DOCUMENT RESUME

ED 185 337 CE 024 817

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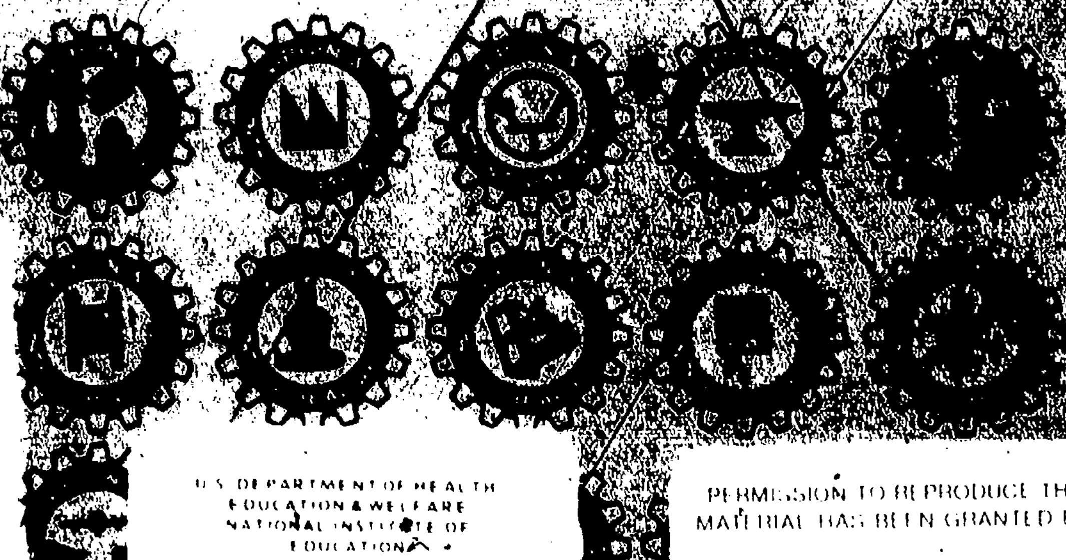
TITLE Industrial Arts Education Competency Catalogs for Exploring Technology, Modern Industry, Construction, Manufacturing.
INSTITUTION Old Dominion Univ., Norfolk, Va. Dept. of Industrial Arts Education.
SPONS AGENCY Virginia State Dept. of Education, Richmond. Trade and Industrial Education Service.
PUB DATE 79
NOTE 175p.; For related documents see CE 024 815-818.

EDRS PRICE MF01/PC07 Plus Postage.
DESCRIPTORS Competence; Competency Based Education; Construction (Process); *Industrial Arts; Industry; Manufacturing; *Minimum Competencies; Secondary Education; *Skill Analysis; Skill Development; Teaching Guides; Technology
IDENTIFIERS Virginia

ABSTRACT

Four competency catalogs of tasks for industrial arts programs are presented. These include catalogs in Exploring Technology, Modern Industry, Construction, and Manufacturing. The purpose of each catalog is to establish a basis for program content selection and criterion levels from which one may measure to see if individual learners have achieved minimal competence. Each catalog begins with an introduction, format description, course description, course goals, and suggested topical outline. The remainder of the catalog is comprised of task statements. Each task follows a typical format that includes the following sections: (1) Area of Competence, which identifies the industrial arts course for which the task was prepared; (2) Content/Concept, which identifies the sub-area with which the particular task is associated; (3) Task, which identifies the knowledge, skills, or attitudes that the learner should possess after instruction; (4) Criterion Referenced Measure, which provides the means of determining whether the learner can successfully perform the task; and (5) Performance Goals, which identifies sub-tasks that lead to the development of the knowledge, skills, and attitudes identified in the task. (LRA)

Industrial Arts Education Competency Catalogs For Film Color



Industrial Arts Education Service
Department of Education
Commonwealth of Virginia
Richmond, VA 23216

1979

John M. Ritz David I. Joyner
Project Co-Directors

This Project is Supported by Funds
Appropriated Under
PL 94-482 for FY-1979
For Industrial Arts Curriculum Development
Funded Through the
Department of Vocational and Industrial Arts Education
Old Dominion University
Norfolk, Virginia

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PREFACE

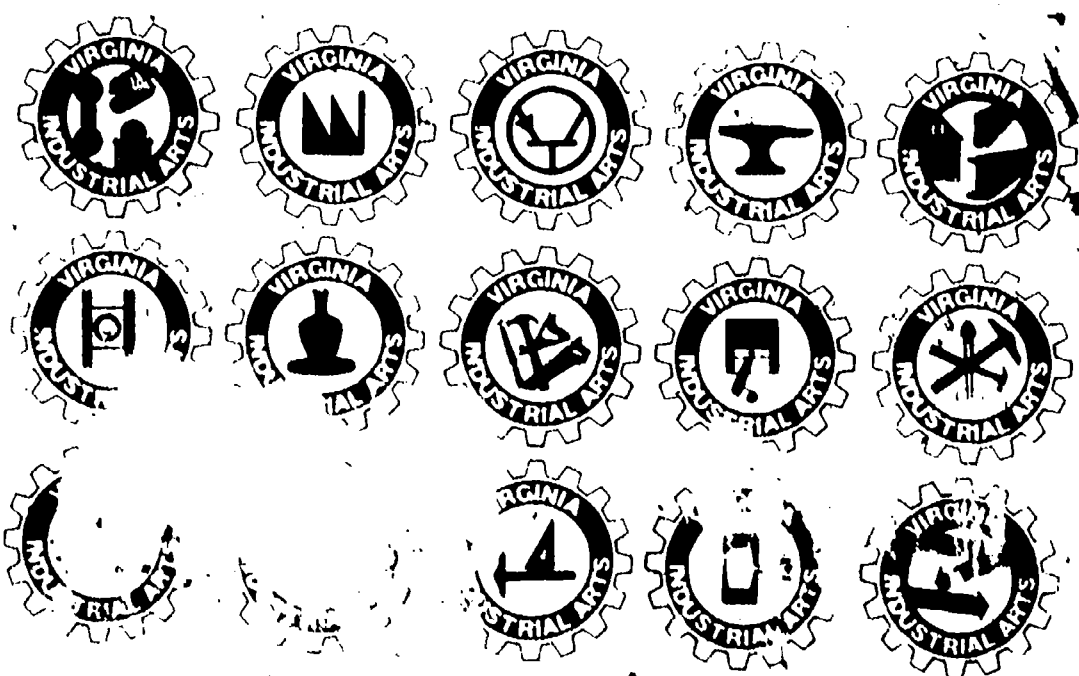
In today's complex society, learners need to be prepared to experience situations they will encounter in the future. Consequently, news media presentations have evidenced an intense and genuine concern on the part of government and the citizenry about the quality of American education. Accountability has become an accepted rule in an effort to improve the process of education for the benefit of learners. A national movement to improve education and its accountability has produced several important developments - among these is Competency-Based Instruction.

Competency-based instruction is a means of education based upon the identification and attainment of prespecified, role-relevant outcomes. To be competent implies that a learner be well qualified and possess certain abilities and qualities within a specified content area. That is, competency based instruction is a system designed to develop prespecified knowledge, skills, and attitudes in learners who are enrolled in an educational program.

Included within this publication are four competency catalogs of tasks for Virginia's Industrial Arts Programs. These include catalogs on Exploring Technology, Modern Industry, Construction, and Manufacturing. The purpose of these are to establish a basis for program content selection and criterion levels from which one may measure to see if individual learners have achieved a minimal level of competence through study in a particular course. In this manner a means to improve education and its accountability to citizenry can be designed based upon the identification and attainment of prespecified outcomes for the industrial arts content area.

A CATALOG OF TASKS FOR COMPETENCY-BASED INSTRUCTION IN

Exploring Technology



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INTRODUCTION

In the summer of 1977, The Industrial Arts Curriculum K-12 was introduced. This plan outlined the preferred courses, course sequences, and purposes which should be addressed in Virginia industrial arts programs. However, the model curriculum plan did not establish exact knowledge, skills, and attitudes which all learners should possess as they exit particular programs.

The purpose of the following competency catalog of tasks is to establish a basis for program content selection and criterion levels from which one may measure to see if individual learners have achieved a minimal level of competence through study in a particular course. In this manner a means to improve education and its accountability to citizenry can be designed based upon the identification and attainment of prespecified outcomes for the industrial arts content area. Although this catalog is designed and presented in a sequencial order of task statements, it does not mean that it must be structured into local programs in this order. Individual instructors may choose to restructure the sequence of competency tasks to meet local needs.

In preparing this catalog considerable research and validation was undertaken to specify those minimal tasks which every learner enrolling in the course should be able to perform. The format of this and other catalogs includes the following areas: area of competence, content/concept, task, criterion referenced measure, and performance guides. The area of competence identifies the industrial arts course for which the particular task was prepared. Content/concept identifies the sub-area with which the particular task is associated. The task is the knowledge, skills or attitudes which the learner should possess after instruction in the industrial arts class. Criterion references measures are means to identify if the learner can successfully perform the stated task and finally, performance guides are sub-tasks which lead to the development of the knowledge, skills and attitudes

identified in the tasks. These areas are illustrated in Table 1. It should be noted that performance objectives have been omitted from the catalogs of tasks. This was done to allow individual instructors to develop objectives they see necessary to meet the local learning environment.

In Table 2 is identified the location of this course in the total program of industrial arts for Virginia. Other competency catalogs are contained in this publication and the remaining catalogs may be obtained from the Industrial Arts Education Service, Division of Vocational Education, Department of Education, P.O. Box 6Q, Richmond, Virginia 23216.

FORMAT DESCRIPTION

AREA OF COMPETENCE Identifies the industrial arts course for which the particular task was prepared.

CONTENT/CONCEPT Identifies the sub-area which the particular task is associated.

TASK Identifies the knowledge, skills, or attitudes which the learner should possess after completing instruction in the industrial arts class.

CRITERION REFERENCED MEASURE: The means to identify if the learner can successfully perform the stated task.

PERFORMANCE GUIDES: Identifies sub-tasks which lead to the development of the knowledge, skills, and attitudes identified in the tasks.

TABLE 1

The Industrial Arts Curriculum

Level	Goal	Program
Elementary School	Learning Reinforcement	Industrial Arts activities integrated within the elementary curriculum
Middle or Junior High School	Orientation and Exploration	Exploring Technology Modern Industry Construction Manufacturing
High School	Technical	Communication Technology Materials and Processes Technology Power and Transportation Technology Architectural Drawing Basic Technical Drawing Electricity and Electronics Energy and Power Engineering Drawing Graphic Communications Metals Technology Woods Technology
	Personal Enrichment	General Industrial Arts Industrial Crafts

TABLE 2

EXPLORING TECHNOLOGY

Course Code
8461 (36 weeks)
8464 (18 weeks)

COURSE DESCRIPTION:

Students make projects that copy models of significant inventions that have advanced society and the work people do. Basic study units include tools and machines, power and energy, transportation, communication, manufacturing, construction or societal concerns.

COURSE GOALS:

Experiences and activities of this INDUSTRIAL ARTS course will enable the student to:

1.1 recall the importance of history in the development of technology.

1.2 identify with oral discussion or writing the application of tools, machines, and materials in cultural development.

1.3 identify resources for obtaining occupational information.

1.4 locate and use resources on technology related topics.

2.1 construct a scale model displaying craftsmanship and tool skills.

3.1 relate how technology can solve a problem while creating other problems.

3.2 recognize that all jobs are important and that work has self-gratifying value.

SUGGESTED TOPICAL OUTLINE:

I. Introduction to Technological Development

II. Area Identification (Manufacturing, Construction, Transportation, Power and Energy, Communication, Tools and Machines, or Societal Concerns)
   A. Subtopic Identification
   B. Construction Phase
      1. model development
      2. report development
      3. display development
   C. Seminar Phase

III. Area Identification (Manufacturing, Construction, Transportation, Power and Energy, Communication, Tools and Machines, or Societal Concerns)
   A. Subtopic Identification
   B. Construction Phase
      1. model development
      2. report development
      3. display development
   C. Seminar Phase

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   A. Subtopic Identification
   B. Construction Phase
      1. model development
      2. report development
      3. display development
   C. Seminar Phase

**V. Area Identification (Manufacturing, Construction, Transportation, Power and Energy, Communication,

Tools and Machines, or Societal Concerns)

A. Subtopic Identification

B. Construction Phase

1. model development
2. report development
3. display development

C. Seminar Phase

VI. The Industrial Arts Student Association

** Included in 36 week course.

NOTE: Area Identification should be rotated through various areas of technology as time permits.

