation--Refer to 1-800.0

GUIDELINES FOR INDUSTRIAL ARTS IN PENNSYLVANIA

CHAPTER III - Middle School

CHAPTER III-Middle School

3-000.0 Rationale

Industrial arts in the middle school is designed for three or four years of schooling beginning with either grade five or six and ending with grade eight. Ideally, students who enter the middle school will have experienced industrial arts activities in the elementary school.

Early phases of the middle school program are similar to elementary school offerings. In these early years industrial arts is used as one very important tool in enabling a child to relate to his environment. The program should capitalize on the student's natural interest and desire to be productive, to design, to build, to create, to invent and actively participate. The student should be encouraged to base his industrial arts activities on his own interests. A minimum of constraints may be necessary such as identifying several interests and coordinating these with other school subjects. The emphasis in the early middle school should be a continuation of an interdisciplinary approach.

Interpretive, technology-oriented programs should gain greater emphasis in later phases of the middle school industrial arts. Industrial arts becomes more than a tool to aid other disciplines. It becomes the primary method in teaching the broad concepts of industry and presents an orientation to a vast range of industrial experiences and possibilities for future career choices.

3-100.0 Purposes of Industrial Arts for the Middle School

3-101.0 Primary Purposes

3-101.1 Interpret the production, management and service components of industry, its environmental responsibilities and place in society.

3-101.2 Expose students to many industrial/technical activities and introduce the world of work within the various cluster areas.

3-101.3 Promote creativity through problem-solving experiences with tools and materials.

3-101.4 Develop integrated activities with other school disciplines. Abstract concepts are made relevant through activity-oriented experiences.

3-101.5 Develop empathy for and interdependence with fellow students through cooperative planning and performance.

3-101.6 Promote safe attitudes and habits relative to an industrial/technical environment.

3-102.0 Secondary Purposes--To be considered after one or two years of interdisciplinary work.

3-102.1 The student will be able to communicate visually selected information by interpretation, planning, preparing and producing general and technical data.

3-102.2 The student will be able to plan, make preparations and utilize industrial materials through processes, tools and equipment, to produce products for particular applications.

3-102.3 The student will be able to utilize various forms of energy through the operation and control of energy generating, transmitting and converting equipment and their basic systems.

3-102.4 The student will develop an understanding of the various industrial management practices through participation in the planning, organizing, directing and controlling of industrial resources (men, money, materials, machines and methods).

3-102.5 The student will develop an understanding of the production industries through the participation in the designing, tooling-up, producing, marketing and servicing of a product.

3-102.6 The student will develop an understanding of the changing employment patterns and opportunities in the present and future world of work.

3-200.0 Legal Basis (Refer to 1-200.0)

3-300.0 Students (Refer to 1-300.0)

3-301.0 Special Characteristics of Middle School Children

3-301.1 The middle school serves pupils who are in varying stages of development ranging from late childhood to early adolescence.

3-400.0 Program (Refer to 1-400.0)

3-401.0 Content (Refer to 1-401.0)

3-402.0 Methods (Refer to 1-402.0)

3-403.0 Interdisciplinary Aspects (Refer to 1-403.0)

3-403.1 Greater emphasis is placed upon student involvement during the early years.

3-403.2 Continued emphasis in later middle school as program becomes increasingly subject-centered.

3-500.0 Professional Personnel (Refer to 1-500.0)

3-501.0 Instructional Personnel (unique characteristics)

3-501.1 An understanding of the physiological and psychological growth of adolescents.

3-501.2 The ability to interpret the world of work and technology in terms of the adolescent's perception.

3-501.3 The ability to integrate industrial arts activities with other disciplines.

3-502.0 Administrative Personnel (Refer to 1-502.0)

3-503.0 Supervisory Personnel (Refer to 1-503.0)

3-504.0 Resource Personnel (Refer to 1-504.0)

3-500.0 Learning Resources (Refer to 1-600.0)

3-601.0 Facilities (Refer to 1-601.0)

3-601.1 Unit shop facilities are not recommended for the middle school.