TASK # 1

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Introduction

TASK: Recall the Importance of History in the Development of Technology.

CRITERION REFERENCED MEASURE: Describe the significance that the following eras of technology have had on the development of people and societies: Pre-History, Age of the Empires, Modern Crafts Era, Machine Age, Power Age, and the Atomic Age.

PERFORMANCE GUIDES:

1. Trace the history of technology.
2. View films on the development of technology.
3. Construct a time line of one era of technology.
4. Visit a local museum.

TASK # 2

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Introduction

TASK: Describe the Anthropological Approach to the Study of Technology.

CRITERION REFERENCED MEASURE: List the purpose of the anthropological unit as (1) a recognition and appreciation of our material heritage, (2) the inventiveness of the minds of the past, (3) and to relate our appreciation of today's world of technology.

PERFORMANCE GUIDES:

1. Review the make up of this class activity.
2. Discuss the purpose of this unit of study.
3. View results of exemplary unit studies.

TASK # 3

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Area Identification

TASK: Identify Potential Major Areas of Study for an Anthropological Unit.

CRITERION REFERENCED MEASURE: List and describe the basic technological elements common to and contributing to all civilized mankind as transportation, communication, manufacturing, construction, tools and machines, power and energy, or their resulting societal concerns.

PERFORMANCE GUIDES:

1. Observe teacher presentations on contributions of technology to civilization.
2. View historical charts of the development of areas of technology.
3. Discuss the major areas of technology including transportation, communication, manufacturing, construction, tools and machines, power and energy, and resulting societal concerns.

TASK # 4

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Area Identification

TASK: Describe Criteria for the Selection of a Technological Area of Study.

CRITERION REFERENCED MEASURE: List criteria for the selection of a technological area of study, including the following: class interest, available resources, available tools, and available supplies.

PERFORMANCE GUIDES:

1. Participate in class discussions on criteria for the selection of an area of study.
2. Compile a list of criteria for the selection of an area of study.
3. Presentation by librarian on available resources for units of study in technology.
4. Tour of industrial arts facility to determine tools and supplies available.
5. Identify available community resources for the study of technology.

TASK # 5

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Area Identification

TASK: Select a Technological Area of Study.

CRITERION REFERENCED MEASURE: Select the initial area of study from the following list using established criteria: transportation, communication, manufacturing, construction, tools and machines, power and energy, or their resulting societal concerns.

PERFORMANCE GUIDES:

1. Discuss the democratic process of selection.
2. Establish a method for area selection.
3. Use established criteria and democratically select a technological area for an anthropological unit of study.

TASK # 6

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Subtopic Identification

TASK: Acquire an Awareness of Possible Subtopics Relating to an Anthropological Unit.

CRITERION REFERENCED MEASURE: List possible subtopics for the selected technological area of study.

PERFORMANCE GUIDES:

1. Observe teacher presentations on significant subtopics of a selected technological area.
2. Review reference books to identify possible subtopics.
3. Participate in class listings of potential area subtopics.

TASK # 7

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Subtopic Identification

TASK: Identify Criteria for the Selection of an Area Subtopic.

CRITERION REFERENCED MEASURE: List criteria for the selection of a technological area subtopic including:

1. Having made a contribution to the growth of civilization.
2. Having a history which may be traced.
3. Being interesting to you.
4. Involving a variety of construction operations and materials.
5. Having moving parts if possible.
6. Being socially acceptable.
7. Lending itself to available resource material.

PERFORMANCE GUIDES:

1. Participate in class discussion of criteria for the selection of a subtopic.
2. List additional criteria for the selection of a subtopic.

TASK # 8

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Subtopic Identification

TASK: Select a Subtopic to Study.

CRITERION REFERENCED MEASURE: Choose a subtopic of study from a major area of technological study using established criteria.

PERFORMANCE GUIDES:

1. Match established criteria for the selection of a subtopic with a list of possible topics.
2. Select individual subtopics to investigate employing the anthropological approach to the study of technology.

TASK # 9

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Subtopic Identification

TASK: Establish Standards on Student Expectation Levels.

CRITERION REFERENCED MEASURE: List standards for project, report, and display construction as established by the instructor and class.

PERFORMANCE GUIDES:

1. Discuss standards utilized in industry.
2. Establish standards for model project construction including size, cost, tools used, time, etc.
3. Establish standards for report composition including format, length, etc.
4. Establish standards for display construction including size, format, graphic representations, design, etc.
5. List all standards for student expectation levels.

TASK # 10

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Subtopic Identification

TASK: Acquire a Knowledge of Available Resources, Tools, and Materials for Project Instructional Outcomes.

CRITERION REFERENCED MEASURE: Describe resources, tools, and materials available for project, report, and display construction.

PERFORMANCE GUIDES:

1. Visit the library to identify sources of information available for a selected subtopic.
2. Tour industrial arts facility to identify tools, machines, and materials available to accomplish subtopic construction and display.
3. Search community resources available for the development of a subtopic.
4. Confirm or reselect subtopics after review of available resources, tools, and materials.

TASK # 11

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Project Planning.

CRITERION REFERENCED MEASURE: Demonstrate skill in project planning including researching, consulting, constructing, and programming.

PERFORMANCE GUIDES:

1. Observe presentations on how industry employs planning in the development of projects.
2. Observe presentations on the development of working drawings.
3. Construct working drawings for a selected technological development.
4. Plan for the construction of a technological development including a bill of materials and operation analysis sheet.

TASK # 12

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Model Construction.

CRITERION REFERENCED MEASURE: Demonstrate skill in the construction of an anthropological model following established program criteria.

PERFORMANCE GUIDES:

1. Discuss laboratory safety procedures.
2. Develop skill in the safe use of tools and machines needed to construct an anthropological model.
3. Develop skill in fastening practices needed to construct an anthropological model.
4. Develop skill in finishing practices needed to construct an anthropological model.
5. Construct an anthropological model.

TASK # 13

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skills in Preparing Reports.

GRITERION REFERENCED MEASURE: Demonstrate skill in preparing an anthropological unit report including purpose, procedures, schematics or pictures, historical or scientific factors, social contributions, equipment utilized, references and resources contacted.

PERFORMANCE GUIDES:

1. Observe presentations on the value of the written research report.
2. View examples of exemplary written research reports.
3. Review standards established by the class on the composition of a research report.
4. Visit other school personnel to seek help in researching, writing, and preparing a written research report.
5. Write a research report on a selected technological development.

TASK # 14

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Constructing Displays.

CRITERION REFERENCED MEASURE: Demonstrate skill in the construction of a group anthropological display following established program criteria.

PERFORMANCE GUIDES:

1. Observe a presentation on the role of the display and display techniques including charts, diagrams, technical art, and schematics.
2. Construct a display representing an anthropological unit of study.

TASK # 15

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Seminar Phase

TASK: Develop Skill in Conducting a Seminar.

CRITERION REFERENCED MEASURE: Demonstrate skill in conducting a seminar including inviting visitors, recording, introductions, progress reports, feature presentations, group problems, topics of interest and closing comments.

PERFORMANCE GUIDES:

1. Observe a presentation on the purpose of a seminar.
2. Discuss the roles of seminar participants.
3. Observe a presentation on how to give an oral presentation.
4. Observe a presentation on the role of media for making information clear to others.
5. Prepare and conduct seminars including inviting visitors, recording information, giving introductions, making progress reports, giving feature presentations, discussing group problems, discussing topics of interest and closing comments to report the progress of the anthropological unit.

TASK # 16

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: Seminar Phase

TASK: Develop an Awareness of the Effects Technology has had on People and Society.

CRITERION REFERENCED MEASURE: Describe the effects that technology has had on people and societies through participation in seminar discussions.

PERFORMANCE GUIDES:

1. Participate in a seminar as moderators, timekeepers, presenters, listeners, and evaluators.
2. Critique seminar presentations.
3. Offer consultations and solutions to problems presented in seminars.
4. Discuss the effects that technological developments have had on people and societies.

TASK # A.I.A.S.A.

AREA OF COMPETENCE: Exploring Technology

CONTENT/CONCEPT: In Class Industrial Arts Student Association

TASK: Participation (involvement) in a democratic organization with activities using course content.

CRITERION REFERENCED MEASURE: Participate with other students in organized activities using industrial resources, leadership or followership, service or enterprise projects and recognition for workmanship.

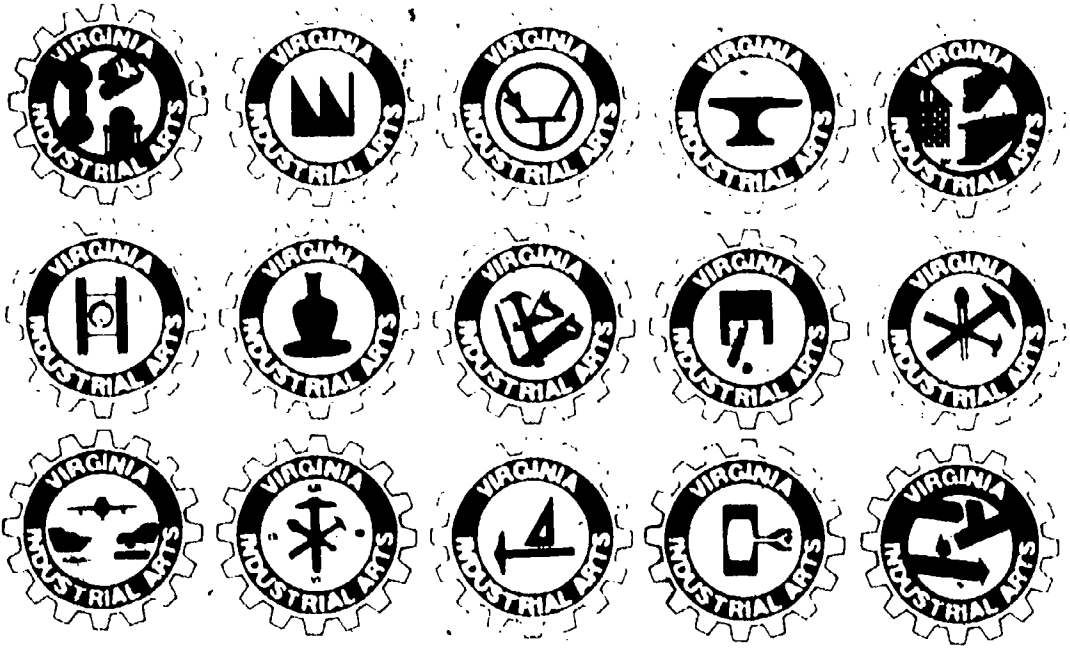
PERFORMANCE GUIDES:

1. Organize class into personnel system for democratic decision making and leader/follower development.
2. Invite speakers to class and use resources of industry and technology from the community.
3. Carry out worthy group activities and projects to improve or serve school or community.
4. Operate an enterprise system to produce item of economic value.
5. Encourage competition in areas of course to motivate and recognize achievement.

NOTE: These performance guides are expanded in the publication titled Student Association Activities in Industrial Arts Instruction available from the Industrial Arts Service, Virginia Department of Education, Richmond, Virginia 23216.

A CATALOG OF TASKS FOR COMPETENCY-BASED INSTRUCTION IN

Modern Industry



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PERFO[illegible]ES: Identifies sub-tasks which lead to the development [illegible], skills, and attitudes identified in the tasks.

TABLE 1

The Industrial Arts Curriculum

Level	Goal	Program
Elementary School	Learning Reinforcement	Industrial Arts activities integrated within the elementary curriculum
Middle or Junior High School	Orientation and Exploration	Exploring Technology Modern Industry Construction Manufacturing
High School	Technical	Communication Technology Materials and Processes Technology Power and Transportation Technology Architectural Drawing Basic Technical Drawing Electricity and Electronics Energy and Power Engineering Drawing Graphic Communications Metals Technology Woods Technology
	Personal Enrichment	General Industrial Arts Industrial Crafts

TABLE 2

MODERN INDUSTRY

Course Code
8462 (36 weeks)
8463 (18 weeks)

COURSE DESCRIPTION:

Students construct group projects to learn about two major types of industries: (1) the process/project industry, which converts raw materials into more useful forms and (2) the production industry, which uses the assembly line. Students organize and run their own industry. The products or projects are made for personal use or to sell.

COURSE GOALS:

Experiences and activities of this INDUSTRIAL ARTS course will enable the student to:

1.1 identify the procedures for processing a selected raw material into a more useful form.