3-601.2 Comprehensive general laboratories are designed to provide instruction in a variety of different activities. Students are encouraged to explore the relationship between the various areas utilizing several areas. A comprehensive general laboratory may have a woodworking area, metals area, electricity/electronics area, graphic arts area, etc.

3-601.3 The general unit laboratory (limited general shop) combines the best features of both the comprehensive general shop and unit shop. The three cluster areas of industrial arts may be organized each in a general unit laboratory.

3-601.4 The three basic cluster areas are shown in the following diagram. These areas, including auxiliary space, may be organized in a comprehensive general laboratory or three general unit laboratories.

INDUSTRIAL ARTS EDUCATION IN PENNSYLVANIA

INDUSTRIAL MATERIALS

- MANUFACTURING
- PRODUCTION
- CONSTRUCTION
- RESEARCH AND DEVELOPMENT

POWER

- ENERGY SOURCES
- WORKING FLUIDS
- ENERGY CONVERTERS
- TRANSMISSION

VISUAL COMMUNICATIONS

- GRAPHIC REPRESENTATION
- SYMBOLISM AND COLOR
- REPRODUCTION PROCESSES
- ELECTRONIC MULTIMEDIA

3-602.0 Equipment (Refer to 1-602.0)

3-602.1 Special consideration should be given to basic and less complicated equipment. Size must be correlated with the physical maturity of the student.

3-603.0 Materials and Supplies (Refer to 1-603.0)

3-604.0 Media (Refer to 1-604.0)

3-700.0 Administration of the Program

3-701.0 Financing (Refer to 1-700.0)

3-701.1 Budgeting--follow local district guidelines. Include all staff in developing budget.

3-701.11 Expendable (consumable) items--a minimum amount per student based on the extent of the program should be budgeted solely for consumable items. (1972 estimate)

3-701.12 Non expendable items--smaller less complicated and often portable equipment. Keep careful records listing purchase date, serial and model numbers, service and maintenance performed and yearly appraisal of condition.

3-701.13 Contingency fund--provides for emergency capital as part of the operating budget. Consider 10% for this fund.

3-701.2 Inventory (Refer to 1-701.2)

3-701.3 Purchasing (Refer to 1-701.3)

3-701.4 Depreciation (Refer to 1-701.4)

3-702.0 Scheduling (Refer to 1-702.0)

3-703.0 Legal Responsibilities (Refer to 1-703.0)

3-704.0 Staff Development (Refer to 1-704.0)

3-705.0 Clerical Assistance (Refer to 1-705.0)

3-706.0 Maintenance Procedures (Refer to 1-706.0)

3-800.0 Evaluation (Refer to 1-800.0)

3-801.0 Internal Evaluation (Refer to 1-801.1)

3-802.0 External Evaluation (Refer to 1-802.0)

GUIDELINES FOR INDUSTRIAL ARTS IN PENNSYLVANIA

CHAPTER IV - Secondary School

4-000.0 Rationale

The secondary school organization includes both the junior high and senior high schools. It is recommended that the planned course in industrial arts for the junior high school be aligned with the one prescribed for the middle school in the "Guidelines for Industrial Arts in Pennsylvania". This section of the "Guidelines" will be concerned with industrial arts in grades 9 through 12.

The activities in industrial arts in the high school program are based on the individual student's needs, interests and ability. The program is an elective offering and the resulting activities will vary accordingly.

The techniques of instruction involve small group and individualized study to meet the various needs, interests and abilities of the young adult.

4-100.0 Purpose

4-100.1 To allow students to study and experience the effects technology in the operation of tools, machines and equipment in relation to the various processes related to industrial materials, power technology and visual communications.

4-100.2 To meet the needs of many types of students through the organization of a program that is flexible and can be prescribed for each individual student's interest, need and ability.

4-100.3 To improve the problem-solving and research or experimentation ability of students through a variety of activities dealing with industrial materials, power technology and visual communications.

4-100.4 To provide students the opportunity to explore career alternatives through diverse laboratory experiences in the areas of industrial materials, visual communication and power. These diverse experiences should be designed to assist students in developing an accurate self-concept of their abilities and interests related to continuing education and careers.