1.2 identify the management practices which are necessary for a project-industry contract.

1.3 identify the job entrance requirements for five selected occupations.

1.4 exhibit basic knowledge of career opportunities in the project-industry.

2.1 use a managed production system to produce a product or project.

2.2 perform the skills in several areas of the production industry.

2.3 demonstrate techniques for securing a job.

3.1 discuss the safety measures necessary in a production industry.

3.2 relate the necessity of selling, distributing and servicing an industrial product.

3.3 plan wisely before producing goods and services.

SUGGESTED TOPICAL OUTLINE:

I. Process Industries
   A. Selection of an industry
   B. Personnel organization
   C. Construction phase
      1. Project development
      2. Presentation development
      3. Publication development
   D. Seminar Phase

II. Production Industries
   A. Selection of a product
   B. Management
   C. Production
   D. Instructional Presentation
   E. Seminar

**III. Project Industries
   A. Selection of an Industry
   B. Personnel Organization
   C. Construction Phase
      1. Project development
      2. Presentation development
      3. Publication development

**IV. Production Industries
   A. Selection of a Product
   B. Management
   C. Production
   D. Instructional Presentation
   E. Seminar

** Included in 36 week course.

NOTE: Second production industries unit should be more student directed if time permits inclusion into the program.

TASK # 1

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Introduction

TASK: Describe the Group Process/Project Approach to the Study of Contemporary Industry.

CRITERION REFERENCED MEASURE: List the purpose of the group process/project approach to the study of contemporary industry as the study of one industry in depth.

PERFORMANCE GUIDES:

1. Discuss the group process/project approach.
2. Discuss the purpose of the unit.
3. Observe results of the group process/ project approach units.
4. Differentiate between process and project industries.
5. Establish research groups.

TASK # 2

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Selection of an Industry

TASK: Identify Potential Major Units of Study for the Group Process/Project Approach.

CRITERION REFERENCED MEASURE: List and describe possible group process/project approaches to the study of contemporary industry to include, but not be limited to, steel, cement, aluminum, copper, lumber, glass, coal, hydroelectric, rubber, bread, and paper process industries and ships, airports, buildings, power-generating systems, and space project industries.

PERFORMANCE GUIDES:

1. Research possible unit topics for process industries.
2. Research possible unit topics for project industries.
3. Identify local process/project industries.
4. Participate in the group listing of possible unit topics for process industries.
5. Participate in the group listing of possible unit topics for project industries.

TASK # 3

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Selection of an Industry

TASK: Establish Criteria for Industry Selection.

CRITERION REFERENCED MEASURE: List criteria for the selection of a contemporary industry including:

1. Availability of resources.
2. Importance of the industry to contemporary society.
3. Construction possibilities.
4. Social acceptance, and
5. Time, materials, and resources available.

PERFORMANCE GUIDES:

1. Observe a presentation on criteria for the selection of a process or project industry to study.
2. Establish additional class criteria for the study of a process or project industry.

TASK # 4

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Selection of an Industry

TASK: Select a Contemporary Industry to Study

CRITERION REFERENCED MEASURE: Select an industry to study employing the group process/project approach to contemporary industry using established program criteria.

PERFORMANCE GUIDES:

1. Participate in the democratic process of selection.
2. Select a contemporary process/project industry to study employing democratic means and established criteria.

TASK # 5

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Personnel Organization

TASK: Identify Possible Job Titles for a Personnel Organization.

CRITERION REFERENCED MEASURE: List and describe the following occupations associated with contemporary industry: project director, safety director, design director, design group, procurement director, education director, project coordinator, construction engineer, electrical engineer, construction group, union steward, director of accounts and records, and research director.

PERFORMANCE GUIDES:

1. Observe a presentation on industrial personnel organization.
2. Participate in a discussion of the responsibilities of the following industrial occupations: project director, safety director, design director, design group, procurement director, education director, project coordinator, construction engineer, electrical engineer, construction group, union steward, director of accounts and records, and research director.

TASK # 6

AREA OF COMPETENCE: Modern Industry (Process/Project Industries)

CONTENT/CONCEPT: Personnel Organization

TASK: Develop Skill in Structuring Organization Charts.

CRITERION REFERENCED MEASURE: Demonstrate skill in constructing an organization chart for a selected industry.

PERFORMANCE GUIDES:

1. Observe a presentation on the purpose of organization charts.
2. View sample organization charts.
3. Construct a industrial organizational chart for a process/project industry including overall class organization and individual research group organizations.

TASK # 7

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Personnel Organization

TASK: Select Roles to be Played in the Study of a Contemporary Industry.

CRITERION REFERENCED MEASURE: Identify and describe abilities associated with particular occupations of an industry.

PERFORMANCE GUIDES:

1. Observe a presentation on work modes or styles (conventional, creative, investigative, enterprizing, mechanical, and social) for industrial occupations.
2. Select students to assume roles in the established organizational chart for the group project.

TASK # 8

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Personnel Organization

TASK: Role-Play an Occupation in a Selected Contemporary Industry.

CRITERION REFERENCED MEASURE: Role play selected occupations of a contemporary industry including using resources, tools, and materials to assemble projects, presentations, displays, publications, and exhibits.

PERFORMANCE GUIDES:

1. Participate in simulation exercises related to industrial occupations.
2. Participate as industrial workers in the assembly of projects, presentations, displays, publications, and exhibits.

TASK # 9

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Planning a Research Unit on a Contemporary Industry.

CRITERION REFERENCED MEASURE: Demonstrate skill in planning and decision making in the assembly of group projects, presentations, displays, publications, and exhibits representing contemporary industry.

PERFORMANCE GUIDES:

1. Observe a presentation on how industry employs decision making in its operations.
2. Participate in student presentations on planning and decision making as related to their selected group project.
3. Plan for the assembly of group displays, publications, and exhibits.
4. Make working drawings of group process/project industries.

TASK # 10

AREA OF COMPETENCE: Modern Industry (Process/Project Industries)

CONTENT/CONCEPT: Construction Phase

TASK: Establish Standards for Group Expectation Levels.

CRITERION REFERENCED MEASURE: List standards for the assembly of group projects, presentations, and publications for a particular class.

PERFORMANCE GUIDES:

1. Discuss standards utilized in industry.
2. Establish standards for group project construction including size, cost, tools used, materials used, electrical and mechanical usage, time, etc.
3. Establish standards for student presentations including format, length, etc.
4. Establish standards for composition of publications including size, format, graphic representations, design, etc.
5. List all standards for student expectation levels.

TASK # 11

AREA OF COMPETENCE: Modern Industry (Process/Project Industries)

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Constructing a Representation of Contemporary Industry.

CRITERION REFERENCED MEASURE: Demonstrate skill in constructing a representation of a contemporary industry following established class criteria.

PERFORMANCE GUIDES:

1. Discuss laboratory safety procedures.
2. Develop skill in the safe use of tools and machines needed to construct representations of contemporary industry.
3. Develop skill in fastening practices needed to construct representations of contemporary industry.
4. Develop skill in finishing practices needed to construct representations of contemporary industry.
5. Construct representations of contemporary industry.

TASK # 12

AREA OF COMPETENCE: Modern Industry (Process/Project Industries)

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Preparing Group Presentations on Contemporary Industries.

CRITERION REFERENCED MEASURE: Demonstrate skill in preparing group presentations of a contemporary industry following established class criterion and including the organization of a modern industry, the factors affecting growth and development of the industry, the contributions of the industry, recent developments in the industry, the processes of the industry, the products of the industry and their impact on society, and problems confronting the industry.

PERFORMANCE GUIDES:

1. Observe a presentation on the contents of a group report for a contemporary industry.
2. View samples of exemplary group presentations of contemporary industry.
3. Prepare a group presentation on a contemporary industry including the above topics.

TASK # 13

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Preparing Group Displays on Contemporary Industries.

CRITERION REFERENCED MEASURE: Demonstrate skill in combining projects, illustrations, samples, and narrative information into a display on contemporary industry.

PERFORMANCE GUIDES:

1. Observe a presentation on the construction of a display.
2. View examples of exemplary displays.
3. Construct a display representing a contemporary industry including projects, illustrations, samples, and narrative information.

TASK # 14

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Preparing Group Publications on Contemporary Industries.

CRITERION REFERENCED MEASURE: Demonstrate skill in composing group publications on a selected contemporary industry following established class criteria including, but not limited to, public relations posters and announcements, one/two page brochures describing the industry. and printed and photographic items describing the industry.

PERFORMANCE GUIDES:

1. Observe a presentation on the composition of group publications related to contemporary industry.
2. View examples of exemplary group project publications.
3. Compose and print publications representing group process/project industries.

TASK # 15

AREA OF COMPETENCE: Modern Industry (Process/Project Industries)

CONTENT/CONCEPT: Construction Phase

TASK: Develop Skill in Preparing Public Exhibits on Contemporary Industries.

CRITERION REFERENCED MEASURE: Demonstrate skill in preparing public exhibits (outside of school) on contemporary industries.

PERFORMANCE GUIDES:

1. Observe a presentation on the value of community exhibits.
2. View exemplary community exhibits representing contemporary industry.
3. Assemble a public exhibit of a group process/project industry.

TASK # 16

AREA OF COMPETENCE: Modern Industry
(Process/Project Industries)

CONTENT/CONCEPT: Seminar Phase

TASK: Develop an Awareness of the Effects that Contemporary Industry has upon People and Societies.

CRITERION REFERENCED MEASURE: Describe the effects that modern industry has had on people and societies by participating in seminar discussions.

PERFORMANCE GUIDES:

1. Participate in a seminar as moderators, timekeepers, presenters, listeners, and evaluators.
2. Critique seminar presentations.
3. Offer consultations and solutions to problems presented in seminars.
4. Discuss the effects that process/project industries have had on people and societies.

TASK # 17

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Introduction

TASK: Describe the Line Production Approach to the Study of Contemporary Industry.

CRITERION REFERENCED MEASURE: List the purpose of the line production approach to the study of contemporary industries as the study of volume producing industries in depth.

PERFORMANCE GUIDES:

1. Discuss the line-production approach.
2. Discuss the purpose of line-production.
3. Observe results of line production industries.

TASK # 18

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Selection of a Product

TASK: Establish Criteria for the Selection of a Product.

CRITERION REFERENCED MEASURE: List criteria for the selection of a line-production product including:

1. Ability to produce.
2. Involving a series of steps (processes and assemblies),
3. Utilizing jigs and fixtures,
4. Saleability, and
5. Social acceptance.

PERFORMANCE GUIDES:

1. Observe a presentation on criteria for the selection of a line-production product.
2. Contribute to a class discussion on the selection of a line-production product.
3. List criteria for the class selection of a line production product.

TASK # 19

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Selection of a Product

TASK: Select a Product for Line Production.

CRITERION REFERENCED MEASURE: Select a product using the line-production approach and criteria established by the class.

PERFORMANCE GUIDES:

1. Discuss the democratic process of selection.
2. Brainstorm ideas for possible line production products.
3. Bring in ideas for possible line-production products.
4. Use established criteria and democratically select a line-production product.

TASK # 20

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Management

TASK: Organize and Finance an Enterprise.

CRITERION REFERENCED MEASURE: Organize and finance a line-production enterprise including the name of the company, number of items to be produced, and financing policies.

PERFORMANCE GUIDES:

1. Observe a presentation on organizing a line-production enterprise.
2. Vote on a company name.
3. Design a company trademark.
4. Observe a presentation on financing a line-production enterprise.
5. Determine a method of finance for an enterprise.
6. Design and print stock certificates.
7. Determine democratically the number of products to be produced.
8. Participate in the sale of stock.
9. Discuss and establish a break even point for production.

TASK # 21

AREA OF COMPETENCE: Modern Industry (Production Industries)

CONTENT/CONCEPT: Management

TASK: Establish Personnel Requirements and Functions for Line Production.

CRITERION REFERENCED MEASURE: List and describe the personnel requirements including tasks, jobs, and responsibilities needed to produce a given product.

PERFORMANCE GUIDES:

1. Observe a presentation on industrial personnel requirements including tasks, jobs, and responsibilities.
2. Identify those personnel requirements needed to produce a selected product.
3. Establish a board of directors for a line-production enterprise.

TASK # 22

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Management

TASK: Develop a Personnel Organization Plan for a Company.

CRITERION REFERENCED MEASURE: Structure a personnel chart for a given company.

PERFORMANCE GUIDES:

1. Observe a presentation on the purpose of organization charts.
2. View examples of sample organization charts.
3. Construct an industrial organizational chart for a line-production enterprise.

TASK # 23

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Management

TASK: Select Roles to be Played in the Study of a Line-Producing Industry.

CRITERION REFERENCED MEASURE: Identify and describe abilities associated with particular occupations in a line-producing industry.

PERFORMANCE GUIDES:

1. Observe a presentation on work modes or styles (conventional, creative, investigative, enterprising, mechanical, and social) for industrial occupations.
2. Select students to assume roles in the established organizational chart for a line-production enterprise.

TASK # 24

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Management

TASK: Role-Play an Occupation in a Line Producing Industry.

CRITERION REFERENCED MEASURE: Role play selected occupations of a line producing industry including using resources, tools, and materials to produce products, presentations, displays, and publications.

PERFORMANCE GUIDES:

1. Participate in simulation exercises related to industrial occupations.
2. Participate as industrial workers in the manufacture of line-production products and the assembly of presentations, displays, and publications.

TASK # 25

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Management

TASK: Develop Skill in Planning for the Line-Production of a Product.

CRITERION REFERENCED MEASURE: Demonstrate skill in planning and decision making in the line production of products and the assembly of presentations, displays, and publications.

PERFORMANCE GUIDES:

1. Observe a presentation on how industry employs planning in its operations.
2. Participate in student presentations on planning and decision making as related to their selected line-production product.
3. Plan for the assembly of presentations, displays, and publications.

TASK # 26

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Production

TASK: Develop Skill in Designing a Line-Production Product.

CRITERION REFERENCED MEASURE: Demonstrate skill in designing including establishing objectives, preliminary sketches, cardboard models, mock-ups, prototypes, and testing.

PERFORMANCE GUIDES:

1. Observe a presentation on designing production products.
2. Establish design objectives for a selected line production product.
3. Develop preliminary sketches for a selected line production product.
4. Develop working drawings of a line-production product.
5. Develop models or mock-ups of line production products.
6. Develop a prototype of a selected line-production product.
7. Test the prototype of a line production product.

TASK # 27

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Production

TASK: Develop Skill in Tooling-Up for the Line-Production of a Product.

CRITERION REFERENCED MEASURE: Demonstrate skill in tooling-up for line production including making production flow charts, schedules, establish the production line, constructing jigs and fixtures, ordering materials and equipment, selecting employees for jobs, training employees, and conducting a trial run.

PERFORMANCE GUIDES:

1. Observe presentations on tooling-up for production.
2. Construct flow charts for a selected line production product.
3. Develop schedules for line-production products.
4. Design and establish the line-production assembly line.
5. Design and develop all jigs and fixtures needed for the line-production of a selected product.
6. Order needed materials and equipment for the line production of a selected product.
7. Assign employees to line-production jobs.
8. Train employees for line-production jobs.
9. Conduct a trial run.

TASK # 28

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Production

TASK: Develop Skill in the Production of a Line Produced Product.

CRITERION REFERENCED MEASURE: Demonstrate skill in producing line production products.

PERFORMANCE GUIDES:

1. Participate in the line production of a selected product.
2. Establish quality control standards.
3. Conduct testing devices.
4. Evaluate production practice.
5. Make necessary production changes (workers, equipment, etc.).

TASK # 29

AREA OF COMPETENCE: Modern Industry (Production Industries)

CONTENT/CONCEPT: Production

TASK: Develop Skill in the Distribution of a Line-Production Product.

CRITERION REFERENCED MEASURE: Demonstrate skill in the distribution of products including packaging, advertising, and selling.

PERFORMANCE GUIDES:

1. Observe a presentation on distribution of line-production products.
2. Design packages for products.
3. Advertise products.
4. Sell products.

TASK # 30

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Production

TASK: Develop Skill in Liquidating an Enterprise.

CRITERION REFERENCED MEASURE: Demonstrate skill in liquidating an enterprise including settling financial accounts and dissolving the enterprise.

PERFORMANCE GUIDES:

1. Observe a presentation on liquidating an enterprise.
2. Settle all financial accounts of the enterprise including paying dividends and bills.
3. Close the enterprise.

TASK # 31

AREA OF COMPETENCE: Modern Industry (Production Industries)

CONTENT/CONCEPT: Instructional Presentation

TASK: Develop Skill in Preparing Presentations on Line-Production Activities.

CRITERION REFERENCED MEASURE: Demonstrate skill in preparing a group presentation on a line production industry.

PERFORMANCE GUIDES:

1. Plan a presentation on individual assignments relating to the line-production enterprise.
2. Give presentations relating to the line-production industry.

TASK # 32

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Instructional Presentation

TASK: Develop Skill in Constructing Displays on Line-Production Companies.

CRITERION REFERENCED MEASURE: Demonstrate skill in preparing a display on production industries.

PERFORMANCE GUIDES:

1. Observe a presentation on the construction of a display.
2. View examples of exemplary displays.
3. Construct a display representing a line production product including sample products, illustrations, and narrative information.

TASK # 33

AREA OF COMPETENCE: Modern Industry
(Production Industries)

CONTENT/CONCEPT: Instructional Presentations

TASK: Develop Skill in Composing Publications on Line-Production Companies.

CRITERION REFERENCED MEASURE: Demonstrate skill in composing publications on line-production enterprises.

PERFORMANCE GUIDES:

1. Observe a presentation on the composition of publications related to a line-production enterprise.
2. View examples of exemplary line-production enterprise publications.
3. Compose and print publications representing line production industries.

TASK # 34

AREA OF COMPETENCE: Modern Industry (Production Industries)

CONTENT/CONCEPT: Seminar

TASK: Develop an Awareness of the Effects that Line-Production Industries have on People and Societies.

CRITERION REFERENCED MEASURE: Describe the effects that line production industries have had on people and societies.

PERFORMANCE GUIDES:

1. Discuss the results of your line-production enterprises.
2. Discuss the effects that line-production industries have had on people and societies.

TASK #. A.I.A.S.A.

AREA OF COMPETENCE: Modern Industry

CONTENT/CONCEPT: In Class Industrial Arts Student Association

TASK: Participation (involvement) in a democratic organization with activities using course content.

CRITERION REFERENCED MEASURE: Participate with other students in organized activities using industrial resources, leadership or followership, service or enterprise projects and recognition for workmanship.

PERFORMANCE GUIDES:

1. Organize class into personnel system for democratic decision making and leader/follower development.
2. Invite speakers to class and use resources of industry and technology from the community.
3. Carry out worthy group activities and projects to improve or serve school or community.
4. Operate an enterprise system to produce item of economic value.
5. Encourage competition in areas of course to motivate and recognize achievement.

NOTE: These performance guides are expanded in the publication titled Student Association Activities in Industrial Arts Instruction available from the Industrial Arts Service, Virginia Department of Education, Richmond, Virginia 23216.

A CATALOG OF TASKS

FOR

COMPETENCY-BASED INSTRUCTION

IN

Construction

Industrial Arts Education Service
Department of Education
Commonwealth of Virginia
Richmond, Virginia 23216
1979

This Catalog of Tasks
Was Prepared At
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INTRODUCTION

In the summer of 1977, The Industrial Arts Curriculum K-12 was introduced. This plan outlined the preferred courses, course sequences, and purposes which should be addressed in Virginia industrial arts programs. However, the model curriculum plan did not establish exact knowledge, skills, and attitudes which all learners should possess as they exit particular programs.

The purpose of the following competency catalog of tasks is to establish a basis for program content selection and criterion levels from which one may measure to see if individual learners have achieved a minimal level of competence through study in a particular course. In this manner a means to improve education and its accountability to citizenry can be designed based upon the identification and attainment of prespecified outcomes for the industrial arts content area. Although this catalog is designed and presented in a sequencial order of task statements, it does not mean that it must be structured into local programs in this order. Individual instructors may choose to restructure the sequence of competency tasks to meet local needs.

In preparing this catalog considerable research and validation was undertaken to specify those minimal tasks which every learner enrolling in the course should be able to perform. The format of this and other catalogs includes the following areas: area of competence, content/concept, task, criterion referenced measure, and performance guides. The area of competence identifies the industrial arts course for which the particular task was prepared. Content/concept identifies the sub-area with which the particular task is associated. The task is the knowledge, skills or attitudes which the learner should possess after instruction in the industrial arts class. Criterion references measures are means to identify if the learner can successfully perform the stated task and finally, performance guides are sub-tasks which lead to the development of the knowledge, skills and attitudes

identified in the tasks. These areas are illustrated in Table 1. It should be noted that performance objectives have been omitted from the catalogs of tasks. This was done to allow individual instructors to develop objectives they see necessary to meet the local learning environment.

In Table 2 is identified the location of this course in the total program of industrial arts for Virginia. Other competency catalogs are contained in this publication and the remaining catalogs may be obtained from the Industrial Arts Education Service, Division of Vocational Education, Department of Education, P.O. Box 60, Richmond, Virginia 23216.

FORMAT DESCRIPTION

AREA OF COMPETENCE Identifies the industrial arts course for which the particular task was prepared

CONTENT CONCEPT Identifies the sub-area which the particular task is associated

TASK Identifies the knowledge, skills, or attitudes which the learner should possess after completing instruction in the industrial arts class.

CRITERION REFERENCED MEASURE The means to identify if the learner can successfully perform the stated task.

PERFORMANCE GUIDES Identifies sub-tasks which lead to the development of the knowledge, skills, and attitudes identified in the tasks.

TABLE 1

The Industrial Arts Curriculum

Level	Goal	Program
Elementary School	[illegible]	Industrial Arts activities integrated within the elementary curriculum
Middle or Junior High School	[illegible]	Exploring Technology Modern Industry Construction Manufacturing
High School	[illegible]	Communication Technology Materials and Processes Technology Power and Transportation Technology Architectural Drawing Basic Technical Drawing Electricity and Electronics Energy and Power Engineering Drawing Graphic Communications Metals Technology Woods Technology
	[illegible]	General Industrial Arts Industrial Crafts

TABLE 1

CONSTRUCTION

Course Code
8431 (36 weeks)
8432 (18 weeks)

COURSE DESCRIPTION:

Students design, build and test scale models structures. Students work with projects that help them to understand the jobs of architects, carpenters, electricians, plumbers, surveyors, contractors, masons, design engineers and a variety of other construction careers.

COURSE GOALS:

Experiences and activities of this INDUSTRIAL ARTS course will enable student to:

1.1 identify and describe the functions of management technology as it relates to the construction of a project on a site.

1.2 recognize and cite evidence of the effects of construction technology on society.

1.3 demonstrate a basic knowledge of the variety of career opportunities and job requirements in the construction industry.

2.1 demonstrate a basic proficiency in the safe handling of tools and techniques used in the construction industry.

2.2 apply principles of planning and design considerations of materials to prepare working drawings.

2.3 solve meaningful problems and relate the problem solving processes to other in-school problematic situations.

3.1 exhibit a positive attitude toward safe working conditions and practices while using tools and materials.

3.2 express positive opinions concerning the influence of the construction industry on society.

3.3 demonstrate an understanding and appreciation of the value of work in one's life.

SUGGESTED TOPICAL OUTLINE:

**I. Managing Construction
- A. Beginning the Project
- B. Designing and engineering construction projects.
- C. Selecting a builder

**II. Applying Technology to People
- A. Working as a contractor
- B. Collective bargaining
- C. Hiring construction personnel
- D. Training and educating for construction.
- E. Working conditions
- F. Advancing in construction
- G. Handling grievances
- H. Mediating and arbitrating
- I. Striking

III. Construction Production Technology
- A. Site preparation
- B. Setting foundations
- C. Building superstructures
- D. Installing utilities
- E. Enclosing framed superstructures

F. Finishing the project
G. Completing the site
H. Servicing the property

IV. The Industrial Arts Student Association: Construction Projects in the Community.

** Included in 36-week course

TASK # 1

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Studying Construction Technology

TASK: Identify Industry as one Part of Economic Technology.

CRITERION REFERENCED MEASURE: Describe how technology helps to lead to the development of an economic system.

PERFORMANCE GUIDES:

1. State why people specialize in their work.
2. Develop a written report on how technology and specialization have had an impact upon your standard of living.
3. Name three examples of materials which are:
   a. extracted
   b. reproduced
   c. constructed
   d. manufactured

TASK # 2

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Studying Construction Technology

TASK: Explain why Construction is a Managed Production System.