4-200.0 Legal Basis (Refer to 1-200.0)

4-300.0 Students (Refer to 1-300.0)

4-400.0 Program (Refer to 1-400.0)

4-400.1 A multi-phase program to fit the needs of various groups of students according to ability and schedule time available.

4-400.2 A multi-phase program may consist of the following sequential experiences.

4-400.21 Individualized learning activities
4-400.22 Independent study
4-400.23 Courses of various length
4-400.24 Inter-discipline activities
4-400.25 Open laboratory approach

4-401.0 Content (Refer to 1-401.0)

4-402.0 Methods (Refer to 1-402.0)

4-403.0 Interdisciplinary Aspects (Refer to 1-403.0)

4-500.0 Personnel (Refer to 1-500.0)

4-501.0 Instructional Personnel--The senior high school industrial arts instructor shall possess the following characteristics:

4-501.1 Advanced technical competencies in the area he is expected to teach.

4-501.2 Knowledge and understanding of the nature of senior high school students (i.e. Needs, interests, abilities, language or communications).

4-501.3 Ability to instruct in a diversity of techniques and structure content to provide for individualized instruction.

4-501.4 Has the ability to be creative and flexible in order to correlate industrial arts with other subject areas.

4-501.5 Understands the prior experiences and learnings of students in order to build the students' sequential program either for group or individualized instruction.

4-501.6 A knowledge of industry and careers that are available for youth in the community, geographic region and the nation.

4-502.0 Administrative Personnel (Refer to 1-502.0)

4-503.0 Supervisory Personnel (Refer to 1-503.0)

4-504.0 Resource Personnel (Refer to 1-504.0)

4-600.0 Learning Resources

4-601.0 Facilities (Refer to 1-601.0)

4-602.0 Equipment (Refer to 1-602.0)

4-603.0 Materials and Supplies (Refer to 1-603.0)

4-604.0 Media (Refer to 1-604.0)

4-700.0 Administration of the Program

4-701.0 Financing (Refer to 1-701.0)

4-701.1 Budgeting

4-701.11 Materials and Supplies--average cost/student/unit credit if $10 to $20 depending upon the technical nature of the program being pursued. (1972 estimate)

4-701.12 Initial equipment of a laboratory has been $1,500 to $2,000/student for instructional equipment (1972 estimate)

Costs for instructing students with large group instructions, packaged learning material and computer assisted instruction will vary with the degree of use and complexity of installation and equipment.

4-701.2 Inventory (Refer to 1-701.2)

4-701.3 Purchasing (Refer to 1-701.3)

4-701.4 Depreciation (Refer to 1-701.4)

4-702.0 Scheduling (Refer to 1-702.0)

4-703.0 Legal Responsibilities (Refer to1-703.0)

4-704.0 Staff Development (Refer to 1-704.0)

4-705.0 Clerical Assistance (Refer to 1-705.0)

4-706.0 Maintenance Procedures (Refer to 1-706.0)

4-800.0 Evaluation (Refer to 1-800.0)

4-801.0 Internal Evaluation (Refer to 1-801.0)

4-802.0 External Evaluation (Refer to 1-802.0)

GUIDELINES FOR INDUSTRIAL ARTS IN PENNSYLVANIA

CHAPTER V - Higher Education

CHAPTER V-Higher Education

5-000.0 Rationale for Industrial Arts in Higher Education

At the higher education level, industrial arts serves the unique functions of (1) career education for those who desire to teach, (2) enrichment and general education experiences for all students, (3) recreational and leisure time pursuits, and (4) service opportunities for community.

5-100.0 Purpose

Industrial arts in higher education serves at least three main functions: first, it serves a career function for the individual seeking employment in industrial arts; second, it develops specific competencies at the post-baccalaureate level; and third, it provides opportunities for continuing education. The following are some specific examples of these functions.

5-101.0 Career functions (undergraduate level)

5-101.1 Serves a career function for industrial arts teachers

5-101.2 Serves a career function, as re-enforcement and as a method for implementing the elementary education program.