CRITERION REFERENCED MEASURE: Name the main functions of management, personnel and reproduction technology including planning, organizing, and controlling; hiring, training, and advancement; and preprocessing, processing, and post-processing.

PERFORMANCE GUIDES:

1. Define construction technology.
2. Identify the three main functions of management (planning, organizing, and controlling).
3. Identify the three main functions of personnel (hiring, training, advancement).
4. Identify the three main functions of production (preprocessing, processing, and post-processing).
5. View a film on the construction industry and observe the management, personnel, and production practices.
6. Listen to a guest speaker from the construction industry.
7. Visit a nearby construction site.

TASK # 3

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Beginning the Construction Project

TASK: Identify the Crucial Elements in Determining the Need for a Construction Project.

CRITERION REFERENCED MEASURE: Be able to list and explain the terms initiator, feasibility, and research as they relate to decisions to build or not to build.

PERFORMANCE GUIDES:

1. Attend a public meeting considering a construction project.
2. Conduct a feasibility study of a proposed building site.
3. Gather data pertaining to a building site.
4. Complete written and reading assignments.
5. Collect and analyze newspaper clippings pertaining to a construction project.

TASK # 4

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Managing Construction

TASK: Describe Developmental Steps Necessary for Beginning a Project.

CRITERION REFERENCED MEASURE: List and describe an orderly sequence necessary for the beginning of a project including a description of initiator, feasibility study, research, and decision to build.

PERFORMANCE GUIDES:

1. Read given assignments.
2. Learn what is necessary to build a project such as research, feasibility study, initiator, etc.
3. Given a project to build develop a plan of procedure.

TASK # 5

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Site Selection

TASK: Discuss the Major Financial Criteria Associated with Selecting a Building Site.

CRITERION REFERENCED MEASURE: Describe and relate the following criteria when considering a building site: (1) cost of construction, (2) cost of operation, and (3) cost per unit of production.

PERFORMANCE GUIDES:

1. Read assignments on site selection.
2. Define site.
3. Describe the following factors considered in site selection: (1) raw material availability, (2) labor, (3) climate, (4) physical characteristics, (5) transportation, (6) utilities, (7) community environment, and (8) land restrictions.
4. Select a project and develop a table of site feasibility factors using the above considerations.
5. Develop a list of costs associated with site selections.

TASK # 6

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Managing Construction

TASK: Discuss Factors Involved when Buying Real Estate.

CRITERION REFERENCED MEASURE: Identify and explain each of the following terms associated with buying real estate: boundaries, improvements, natural features, easements, encroachments, right of way and condemnation.

PERFORMANCE GUIDES:

1. Listen to instructor's lecture concerning factors when buying real estate.
2. Name the kinds of information recorded on a deed for a building.
3. Explain why accurate measurement is essential in surveying.
4. Explain each of the following terms: boundaries, improvements, natural features, condemnation, easements, and encroachment as they relate to buying real estate.
5. Listen to a guest speaker on real estate in the local community.
6. Complete forms associated with selling and acquiring real estate in the local community (i.e. listing agreement, purchase/sales contract, or insurance forms).

TASK # 7

[redacted] OF COMPETENCE: Construction

CONTENT/CONCEPT: Surveying and Mapping

TASK: Describe the Steps used in the Process of Surveying and Mapping.

CRITERION REFERENCED MEASURE: List and explain the following steps in surveying and mapping: (1) researching existing monuments, (2) finding new locations and elevations, (3) plotting data, and (4) making maps and drawings.

PERFORMANCE GUIDES:

1. Read assignments on surveying and mapping.
2. List the natural features that may have existing on your school property.
3. Define the following terms: survey parties, bench maker, topographic map, elevation, triangulation, vertical control, horizontal control, grid and contour.
4. Develop a drawing using information from elevations using either the grid system or contours.
5. Conduct a title search of property in the local community.
6. Conduct a physical and paper survey of a selected site.

TASK # 8

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Managing Construction

TASK: Outline the Architectural Design Process Considering the Major Criteria Associated with Site Selection.

CRITERION REFERENCED MEASURE: Develop a site plan for various construction projects in a community to include homes, businesses, road ways and super highways and identify the criteria associated with site selection for each including feasibility study, criteria for selecting site, and selection by management.

PERFORMANCE GUIDES:

1. Develop a list of major site considerations.
2. Explain the relationship of various construction projects to the above criteria.
3. Develop designs and/or models compatable with the criteria for site selection.

TASK # 9

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Managing Construction

TASK: Identify the Various Jobs Available Within an Architectural Firm.

CRITERION REFERENCED MEASURE: Develop a list of the career occupations available in an architectural firm.

PERFORMANCE GUIDES:

1. Identify and define the various careers and occupations in an architectural firm such as draftsmen, designers, surveyors, etc.
2. Select an occupation and develop a research paper containing information to present to the class.
3. Listen to a representative from a local architectural firm.

TASK # 10

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Soil Testing

TASK: Identify Soil Properties

CRITERION REFERENCED MEASURE: Describe how the soil in your community may affect the following: (1) water supply, (2) building foundations, (3) basements or roadways, (5) drainage, and (6) plant growth.

PERFORMANCE GUIDES:

1. Read given assignments.
2. Analyze local soil samples for clay, sand, and water absorption.
3. Test two soil samples of clay and sand to find out if excavation facing is needed.
4. Analyze the soil strengths of clay and sand.
5. Become familiar with the identification and classification of various soils.

TASK # 11

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology

TASK: Describe Methods of Soil Modification.

CRITERION REFERENCED MEASURE: Recall, identify and explain the following means of soil modification: dewatering, compaction and mixing.

PERFORMANCE GUIDES:

1. Listen to instructor's lecture describing the following measures for soil modification: dewatering, compaction, and mixing.
2. Cite examples within your community of the above means of soil modification.
3. Become familiar with the various methods of soil modification.

TASK # 12

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Managing Construction

TASK: Discuss Site Location Factors When Considering Where to Build.

CRITERION REFERENCED MEASURE: Describe site location factors of natural energy sources, transportation, raw materials, climate, schools, churches, and shopping facilities when considering where to build.

PERFORMANCE GUIDES:

1. Given a project to build and different locations, choose the best location when considering the factors of natural energy sources, available transportation, supply of raw materials, and area climate (take into account materials used).
2. Discuss construction techniques that might be used in building construction projects (consider past community projects).
3. Develop a table of site feasibility factors.

TASK # 13

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Working Drawings

TASK: Name the types of Working Drawings Needed to Explain the Layout and Construction Details of Projects.

CRITERION REFERENCED MEASURE: Develop a working drawing of a construction project to scale.

PERFORMANCE GUIDES:

1. Participate in discussion concerning working drawings.
2. State two reasons why working drawings must be dimensioned as well as drawn to scale.
3. Given the design requirements for a structure, draw the foundation plan to scale and dimension the drawing.
4. Develop a building plan for a house that is to be occupied by an average size family in your community.
5. Develop plans that could be used for a commercial or industrial building in your community.

TASK # 14

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Introduction to Drawing

TASK: Developing Isometric Drawings.

CRITERION REFERENCED MEASURE: Develop different multi-view drawings of construction projects.

PERFORMANCE GUIDES:

1. Listen to instructor's introduction of lesson pertaining to working drawings.
2. Given drawing equipment develop different multiview drawings using prescribed techniques.
3. Observe professional blueprints of your school and home.
4. Recall and practice procedures when developing models or drawing.
5. Collect and display different types of working drawings.

TASK # 15

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Applying Technology to People

TASK: Identify Major Responsibilities of a Contractor.

CRITERION REFERENCED MEASURE: Identify and discuss the requirements associated with becoming a general contractor including advertising, receiving bids, opening bids, awarding contracts, bonding, agreement, and notice to proceed.

PERFORMANCE GUIDES:

1. Discuss the significance of decisions that a contractor may make.
2. Listen to the instructor's lecture explaining why ethics are important to a contractor.
3. Identify the procedure for obtaining a contractor's license.
4. Describe contractor responsibilities and liabilities, both moral and legal, to consumers.
5. Investigate local licencing requirements and take exams necessary to become licensed.

TASK # 16

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Applying Technology to People

TASK: Examine the Work of a Subcontractor.

CRITERION REFERENCED MEASURE: Analyze the responsibilities and work roles associated with being a subcontractor.

PERFORMANCE GUIDES:

1. Listen to the instructor's lecture explaining the work of a subcontractor.
2. Compile a list of responsibilities a subcontractor might have once under contract.
3. Analyze and describe some of the problems associated with being a subcontractor.

TASK # 17

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Applying Technology to People

TASK: Identify the Related Careers and Occupations in Construction.

CRITERION REFERENCED MEASURE: Describe the duties of workers in the occupations in construction.

PERFORMANCE GUIDES:

1. Identify and define the various careers and occupations in construction such as carpentry, plumber, mason, electrician, etc.
2. Develop a list of occupations in construction noting salary, education and fringe benefits.
3. Identify and make arrangements for a guest speaker (could be connected to career day).

TASK # 18

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - General Contracting Organization

TASK: Define the Function of a General Contracting Company.

CRITERION REFERENCED MEASURE: Describe the work roles of officials and workers in a general contracting company.

PERFORMANCE GUIDES:

1. List officers and duties.
2. Make contracts and subcontracts and complete work.
3. Define goals of construction companies.
4. Visit a company and list work roles of people in the company.
5. Participate in extra/co curricular construction projects.
6. Participate in local, state, national events related to club activities.
7. Become members of local contracting organization, attend meeting, and report to class.

TASK # 19

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology

TASK: Compile a List of Common Site Clearing Practices.

CRITERION REFERENCED MEASURE: List and describe some of the common site clearing practices used in industry including demolishing, salvaging, cutting, burning, earth moving, and disposing.

PERFORMANCE GUIDES:

1. Determine what is meant by site factors.
2. Study as many site clearing practices as possible such as demolishing and salvaging.
3. Describe the elements effecting the selection of clearing methods.
4. Participate in a field trip to a local site.

TASK # 20

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology

TASK: Describe the Methods of Earthmoving.

CRITERION REFERENCED MEASURE: Identify and describe the following methods of earthmoving including excavating, trenching, dredging, and tunnel, bulkpit, and vertical excavating.

PERFORMANCE GUIDES:

1. Define the term earthmoving.
2. List and describe the following methods of excavating land: trenching, dredging, tunneling, and bulkpit and vertical excavation.
3. Locate and observe sites which are being cleared by one of the preceeding methods.

TASK # 21

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Labor Unions in Construction

TASK: Describe Major Unions Associated with the Construction Industry and Explain their Effect on the Construction Industry.

CRITERION REFERENCED MEASURE: Identify local union chapters, their relationship to national organizations, and explain their goals and objectives.

PERFORMANCE GUIDES:

1. Compare and contrast the working situation of organized and non-organized labor in construction industry.
2. Explain the advantage and disadvantages of becoming a member of/or staying out of unions.
3. Listen to a lecture on organized labor and its effect on construction and develop a position paper.
4. Identify the percent of local labor affiliated with and not affiliated with unions.
5. Explain how unions work to protect the members of their organization.
6. Role play various phases of union/management relationships such as grievances, collective bargaining, and strikes.

TASK # 22

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Governmental Regulation of the Construction Industry.

TASK: Describe the effect of OSHA and Environmental Impact Studies.

CRITERION REFERENCED MEASURE: Explain the meaning and impact of OSHA standards and environmental impact studies on the construction industry.

PERFORMANCE GUIDES:

1. Listen to a representative of various agencies and develop a list of major concerns about safety and the environmental issues.
2. View a film or visit a site and identify the effect of standards on the work being conducted.
3. Develop a sinario of what may happen without regulation in safety and environmental impact.
4. Visit a site and develop an environmental impact study.

TASK # 23

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology

TASK: Describe the Various Types of Foundations.

CRITERION REFERENCED MEASURE: Identify and explain the following types of foundations: continuous, grade beam, spread, and mat foundations.

PERFORMANCE GUIDES:

1. Read assignments on foundations.
2. Cite examples of the following foundations: continuous, grade beam, spread, and mat foundations.
3. Develop diagrams of a foundation labeling all parts.
4. State reasons for selecting a particular foundation over another when constructing a project.
5. Identify the common materials used to construct most foundations.

TASK # 24

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Nomenclature of Carpenters Tools

TASK: Identify the Common Tools Associated with the Carpentry Occupation.

CRITERION REFERENCED MEASURE: Define the common tools used in residential house construction and list the safe use of each.

PERFORMANCE GUIDES:

1. View a film on house construction and present an analysis of the kinds of tools used and methods used.
2. After a lecture/demonstration, select and use carpenters tools to build a wood frame dwelling or model.
3. Visit a construction job site and list the tools being used.
4. Develop a display of carpenters tools - past and present.
5. Prepare a list of safety rules for tool usage and post them in the class.

TASK # 25

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Safety

TASK: Explain the Importance of Safety Procedures and Exhibit such Procedures when Conducting Laboratory Activities.

CRITERION REFERENCED MEASURE: Develop a list of ten safety rules related to construction technology.

PERFORMANCE GUIDES:

1. Learn the rules of conduct and general safety involving machines.
2. Pass written safety test.
3. Proficiency tests on the operation of machines and equipment.
4. Compile a list of reasons why safety is important in any work area.

TASK # 26

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Footings and Foundations.

TASK: Demonstrate how to Proceed in Setting a Footing and Foundation.

CRITERION REFERENCED MEASURE: Perform the proper sequence for setting a foundation.

PERFORMANCE GUIDES:

1. State reasons for the production of foundations.
2. Identify the parts of a foundation and describe their function.
3. Observe instructor demonstration/lecture on foundations and footings.
4. Construct a model footing foundation under the instructor's supervision.

TASK # 27

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Building Forms

TASK: Identify Concrete [redacted]ms.

CRITERION REFERENCED MEASURE: Identify concrete surfaces that were shaped using various forms and explain if these were foundation forms or forms for a superstructure.

PERFORMANCE GUIDES:

1. Read assignment on building forms.
2. Observe teacher demonstration on building forms.
3. Participate in a group activity on building a footing form and a footing base.
4. Label the above model form.
5. Identify concrete surfaces that were shaped against forms.

TASK # 28

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Building Superstructures

TASK: Recognize Steel, Concrete, and Wooden Frames.

CRITERION REFERENCED MEASURE: Compare the advantages and disadvantages of steel, concrete and wooden frames in building superstructures.

PERFORMANCE GUIDES:

1. Give reasons why wood framing is used for structures such as homes.
2. List some advantages of using precast concrete shapes and give reasons why more or less precast structural members will be used in the future.
3. Compare the advantages of steel framed superstructures.
4. Build forms for making concrete frames.

TASK # 29

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Superstructures

TASK: Identify the Component parts of a Residential Superstructure.

CRITERION REFERENCED MEASURE: Identify and list the following component parts of a residential superstructure - joists, headers, subfloor, bottom plate, studs, top plate, double plate, sill, rafters, gussets, and ridge board.

PERFORMANCE GUIDES:

1. Read assignments on superstructure components.
2. Participate in discussion on superstructures.
3. Construct a model of a wall section.
4. Label the above model wall section.

TASK # 30

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Utility Services

TASK: Identify Utilities Services.

CRITERION REFERENCED MEASURE: Examine and explain the following utility services: water, waste disposal, electricity, gas and communications.

PERFORMANCE GUIDES:

1. Read assignments on installing utilities.
2. Listen to the instructor's description of the various utility services incorporated in your school.
3. Given the term utility systems, define the concept.
4. Name what utilities service your home and name other utilities which are used in your community.
5. Describe the importance and function of utility services in your local region for private, personal and public use.

TASK # 31

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology – Wiring Systems

TASK: Describe Electrical Power Systems in Residential, Industrial and Commercial Buildings.

CRITERION REFERENCED MEASURE: Develop a model wiring system as may be used in a industrial, residential or commercial structure.

PERFORMANCE GUIDES:

1. Read assignment on electrical power systems.
2. Learn the components of the outside and inside construction electrical power systems.
3. Demonstrate how a structure is prepared for wiring.
4. Explain the installation and utilization of electrical power systems.
5. Design a wiring system for a selected structure.
6. Install a wiring system in a model structure.

TASK # 32

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Pipeline

TASK: Examine the Procedure in Installing Piping Systems.

CRITERION REFERENCED MEASURE: List and explain the following aspects associated with the installation of a piping system: personnel, records, earth working, assembling, and setting lines.

PERFORMANCE GUIDES:

1. Name two pipeline systems in your community.
2. Analyze the major steps in installation of a piping system from personnel to setting lines.
3. Develop a file or display that visually depicts the installation of a piping system.

TASK # 33

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Plumbing

TASK: Identify Major Kinds of Plumbing Systems.

CRITERION REFERENCED MEASURE: List and describe the usages of plumbing systems including fresh water, hot water, water for fire protection, gases and sewage.

PERFORMANCE GUIDES:

1. Name two separate piping systems required for most structures.
2. List four materials carried through plumbing systems.
3. Observe teacher demonstration on how pipe is cut and threaded for use in plumbing a structure.
4. Perform the instructor's demonstration in cutting, joining, and assembling pipe.

TASK # 34

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Utility Distribution

TASK: Identify Utility Distribution Networks.

CRITERION REFERENCED MEASURE: Describe and classify the following utility distribution networks: ducting, piping, and wiring.

PERFORMANCE GUIDES:

1. Listen to instructor's lecture on utility distribution networks.
2. Discuss how utility systems distribute materials and energy from one structure to another.
3. Discuss how materials and energy carried by utilities can be converted into other forms.
4. Cite examples of the following distribution networks: ducting, piping and wiring.
5. Explain the importance of codes when selecting materials and installing these systems.

TASK # 35

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Drainage

TASK: Identify the Component Parts of a Drainage System.

CRITERION REFERENCED MEASURE: Explain the following major component parts of storm and sanitary drainage systems: vents, trays, cleanouts, and interceptors.

PERFORMANCE GUIDES:

1. Read given assignments on drainage systems.
2. Define the following parts of a drainage system:
   1. vents
   2. trays
   3. cleanouts
   4. interceptors
3. Develop or draw a model drainage system.

TASK # 36

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Electrical Careers

TASK: Evaluate the Related Careers and Occupations in a Electric Utility Company.

CRITERION REFERENCED MEASURE: Identify career occupations available in a electric company and evaluate their potential on skill required, salary, and working conditions.

PERFORMANCE GUIDES:

1. Identify and define the various careers and occupations in a electric company such as: engineers, contractors, craftsmen, linemen and wiremen.
2. Observe lectures, interviews, job surveys, and media sources on careers and occupations in a electric utility company.
3. Evaluate your information to arrive at a conclusion on selected jobs.
4. Listen to guest speaker from local electric company.
5. Gather literature from newspapers and other sources that deal with careers in the electric company and present a summary to the class.

TASK # 37

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Solar Energy

TASK: Describe the Component Parts of Active and Passive Solar Systems.

CRITERION REFERENCED MEASURE: Define the terms active and passive solar systems and list the advantages/disadvantages of each.

PERFORMANCE GUIDES:

1. Conduct research regarding the use and application of active and passive solar systems in the construction industry.
2. Develop working models of each system and conduct experiments regarding performance and efficiency.
3. Develop lists of structural requirements, insulation requirements, and advantages/disadvantages of active/passive solar systems.

TASK # 38

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Floor Coverings

TASK: List Types of Materials used for Flooring.

CRITERION REFERENCED MEASURE: Identify at least five different flooring materials used in construction.

PERFORMANCE GUIDES:

1. Name the material used to cover the floor in your shop laboratory and tell why it is the same or different than flooring material in rooms in your own home.
2. Listen to instructor lecture on various flooring materials and adhesives.
3. Identify at least five different flooring materials.
4. Install floor coverings (i.e. tile, wood, carpet, etc.) as part of a laboratory activity.

TASK # 39

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Insulation

TASK: Explain the Term Insulation.

CRITERION REFERENCED MEASURE: Define insulation and compile a list of the various types of insulation used in industry today.

PERFORMANCE GUIDES:

1. Define insulation.
2. Study as many types of insulation used in the construction industry.
3. Compile a list of the various types of insulation.
4. Look up the "R" rating for several building materials and write some conclusion regarding their effectiveness as insulation.
5. Develop a demonstration model to show the effect of various insulations on conduction, convection and radiation.

TASK # 40

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Electrical Accessories

TASK: Describe the Installation of Electrical Accessories.

CRITERION REFERENCED MEASURE: Demonstrate skill in installing electrical accessories that are needed in a superstructure including receptacles, switches, and lights.

PERFORMANCE GUIDES:

1. Name the various electrical accessories installed in a superstructure.
2. Observe instructor's lecture/demonstration for installing electrical fixtures.
3. Follow the procedures demonstrated to install receptacles, a switch, and a light.

TASK # 41

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Natural Energy Sources

TASK: Compare and Contrast Construction Techniques in Utilizing Natural Energy Sources.

CRITERION REFERENCED MEASURE: Analyze construction techniques and develop conclusions on their effectiveness in using natural energy efficiently in residential and commercial buildings.

PERFORMANCE GUIDES:

1. Listen to the instructor's lecture describing the differences between construction techniques.
2. Record the amount of efficiency of each technique.
3. List conclusions in comparing the efficiency of the above techniques.
4. Discuss the importance of location and orientation to maximize the effect of natural energy sources.

TASK # 42

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Completing Worksites

TASK: Identify Activities Associated with Completing the Work Site.

CRITERION REFERENCED MEASURE: Develop a brief report on the activities associated with completing a work site including trimming, painting, installing accessories and land scaping to obtain a certificate of occupancy.

PERFORMANCE GUIDES:

1. Read given assignments.
2. Study the finishing stages of a work site.
3. Develop a written report (50 words minimum) on the activities associated with completing a work site such as landscaping.
4. Learn the purposes for site completion.
5. List several tasks that had to be done to finish a local construction project in order to get a certificate of occupancy.
6. Describe two examples of finishing practices associated with completing a residential, commercial, or industrial work site.

TASK # 43

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Production Technology - Post Processing

TASK: Describe the term Post Processing.

CRITERION REFERENCED MEASURE: Become familiar with the practices involved in post processing as they relate to servicing and maintenance of a construction project.

PERFORMANCE GUIDES:

1. Learn the practices of servicing a product.
2. Be able to define post processing.
3. Familiarize yourself with post processing practices as they relate to your home.
4. Develop a display that depicts various activities associated with post processir servicing/maintaining a completed construction project.

TASK # 44

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: Applying Technology to People

TASK: Identify the Major Divisions of Construction Occupations.

CRITERION REFERENCED MEASURE: Examine the three major divisions of construction occupations including a) structural trades, b) finishing trades, and c) mechanical trades.

PERFORMANCE GUIDES:

1. Identify various occupations in each of the following divisions: (1) structural trades, (2) finishing trades, and (3) mechanical trades.
2. Discuss the various occupations in each of these divisions.
3. Select one (or more) occupations and prepare a follow-up report.

TASK # A.I.A.S.A.

AREA OF COMPETENCE: Construction

CONTENT/CONCEPT: In Class Industrial Arts Student Association

TASK: Participation (involvement) in a democratic organization with activities using course content.

CRITERION REFERENCED MEASURE: Participate with other students in organized activities using industrial resources, leadership or followership, service or enterprise projects and recognition for workmanship.

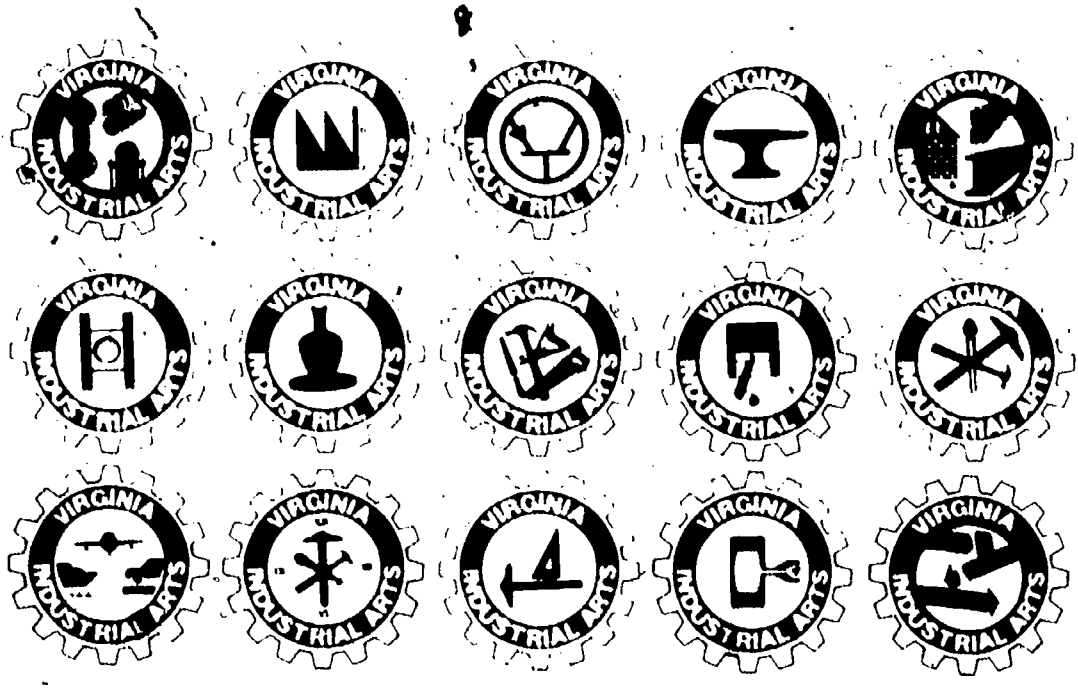
PERFORMANCE GUIDES:

1. Organize class into personnel system for democratic decision making and leader/follower development.
2. Invite speakers to class and use resources of industry and technology from the community.
3. Carry out worthy group activities and projects to improve or serve school or community.
4. Operate an enterprise system to produce item of economic value.
5. Encourage competition in areas of course to motivate and recognize achievement.