5-101.3 Serves a general education function for all collegiate students, i.e., providing enrichment opportunities which aids in furthering vocational goals.

5-102.0 Competency development (post-baccalaureate level)

5-102.1 Advanced professional competencies

5-102.2 Advanced interdisciplinary student competencies (enrichment)

5-103.0 Continuing education functions

5-103.1 Broadening or changing certification through inservice activities

5-103.2 Inter- and intra-institutional cooperative experiences for professional and/or self-actualization

5-103.3 Avocational and leisure time interests, furthering career development

5-200.0 Legal Basis

The legal basis for industrial arts in higher education institutions have a responsibility to provide industrial arts experiences of a broad nature as defined in section 5-000.0 above. The specific legal basis and criteria for industrial arts in higher education can be found in the Regulations of the State Board of Education of Pennsylvania, Chapter 11, "Higher Education" and other documents as cited below.

5-201.0 Certification of teachers

5-201.1 Chapter 10 "Certification of Personnel"

5-201.2 Teacher Education Bulletin #69-1 (Jan. 1, 1969)

5-201.3 Guidelines for Industrial Arts Teacher Education Programs

5-202.0 Facilities

5-202.1 See chapter 3, School Buildings, section 3-700, "Higher Education Facilities"

5-203.0 Curriculum (Refer to 1-200.0)

5-300.0 Students

Industrial arts in higher education serves students at three levels: first, it provides experiences for students at the undergraduate level; second, it provides both certification and enrichment experiences at the graduate level; and third, it provides a wide variety of continuing education experiences. Included below are some examples of these categories.

5-301.0 Undergraduate level

5-301.1 Prospective industrial arts teachers

5-301.2 Prospective elementary and secondary level teachers

5-301.3 All students as enrichment

5-302.0 Graduate level

5-302.1 Certified industrial arts teachers

5-302.2 Other certified teachers

5-302.3 Interdisciplinary students

5-303.0 Continuing education level

5-303.1 Post baccalaureate certification

5-303.2 Transient students

5-303.3 Community service and enrichment courses

5-303.31 Collegiate credit
5-303.32 Non-collegiate credit

5-400.0 Program

In addition to the basic program described in 1-400.0, higher education offers professional and enrichment courses to meet the needs of students as described in 5-300.0.

5-401.0 Content

The content of the program for industrial arts in higher education relies heavily upon developing understandings of the structure, functions, and effects of industry and how materials are transformed from their natural element into man-made consumable goods. Included will be the development of unique competencies related, but not limited to, the following broad areas (in addition to 1-400.0).

5-401.1 Professional

5-401.11 Organizing and administering a program
5-401.12 Planning or organizing laboratory facilities and instructional equipment
5-401.13 Curriculum development and teaching methodology
5-401.14 Internship and field experiences
5-401.15 Foundations and orientation
5-401.16 Philosophy of industrial arts education
5-401.17 Administration and supervision of industrial arts programs

5-401.2 Enrichment

5-401.21 History of technology
5-401.22 Field experiences in education and industry
5-401.23 Technological and/or urban problems
5-401.24 Man and his environment
5-401.25 Exploring the world of work

5-402.0 Methods - (Refer to 1-402.0)

5-403.0 Interdisciplinary aspects

Industrial arts aspects in higher education must by their nature involve learning experiences and activities closely associated with other academic areas. Consideration should be given, but not limited to, the following:

5-403.1 Instructional personnel

5-403.11 Coordination of instructional personnel involved in analogous areas (electronics, photography, etc.)

5-403.12 Coordination of personnel in supportive service areas in and between industrial arts and other curriculum areas

5-403.2 Learners

5-403.21 Grouping and teaching of students in industrial arts from other disciplines

5-403.22 Heterogeneous grouping of industrial arts students within other discipline areas

5-403.3 Curriculum

5-403.31 Teaching of other disciplines within any given industrial arts course

5-403.32 Studying a discipline in terms of a technical area

5-403.33 Integration of disciplines (interdisciplinary approach) as a total education package

5-403.34 Studying technology as a means of enabling one to control his environment--industrial arts as a form of liberal education

5-404.0 Programs for pre and inservice teachers of students with special needs

Students frequently require special and unique attention within their educational development process. Industrial arts programs in higher education can and must work closely with specialists assigned to these students in developing activities and experiences that will further their learning processes. A separate section (6-400.0) further defines special need areas.