NOTE: These performance guides are expanded in the publication titled Student Association Activities in Industrial Arts Instruction available from the Industrial Arts Service, Virginia Department of Education, Richmond, Virginia 23216.

A CATALOG OF TASKS FOR COMPETENCY-BASED INSTRUCTION IN

Manufacturing



Industrial Arts Education Service
Department of Education
Commonwealth of Virginia
Richmond, Virginia 23216
1979

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Was Prepared At
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INTRODUCTION

In the summer of 1977, The Industrial Arts Curriculum K-12 was introduced. This plan outlined the preferred courses, course sequences, and purposes which should be addressed in Virginia industrial arts programs. However, the model curriculum plan did not establish exact knowledge, skills, and attitudes which all learners should possess as they exit particular programs.

The purpose of the following competency catalog of tasks is to establish a basis for program content selection and criterion levels from which one may measure to see if individual learners have achieved a minimal level of competence through study in a particular course. In this manner a means to improve education and its accountability to citizenry can be designed based upon the identification and attainment of prespecified outcomes for the industrial arts content area. Although this catalog is designed and presented in a sequencial order of task statements, it does not mean that it must be structured into local programs in this order. Individual instructors may choose to restructure the sequence of competency tasks to meet local needs.

In preparing this catalog considerable research and validation was undertaken to specify those minimal tasks which every learner enrolling in the course should be able to perform. The format of this and other catalogs includes the following areas: area of competence, content/concept, task, criterion referenced measure, and performance guides. The area of competence identifies the industrial arts course for which the particular task was prepared. Content/concept identifies the sub-area with which the particular task is associated. The task is the knowledge, skills or attitudes which the learner should possess after instruction in the industrial arts class. Criterion references measures are means to identify if the learner can successfully perform the stated task and finally, performance guides are sub-tasks which lead to the development of the knowledge, skills and attitudes

identified in the tasks. These areas are illustrated in Table 1. It should be noted that performance objectives have been omitted from the catalogs of tasks. This was done to allow individual instructors to develop objectives they see necessary to meet the local learning environment.

In Table 2 is identified the location of this course in the total program of industrial arts for Virginia. Other competency catalogs are contained in this publication and the remaining catalogs may be obtained from the Industrial Arts Education Service, Division of Vocational Education, Department of Education, P.O. Box 6Q, Richmond, Virginia 23216.

FORMAT DESCRIPTION

AREA OF COMPETENCE Identifies the industrial arts course for which the particular task was prepared.

CONTENT CONCEPT Identifies the sub-area which the particular task is associated

TASK Identifies the knowledge, skills, or attitudes which the learner should possess after completing instruction in the industrial arts class.

CRITERION REFERENCED MEASURE The means to identify if the learner can successfully perform the stated task.

PERFORMA[illegible] GU[illegible] Identifies sub-tasks which lead to the development of th[illegible]ills, and attitudes identified in the tasks.

TABLE 1

The Industrial Arts Curriculum

Level	Goal	Program
Elementary School	Learning Reinforcement	Industrial Arts activities integrated within the elementary curriculum
Middle or Junior High School	Orientation and Exploration	Exploring Technology Modern Industry Construction Manufacturing
High School	Technical	Communication Technology Materials and Processes Technology Power and Transportation Technology Architectural Drawing Basic Technical Drawing Electricity and Electronics Energy and Power Engineering Drawing Graphic Communications Metals Technology Woods Technology
	Personal Enrichment	General Industrial Arts Industrial Crafts

TABLE 2

MANUFACTURING

Course Code
8425 (36 weeks)
8426 (18 weeks)

COURSE DESCRIPTION:

Students organize and operate a manufacturing company to explore careers and work habits typical of the American industry's free enterprise system. Students make projects or products in the 'company' which can be sold. Students experience the work of planners, designers, engineers, machine operators, personnel managers and a variety of other manufacturing careers.

COURSE GOALS:

Experiences and activities of this INDUSTRIAL ARTS course will enable the student to:

1.1 describe the need for tooling in mass manufacturing.

1.2 identify the different methods of separating, forming, machining, assembling and finishing materials.

1.3 exhibit basic knowledge of career opportunities in the manufacturing industry.

2.1 apply measurement systems used in the manufacture of a product.

2.2 use a managed production system to produce a product.

2.3 perform the basic skills in several areas of manufacturing.

3.1 relate the necessity of selling, distributing, and servicing a manufactured product.

3.2 plan wisely before producing goods and services.

3.3 relate the necessity for a variety of jobs in the manufacturing industry.

SUGGESTED TOPICAL OUTLINE:

I. Introduction to Manufacturing

II. Manufacturing Management Technology
- A. Identify Consumer Demands
- B. Research and Developing
- C. Designing Manufactured Goods
- D. Three-dimensional models
- E. Engineering the Product
- F. Planning Production
- G. Measuring Work
- H. Production Control

III. Manufacturing Personnel Technology

IV. The Enterprise

**V. Industrial Inputs
- A. Materials
- B. Energy

**VI. Industrial Processes
- A. Forming
- B. Separating
- C. Combining

**VII. Distribution and Servicing

** Included in 36 Week Course

TASK # 1

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Introduction to Manufacturing

TASK: Demonstrate an Understanding of Technology.

CRITERION REFERENCED MEASURE: List several definitions of technology as related to contemporary industry.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. List all definitions in the dictionary.
5. Check an encyclopedia for other definitions.
6. Write student's own definition.

TASK # 2

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Introduction to Manufacturing

TASK: Demonstrate an Understanding of the Evolution of Manufacturing.

CRITERION REFERENCED MEASURE: Describe the evolution of manufacturing during the following stages of history - Greek and Roman Empires, the middle ages, the renaissance, the industrial revolution, and contemporary society.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. List some of the earliest kinds of skill and knowledge.
4. Describe the industrial revolution.
5. Describe the Renaissance.
6. Describe the middle ages and the spread of technology from that period.
7. Participate in class discussions.
8. Construct evolution chart.
9. Participate in a simple, primitive manufacturing process.
10. Visit a museum.

TASK # 3

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Introduction to Manufacturing

TASK: Demonstrate an Understanding of the Relationship of the Economic System to the Manufacturing System.

CRITERION REFERENCED MEASURE: Describe the economic system and its relationship to the manufacturing system including - input, process, output, natural resources, human resources, finance, capital, energy, knowledge, management practices, production practices, and personnel practices.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentation.
3. Describe supply and demand.
4. List the inputs to manufacturing.
5. Describe the three manufacturing processes.
6. Participate in class discussions.
7. Develop a graph of the G.N.P. for the last five years.
8. Locate on a map where major deposits of natural resources are located in the world.

TASK # 4

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Manufacturing Technology

TASK: Demonstrate an Understanding of the Broad Spectrum of Manufacturing Technology.

CRITERION REFERENCED MEASURE: List and describe the elements of management technology including - planning, organizing, controlling, production technology, preprocessing, processing, post-processing, personnel technology, hiring, training, working, advancing, and retiring.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Make lists of the three kinds of manufacturing technology.
4. Participate in class discussions.

TASK # 5

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Management Technology

TASK: Demonstrate an Understanding of Management Stages.

CRITERION REFERENCED MEASURE: List and discuss the six stages of management including identifying, designing and engineering, planning, tooling up, getting inputs, and setting up for production.

PERFORMANCE GUIDES:

1. Read the text assignments.
2. Observe the class presentations.
3. Participate in the class discussions.
4. Write out definitions of the six stages of management.
5. Develop a short paper displaying the progression of the stages of management.

TASK # 6

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Management Technology

TASK: Demonstrate an Understanding of the Occupational Levels of Industrial Management.

CRITERION REFERENCED MEASURE: Describe the occupational levels of management usually found in industry including - the president, vice president, general manager, personnel director, factory manager, general foreman, foreman, and various workers.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in the class discussions.
4. Write out definitions of the levels of management.
5. Participate in role playing activities related to the many levels of management.
6. Discuss training, salaries, and responsibilities of various levels of industrial management.

TASK # 7

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Management Technology

TASK: Demonstrate an Understanding of the Different types of Organization, Ownership, and Profit Taking Found in Manufacturing Enterprises.

CRITERION REFERENCED MEASURE: Define proprietorship, partnership, and corporation and give the advantages and disadvantages of them in terms of legal responsibility, profit distribution, personnel structure differences, and stocks.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in the class discussions.
4. Write definitions of proprietorship, partnership, and corporation.
5. Make a list of the advantages and disadvantages of the different types of ownership.
6. Set up a mock corporation, and compare it to the other types of ownership.

TASK # 8

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Identifying Consumer Demands

TASK: Develop Skill in Identifying Consumer Demands.

CRITERION REFERENCED MEASURE: Demonstrate skill in identifying consumer demands including retrieving and describing information about market potential, population groups, trends, preferences, competition, and volume.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in the class discussions.
4. List marketing plan elements.
5. List consumer demand entities.
6. Conduct a sample market survey.

TASK # 9

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Researching and Developing

TASK: Demonstrate an Understanding of Research and Development.

CRITERION REFERENCED MEASURE: Demonstrate an understanding of researching and developing in terms of retrieving, describing, experimenting, designing, and engineering.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. List and describe the elements of researching.
5. List and describe the elements of developing.
6. Research information needed to manufacture a selected product.

TASK # 10

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Designing Manufactured Goods

TASK: Demonstrate an Understanding of Designing.

CRITERION REFERENCED MEASURE: Describe product designing procedures in terms of concepts, function, basic form and dimensions, refinements, producibility, rendering, models, and drawings.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in the class discussions.
4. Practice making sketches and drawings.
5. Inspect and critique the design of several manufactured goods.

TASK # 11

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Three-Dimensional Models

TASK: Develop Skill in Making Three-Dimensional Models.

CRITERION REFERENCED MEASURE: Demonstrate skill in making mock-ups including a paste-up, an appearance mock-up, and a hard mock-up.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. Practice making mock-ups.
5. List the uses for mock-ups.

TASK # 12

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Engineering the Product

TASK: Develop an Understanding of Product Engineering Processes.

CRITERION REFERENCED MEASURE: Demonstrate an understanding of the product engineering processes including designing power elements, mechanical assemblies, and other interior parts and making working drawings, building prototypes, composing technical writings and illustrations.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. Practice making drawings of power elements and mechanical assemblies.
5. Practice technical writing and illustrating.

TASK # 13

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: The Prototype

TASK: Demonstrate an Understanding of the Prototype.

CRITERION REFERENCED MEASURE: Define prototype, and discuss the testing of the prototype, the need for a prototype, field testing the prototype, and preproduction planning.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. Practice making a prototype.
5. Use the prototype production information in preproduction planning.
6. Test a prototype.

TASK # 14

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Planning Processes

TASK: Demonstrate an Understanding of Planning Processes.

CRITERION REFERENCED MEASURE: Describe the planning processes including - listing processes and operations, choosing work stations, analyzing work flow, and analyzing operation methods.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. List the people who do the planning.
5. Set up an assembly line to produce a product.

TASK # 15

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Planning Production

TASK: Acquire an Understanding of Production Planning Occupations.

CRITERION REFERENCED MEASURE: Define production planning including manufacturing engineer, industrial engineer, process engineer, methods engineer, tool engineer, and work measurement engineer.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in the class discussions.
4. Make a list of the various engineers and describe their function.
5. Participate in a mock planning session.