5-500.0 Personnel

Personnel involved with industrial arts in higher education are selected under the provisions of Chapter 11, of the Regulation of the State Board of Education of Pennsylvania, "Higher Education". These regulations are further defined, clarified, and implemented by the Secretary of Education.

5-501.0 Instructional personnel

The instructional personnel are selected and are involved with professional responsibilities according to their academic preparation, professional preparation, experience and technical competency. They are employed as instructors or professors, teaching courses commensurate with their academic preparation.

5-501.1 Teach technical courses in laboratories or classrooms

5-501.11 Power Technology
5-501.12 Visual Communications
5-501.13 Industrial Materials

5-501.2 Teach professional courses

5-501.21 Methodology
5-501.22 Curriculum construction
5-501.23 Organizing and administering programs
5-501.24 History of technology
5-501.25 Professional problems

5-501.3 Teach enrichment or general education courses

5-501.4 Teach technical content courses for continuing education

5-501.5 Teach inservice courses or workshops

5-501.6 Coordination of field experiences

5-501.7 Conduct other professional activities

5-501.71 Advise and counsel students
5-501.72 Conduct and report professional research
5-501.73 Participate in professional association activities
5-501.74 Participate in industrial and community affairs and activities

5-501.75 Maintain availability to assist with local school programs

5-502.0 Administrative personnel

Administrative personnel meet the same minimal qualifications and are capable of performing the same tasks as instructional personnel. Administrators are most frequently employed as deans of divisions or directors of special certification programs. In addition they perform the following specific tasks:

5-502.1 Perform first level administrative decision-making

5-502.2 Prepare and administer budgetary problems of department

5-502.3 Responsible for recommending students for certification

5-502.4 Serve as a liaison person between the college administration and instructional staff and students

5-502.5 Coordinate all administrative functions of department or division under his direction

5-502.6 Select, evaluate and recommend professional staff in matters of employment, tenure, promotion, etc.

5-502.7 Perform such other administrative functions as assigned by college administrator

5-503.0 Supervisory personnel (Refer to 1-503.0)

5-504.0 Resource personnel (Refer to 1-504.0)

5-504.1 Graduate assistants

Candidates enrolled within a graduate program who operate under the general guidelines and academic provisions as set forth by the Secretary of Education

5-600.0 Learning Resources (Refer to 1-600-604)

5-700.0 Administration of the Program

An industrial arts program in higher education is usually structured as a department within a division of education which has both

undergraduate and graduate components. Matters pertaining to instruction, staffing, and professional affairs may be referred to and administered by a dean of education or a vice president of academic affairs.

5-701.0 Financing

The structure of higher education in Pennsylvania provides for two basic types of financing: (1) local, and (2) central or governmental. Specific procedures will vary from campus to campus throughout the Commonwealth. The following figures are based upon costs determined in 1972.

5-701.1 Budgeting

5-701.11 Materials and supplies -- average cost/student/credit hour is $7 to $12 depending upon the technical nature of the course being pursued

5-701.12 Instructional equipment

5-701.121 Initial equipping of a technical laboratory has been $1,500/student for instructional equipment

5-701.122 Equipment used for teaching professional courses (initial cost) is approximately $500/student

5-701.2 Inventory (Refer to 1-701.2)

5-701.3 Purchasing (Refer to 1-701.3)

5-701.4 Depreciation (Refer to 1-701.4)

5-702.0 Scheduling (Refer to 1-702.0)

5-703.0 Legal responsibilities (Refer to 1-703.0)

5-704.0 Staff development (Refer to 1-704.0)

5-705.0 Clerical assistance (Refer to 1-705.0)

5-706.0 Maintenance procedures (Refer to 1-706.0)

5-707.0 Supervising

For the efficient and effective operation of industrial arts programs in higher education, there are several levels of supervisory responsibilities which must necessarily be considered. These could include:

5-707.1 Student-staff supervisory relationships

- 5-707.11 Classroom supervision-individual, small and large group
- 5-707.12 Laboratory supervision-individual, small and large group
- 5-707.13 Supervision of laboratory assistants

5-707.2 Administrative staff supervisory practice as related to departmental personnel policies and practices.