TASK # 16

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Automation

TASK: Define Automation in Relation to Manufacturing.

CRITERION REFERENCED MEASURE: Define automation including - mechanical devices, manual labor, mechanization, controlling, programmed automation, increase production capacity, reduce waste, improve working conditions, improve distribution, and reduction in costs.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. List reasons for automation.
5. List principles of automation including - feedback, machine handling, program control, and data processing.
6. View movies on automation.

TASK # 17

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Tooling-Up for Production

TASK: Define Tooling-Up.

CRITERION REFERENCED MEASURE: Describe the four major engineering jobs in tooling-up including -

1. Deciding what machines, equipment, and tools will be needed.
2. Choosing and ordering all standard machine tools and equipment.
3. Designing and ordering any machines, tools, and equipment which must be specially made.
4. Supervising the installation of machines and equipment, start up, and trial run of productic

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. Using catalogs, simulate pricing and ordering machines for manufacturing a product of your choice.
5. Plan the layout of a manufacturing laboratory for a production run.

TASK # 18

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Jigs and Fixtures

TASK: Develop Skill in Constructing Jigs and Fixtures.

CRITERION REFERENCED MEASURE: Demonstrate skill in constructing jigs and fixtures for production products.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe class presentations.
3. Take part in class discussions.
4. Design and construct a jig or fixture.
5. Practice using jigs and fixtures in an assembly line production.

TASK # 19

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Measuring Work

TASK: Develop Skill in Measuring Work.

CRITERION REFERENCED MEASURE: Describe work measurement in relation to man time, machine time, task performance methods, time study analysis, time and motion study, work measurement analysis, operator relief, down time, and incentive.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in the class discussions.
4. Practice making time studies and analysis.
5. Practice making work measurement analysis by observing elapsed time and work done during (loading, unloading, assembling, adjusting, inspecting, moving) a production line process.

TASK # 20

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Estimating Costs

TASK: Develop Skill in Estimating Costs.

CRITERION REFERENCED MEASURE: Demonstrate skill in estimating costs including consideration of materials, direct labor, overhead and profit.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe class presentations.
3. Participate in class discussions.
4. Practice estimating costs for a production line process.
5. List the costs for the production line process including materials, labor, profit and overhead such as cost of supervision, taxes, equipment, depreciation, inspection, sales, utilities and other factors.
6. Estimate the cost of manufacturing a product of your choice.

TASK # 21

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Production Control

TASK: Demonstrate an Understanding of Production Control.

CRITERION REFERENCED MEASURE: Describe production control including - ordering, routing, scheduling, and dispatching and records of performance, performance comparison, corrective action, flow production, order production and bath, block, load, and special project production.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe class presentations.
3. Participate in class discussions.
4. List types of production.
5. List controlling measures.
6. Make a graph or a line scale of production control.
7. Participate in exercises involving batch, block, and load production.

TASK # 22

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Quality Control

TASK: Demonstrate an Understanding of Quality Control.

CRITERION REFERENCED MEASURE: Describe quality control in terms of sampling, directing, monitoring, inspecting, testing, reporting, and correcting.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentation.
3. Participate in class discussions.
4. Design quality control means for a production line.
5. Practice quality control activities during a production line operation.

TASK # 23

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Designing and Engineering the Plant

TASK: Demonstrate an Understanding of Designing and Engineering a Plant.

CRITERION REFERENCED MEASURE: Describe the steps to be taken in designing and engineering a plant including - problem identification, preliminary ideas, refinement and analysis of site, function, structure, and cost.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. Practice making charts, graphs, diagrams and schematics, and group presentations on plant design.
5. Practice preparing working drawings and specifications of plant layouts.

TASK # 24

AREA OF COMPETENCE: Manufacturing.

CONTENT/CONCEPT: Accident Prevention

TASK: Develop Skill in Accident Prevention Programs.

CRITERION REFERENCED MEASURE: Demonstrate skill in establishing an accident prevention program including - establishing safety program, educating employees, engineering safety into operations and equipment, enforcing safety programs, periodic inspection, and systematically reporting all accidents.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe class presentations.
3. Participate in class discussions.
4. List some safety equipment.
5. List some safety procedures.
6. Make safety posters.
7. Prepare a bulletin board of safety guides, slogans, or posters and pictures.

TASK # 25

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Supplying Equipment and Materials

TASK: Demonstrate an Understanding of Supplying Equipment and Materials.

CRITERION REFERENCED MEASURE: Describe the problems in supplying equipment and materials including the right material, the right quality, the right quantity, the right price, the right place, and the right time.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in the class discussions.
4. List methods of purchasing.
5. Describe the purchasing procedure.
6. Draw a mock manufacturing floor plan and show the materials routing plan.
7. Order materials for a production run.

TASK # 26

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Data Processing

TASK: Gain an Awareness of Data Processing.

CRITERION REFERENCED MEASURE: Describe the four basic functions of data processing in manufacturing including - recording, classifying, calculating, and summarizing.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. List the four basic functions of data processing.
5. List occupations in data processing.
6. View a film on data processing.

TASK # 27

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Computer Operation

TASK: Gain an Understanding of Computer Operation.

CRITERION REFERENCED MEASURE: Describe computer operation including - programming (identifying, flowcharting, writing), input forms (cards, tapes), central processing (control, memory, arithmetic, logic), and output form (printed page, cards, tapes).

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. Identify some computer programming symbols.
5. Punch a computer card by hand and have it run on a local computer if possible.

TASK # 28

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Personnel Technology

TASK: Demonstrate an Understanding of Personnel Technology.

CRITERION REFERENCED MEASURE: Describe the stages of personnel technology including - hiring, training, working, advancing, and retiring.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. Describe hiring practices such as recruiting, selecting, and inducting.
5. Describe training practices such as on-the-job training, vestibule schools, apprenticeship, classroom training, cooperative training, and supervisor training.
6. Describe the processes of working, advancing, and retiring personnel.
7. Describe labor and collective bargaining.
8. Have a guest speaker on personnel technology as related to a manufacturing firm.

TASK # 29

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: The Enterprise

TASK: Develop Skill in Establishing a Mass Production Enterprise.

CRITERION REFERENCED MEASURE: Demonstrate skill in establishing a mass production enterprise including organizing and financing, product design, tooling-up, production, distribution, and liquidation.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. Organize an enterprise.
5. Finance an enterprise.
6. Design a marketable product.
7. Tool-up for production.
8. Produce the product.
9. Sell the product.
10. Dissolve the company.

TASK # 30

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Reproducible Raw Materials

TASK: Demonstrate an Understanding of Reproducible Raw Materials.

CRITERION REFERENCED MEASURE: Describe reproducible raw materials including - source (plants and animals), need for conservation, securing crops, securing livestock products, and securing fish and marine life.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. List by-products of slaughtering.
5. List methods of taking marine life.
6. Describe conservation methods.
7. Construct a bulletin board on reproducible raw materials.

TASK # 31

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Extracting Raw Materials

TASK: Demonstrate an Understanding of Extracting Raw Materials.

CRITERION REFERENCED MEASURE: Describe methods of extracting raw materials including drilling, surface mining, and underground mining.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. List classes of mineral resources.
5. List extraction methods.
6. View film on extraction techniques.

TASK # 32

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Energy from Nature

TASK: Gain an Understanding of Natural Energy Sources.

CRITERION REFERENCED MEASURE: Describe methods of harnessing natures energy including - mechanical, radiant, chemical, heat, electrical and nuclear energies.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. List the classes of energy.
5. List some energy conversion methods.
6. Build a model of a natural energy source such as a dam, windmill, solar heating unit, etc.

TASK # 33

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Processing Industrial Materials into Standard Stock

TASK: Develop an Understanding of the Processes Involved in Processing Industrial Materials into Standard Stock.

CRITERION REFERENCED MEASURE: Describe the forming, separating and combining processes including - casting or molding, compressing or stretching, conditioning, shearing, chip removing, mixing, coating, bonding and mechanical fastening.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. Practice forming methods.
5. Practice separating methods.
6. Practice combining methods.

TASK # 34

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Casting

TASK: Develop Skill in Casting.

CRITERION REFERENCED MEASURE: Describe and demonstrate the steps in casting including - (1) mold production, (2) metal preparation (melting), (3) pour material into mold, (4) hardening, and (5) extract the casting.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe class demonstrations and presentations.
3. Take part in class discussions.
4. Practice making castings.
5. List ways to prepare materials for casting.
6. List ways of introducing materials into molds.
7. List the types of molds.

TASK # 35

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Forming Processes

TASK: Develop Skill in Forming Processes.

CRITERION REFERENCED MEASURE: Describe the following forming operations: forging, extrusion, rolling, drawing, corrugating, bending, spinning, wire drawing, and stretch forming.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe class presentations.
3. Take part in class discussions.
4. Describe extrusion, forging and vacuum forming.
5. List some key words, such as - forming, yield point, deform, fracture point, cold forming, and recrystallization temperature.
6. Describe methods, other than machine tools, used to provide forming forces.
7. Practice forming exercises.

TASK # 36

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Separating Practices

TASK: Develop Skill in Separating Practices.

CRITERION REFERENCED MEASURE: Describe flame cutting, chip removal, and shearing.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. Describe the difference between chip removal and shearing.
5. Practice separating processes.

TASK # 37

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Conditioning Processes

TASK: Develop Skill in Conditioning Processes.

CRITERION REFERENCED MEASURE: Describe and demonstrate conditioning processes including thermal conditioning, mechanical deforming, and chemical reactions.

PERFORMANCE GUIDES:

1. Read the text assignments.
2. Observe the class presentations.
3. Take part in class discussions.
4. Practice thermal conditioning, mechanical deforming, and chemical reactions.

TASK # 38

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Other Separating Processes

TASK: Acquire an Understanding of Separating Processes.

CRITERION REFERENCED MEASURE: Describe thermal erosion, chemical separating, electrochemical separating, and induced-fracture separating.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. List and describe thermal, chemical, electrochemical and induced fracture separating.
5. Practice these separating processes.

TASK # 39

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Combining Components

TASK: Develop Skill in Combining Components.

CRITERION REFERENCED MEASURE: Describe and demonstrate mixing, coating, bonding, and mechanical fastening.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. Practice mixing processes.
5. Practice coating processes.
6. Practice bonding processes.
7. Practice mechanical fastening.

TASK # 40

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Combining Subassemblies

TASK: Demonstrate an Understanding of Combining Subassemblies.

CRITERION REFERENCED MEASURE: Describe combining subassemblies including batch assembly and continuous assembly.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. Describe when batch assembly is used.
5. Describe when continuous assembly is used.
6. Participate in exercises involving batch assembly.
7. Participate in exercises involving continuous assembly.

TASK # 41

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Preparing for Distribution

TASK: Demonstrate an Understanding of Preparing for Distribution.

CRITERION REFERENCED MEASURE: Describe distribution preparation including discussion of protection, labeling, storing, and distribution.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Take part in class discussions.
4. List reasons for protection.
5. List reasons for labeling.
6. List people involved in shipping, wholesaling, retailing, and consuming.
7. Design packages for mass produced products.

TASK # 42

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: Servicing Products

TASK: Demonstrate an Understanding of Servicing Manufactured Products.

CRITERION REFERENCED MEASURE: Describe the servicing of products in terms of installing, maintaining, repairing, and altering them.

PERFORMANCE GUIDES:

1. Read the text assignment.
2. Observe the class presentations.
3. Participate in class discussions.
4. Describe reasons for postprocessing.
5. List who does the postprocessing.
6. Practice servicing manufactured products.

TASK # A.I.A.S.A.

AREA OF COMPETENCE: Manufacturing

CONTENT/CONCEPT: In Class Industrial Arts Student Association

TASK: Participation (involvement) in a democratic organization with activities using course content.

CRITERION REFERENCED MEASURE: Participate with other students in organized activities using industrial resources, leadership or followership, service or enterprise projects and recognition for workmanship.

PERFORMANCE GUIDES:

1. Organize class into personnel system for democratic decision making and leader/follower development.
2. Invite speakers to class and use resources of industry and technology from the community.
3. Carry out worthy group activities and projects to improve or serve school or community.
4. Operate an enterprise system to produce item of economic value.
5. Encourage competition in areas of course to motivate and recognize achievement.

NOTE: These performance guides are expanded in the publication titled Student Association Activities in Industrial Arts Instruction available from the Industrial Arts Service, Virginia Department of Education, Richmond, Virginia 23216.