- 5-707.21 Supervision of instructional staff
- 5-707.22 Supervision of para-professionals
- 5-707.23 Supervision of graduate assistants

5-707.3 Program supervision to include the administrator-supervisor-staff relationships in matters pertaining to the operation and functions of the program including such things as:

- 5-707.31 Curriculum development, evaluation and revision
- 5-707.32 Organization and administration of the physical facilities
- 5-707.33 Budgeting, finance, inventory and control
- 5-707.34 Scheduling practices for students and staff personnel

5-800.0 Evaluation (Refer to 1-800.0)

GUIDELINES FOR INDUSTRIAL ARTS IN PENNSYLVANIA

CHAPTER VI - Special Programs

CHAPTER VI-Special Programs

6-000.0 Rationale

Through carefully planned and guided experiences, education should provide opportunities for all students to grow and develop toward active, useful, contributing membership in a democratic society. As an integral part of the total program of education, industrial arts provides unique opportunities for all students to further develop their self-concept in relationship to the changing needs required to optimum participation in an industrial-technical culture.

Whenever the unique talents, circumstances or handicaps of students are incompatible with instruction in regular industrial arts classes a special program shall be required.

6-100.0 Purpose

Special programs in industrial arts are those instructional programs designed to provide individuals having unique talents, handicaps, or circumstances, which would prohibit optimum learning in regular industrial arts classes, with educational experiences essential to a satisfying life in an industrial-technical culture.

6-200.0 Legal Basis (Refer to 1-200.0)

6-300.0 Students (Refer to 1-300.0)

Special programs in industrial arts shall be provided for all individuals who, because of unique talents, circumstances or handicaps, would profit more from a special instructional program than regular instruction in industrial arts.

6-301.0 Academically talented

Academically talented 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. These 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. The homogenous grouping of exceptionally bright pupils for industrial arts instruction is recommended.

6-302.0 Mentally handicapped

Educational experiences for the mentally handicapped become increasingly meaningful as they participate in industrial arts activities in which "hand-on experiences" are emphasized. The learning activities in industrial arts may become the means through which many of the other school subjects are made more meaningful for these students. The morale of mentaliy handicapped students may be improved through successful participation in special industrial arts programs.

6-303.0 Physically handicapped

Industrial arts activities provide practical and effective motivation as well as mental and physical therapy essential to the rehabilitation and adjustment of the physically handicapped. These activities are invaluable in the evaluation of the degree of physical impairment and the extent of the physically handicapped individual's capacity for social and economic activities.

6-304.0 Disadvantaged

Industrial arts makes a significant contribution to the educational development of disadvantaged individuals. Instructional activities allow for greater mobility and freedom of expression than do other subject areas. The career guidance function of industrial arts is extremely valuable in helping disadvantaged students develop positive concepts of themselves and their relationship to a highly technical society.

6-305.0 Adults

Special industrial arts programs in adult education offers opportunities for these individuals to further their interests in various areas. These programs provide instruction in skills that will assist adults in developing worthwhile avocational interests, organizing home workshops, making and repairing useful household articles, and discovering personal interests and aptitudes which might prove to be of occupational value.

6-400.0 Program (Refer to 1-400.0)

6-401.0 Content

Special programs in industrial arts should provide for an orderly sequence of learning geared to the unique

talents, handicaps, or circumstances of the individuals served. Efforts should be made to show relationships with other subject areas. Opportunities should be provided for learning both in and out of school through individual and group activities involving a combination of "hands-on" and "on site" learning experiences.

The content for special programs in industrial arts shall be individually or group-prescribed depending upon the unique talent, handicap or circumstance of the individuals served. In either case efforts should be made to recognize and reward individual achievement.

This content shall evolve from problem-solving activities that are designed to foster greater understanding of the technological nature of our society. It is to be selected from the three instructional clusters presented in 1-400.0.

The following criteria should be used in determining content for special programs: (1) should aid in the accomplishment of the pre-determined objectives, (2) should be appropriate for the group being served, (3) should have educational value, and (4) should permit recognition and rewards for individual achievement.

6-401.1 Academically talented

Special industrial arts programs for the academically talented should have a pre-professional emphasis. These programs should be designed primarily for students who may continue their formal education after completing secondary school. Industrial arts for this group should allow for much student planning and serve as a foundation for further study. Research and experimentation activities should constitute a major portion of the class experience. The utilization of the open curriculum concept and mini-courses are most appropriate with academically talented students.

6-401.2 Mentally handicapped

Industrial arts activities built around the idea of providing manipulative experiences in the mass production of certain basic products are recommended for the mentally handicapped.

The repetition of experiences provides these students with the challenge that satisfies their

urge to do something successfully. It gives these students an opportunity to learn the techniques associated with f damental tools and machines and certain limited manipulative processes which can help them to become satisfactory workers in many industrial and service situations. More important, however, it helps them to develop self-reliance and confidence in their ability to learn.

6-401.3 Physically handicapped

Industrial arts activities perform an important therapeutic function in dealing with the physically handicapped. Many such individuals are in need of career guidance related to considerations for a particular handicap. Through the use of the work sample and/or actual jobs approach to evaluation of the handicapped, industrial arts serves as a median of expression.

For many handicapped individuals the avocational aspects of industrial arts provide a means for pride of accomplishment. For others it may lead to a means of earning a living or be simply a worthwhile form of relaxation.

A wide array of industrial arts offerings should be available to meet the individual needs and interests of these individuals.

6-401.4 Disadvantaged

Special programs with a pre-technical emphasis are intended for this group. Industrial arts activities for this group should be more career oriented. For many, the emphasis should be on the development of skills in the use of tools, machines and materials. The most important contribution made by industrial arts is the fostering of a positive self concept. This comes about as these individuals develop the ability to work independently or collectively on a particular problem.

6-401.5 Adults

The concept of continuing education, starting with early childhood and persisting throughout life, is an accepted phenomenon. The rapid rate at which knowledge and jobs become obsolescent,

and the fact that problems of living take on different connotations and require different solutions through the various cycles of life are ample evidence that education completed yesterday is inadequate today.

Special programs for adults provide industrial arts experiences for all who would continue their education. These programs may be recreational, avocational, or designed to facilitate securing or changing occupations.

6-402.0 Methods

The instructional methods used in industrial arts special programs shall vary depending upon the unique talents, handicaps, or circumstances of the students. Mentally and physically handicapped students should receive instruction weighted in favor of the group approach. Instructional methods employed for other special students should provide for more individual development.

The use of an interdisciplinary approach is recommended for all special programs, for purposes of continuity and reinforcement. Detailed descriptions of the instructional methods suggested for industrial arts education can be found in 1-402.0.

6-403.0 Interdisciplinary aspects (Refer to 1-403.0)

6-500.0 Personnel

6-501.0 Instructional personnel

All instructional personnel shall be certified to teach industrial arts in the Commonwealth of Pennsylvania. It is desirable that instructional personnel also have additional training or experience in working with special students. Where possible, a team of teachers possessing different strengths should be employed. The teacher of special programs should be able to make the necessary program adjustments to meet specific needs of the students being served or recognize alternatives, particularly where safety hazards are present or imminent.

The teacher of special programs should be able to plan, organize, implement, and evaluate industrial arts programs designed to meet the specific needs and interests of

individuals having unique talents, circumstances or handicaps.

This teacher shall demonstrate professional competencies essential to the effective organization and utilization of the following: (1) laboratory equipment and facilities, (2) learning activities, (3) instructional materials, (4) audio-visual aids and (5) teaching and evaluative techniques.

6-501.1 Industrial arts teacher

6-501.2 Special education teacher

6-501.3 Special subject teacher

6-502.0 Administrative personnel (Refer to 1-502.0)

6-503.0 Supervisory personnel (Refer to 1-503.0)

6-504.0 Resource personnel

Due to the unique nature of special programs and the subsequent demand for special teacher competencies, the extensive use of resource personnel is necessary.

6-600.0 Learning Resources

Unique learning resources may be required for special programs in industrial arts. Special facilities are usually required to permit handicapped students to fully participate in industrial arts activities. Portable and/or adjustable equipment should be permitted only after the teacher has determined that such tools and equipment can be safely operated. In the final analysis, the tools and equipment for special programs in industrial arts should be determined by the nature of the instructional activities planned.

Industrial arts for adults and the physically handicapped may require entrances and exits which can be controlled without access to other parts of the building. Additional and/or separate storage facilities, toilet facilities, mobility of equipment and localized lighting must also be considered.

Functionally planned space and facilities for special programs not only assists in the implementation of the program but also provides an atmosphere that fosters learning. The provision of facilities and space that can be adjusted, rearranged and altered as the need arises is a must for special programs in industrial arts.

The open laboratory with provision for instructional clusters or the comprehensive general laboratory is recommended for special programs.

Detailed information regarding learning resources for special programs in industrial arts can be found in 1-600.0.

6-700.0 Administration of the Program

The administration and supervision of special programs shall be a function of those individuals charged with the responsibility of administering and supervising all other industrial arts programs within a school district. Due to the nature of special programs much cooperation is required among area supervisors. Therefore, the administration and supervision of special programs requires individuals who are sensitive to and aware of the needs and objectives of such programs.

6-701.0 Financing

The per pupil cost of special programs in industrial arts may be somewhat high due to the special facilities and instructional personnel which may be required to effectively operate such programs. Per pupil costs should be determined on an individual program basis. There are many outside sources of funds for special programs. They should be considered when planning such programs. Using a student-teacher maximum ratio of 12 to 1 the projected per pupil cost for special programs is $120.00.

6-702.0 Scheduling

Scheduling and class size of special programs shall be determined primarily by the intent of the program and the capabilities of the individuals being served. A low student-teacher ratio of 12 to 1 or less is recommended.

6-703.0 Inventory

Special programs in industrial arts will require a proper system of inventory control. This system shall require appropriate inventory forms to facilitate the necessary record keeping.

6-704.0 Purchasing

A procedure for purchasing shall be determined by those individuals charged with the responsibility of administering special programs in industrial arts. This procedure shall

require appropriate requisition and specification forms to facilitate ordering and receiving.

6-705.0 Depreciation

The development of a procedure for establishing depreciation formulae for all major pieces of equipment utilized in special programs in industrial arts shall be the responsibility of administering special programs in industrial arts.

6-706.0 Safety and maintenance

Special programs in industrial arts involves working with materials, machines, tools and equipment which may pose hazards to safety. The establishment of a safe learning environment is mandatory. Essential features of a safe learning environment are:

6-706.1 Student laboratory conduct code

6-706.2 Laboratory maintenance system

6-706.3 Laboratory inventory system

6-800.0 Evaluation (Refer to 1-800.0)

The evaluation of special programs shall be in terms of the overall attainment of pre-determined objectives. This procedure will involve the following: (1) a statement of behavioral objectives, (2) an analysis of these objectives in terms of behavior changes, (3) the provision of isolating situations where the desired behavioral changes may be measured or observed and (4) the recording of the occurence or non-occurrence of the desired behavioral changes.

6-801.0 Internal evaluation

6-801.1 Industrial arts teacher

6-801.2 Special education teacher

6-801.3 Special subject teacher

6-801.4 Industrial arts supervisor

6-801.5 Building principal

6-801.6 Students in special programs

6-802.0 External evaluation

6-802.1 Parents of students in special programs

6-802.2 Other members of the school community

6-802.3 Local, state and regional accrediting organizations