DOCUMENT RESUME

ED 132 416 88 CE 009 213

AUTHOR Barrington, Thomas L.; And Others
TITLE Elementary Industrial Arts Curriculum Guide. Grades K-8 & Special Education. Revised.
INSTITUTION Bertie County Public Schools, N.C.
SPONS AGENCY Bureau of School Systems (DHEW/OE), Washington, D.C. Div. of Supplementary Centers and Services.; North Carolina State Dept. of Public Instruction, Raleigh.
PUB DATE Sep 70
NOTE 144p.; For a related document see CE 009 190

EDRS PRICE MF-$0.83 HC-$7.35 Plus Postage.
DESCRIPTORS Course Content; Curriculum Guides; Elementary Education; *Industrial Arts; *Industrial Education; *Learning Activities; Learning Experience; Psychomotor Skills; *Skill Development; Special Education; Supplementary Textbooks; Teaching Guides
IDENTIFIERS Elementary Secondary Education Act Title III; ESEA Title III; North Carolina

ABSTRACT

Elementary textbooks containing references to technology and the Industrial society form the base for this curriculum guide, which is designed to assist teachers in a more effective method of using these references for the benefit of students. A brief course outline and suggested projects involving power, transportation, communications, manufacturing, and construction, are offered for special education students. Manufacturing activities are suggested for the kindergarten level. For each grade, 1 through 8, the guide provides, using a column format, specific topics of study, with each topic including references, and suggested activities. The reference indicates a book listed in the textbook bibliography for that grade. Other references to the same topic are also listed and are included in the bibliography. Topics include communications, construction, manufacturing, transportation, power, services, and pollution. Safety rules in industrial arts are discussed; descriptions are provided for tools and their use. A partially annotated section on resource materials is included, listing books, pamphlets, magazines, films, and field trip contacts. (TA)

ELEMENTARY INDUSTRIAL ARTS CURRICULUM GUIDE

Grades K-8 & Special Education

Compliled by

Thomas L. Barrington
George H. Heckman, II
Charles E. Long
Johnnie E. Rascoe

1970 Revision by

Thomas L. Barrington

Manuscript Preparation by

Janis R. Castelloe

Edited by

Larry T. Ivey

Title III, E.S.E.A.
Elementary Industrial Arts
Project No. 5659

Published by Bertie County
Board of Education
Windsor, North Carolina

September, 1970

TABLE OF CONTENTS

PREFACE

The report contained herein was performed pursuant to a grant from the U. S. Department of Health, Education, and Welfare, Office of Education, Title III of the Elementary and Secondary Education Act. This report does not necessarily represent official position or policy of the Office of Education.

Organization of this curriculum guide was based on a similar study conducted by William R. Hoots, Jr., Ph.D., East Carolina University, Greenville, N. C. Dr. Hoots serves as continuing consultant to Bertie County's Elementary Industrial Arts Project. This study differs from Dr. Hoots' study by utilizing references from textbooks adopted for Bertie County Schools rather than from the entire North Carolina elementary school basal adoption textbooks.

A separate booklet containing behavioral objectives for each grade level has been prepared and is available to each teacher. We are not so optimistic as to believe that each child will achieve the stated objectives on a level with every other child. Each child must be evaluated on the basis of his individual ability and performance. Therefore, each teacher is encouraged to apply those objectives deemed appropriate for each child individually. All children should be made aware of the objectives for each activity and/or learning experience. We believe that children perform better when they know what is expected of them.

Teachers are encouraged to expand upon this guide by employing their own skills, knowledge, and techniques in implementing industrial arts in their classes.

Larry T. Ivey
September, 1970

INTRODUCTION

Administrators, teachers, students and parents from all areas of the United States are asking an important question. "What is Elementary Industrial Arts and what are its major concepts, points of view and unique contributions to the educational process for students?"

All to often, the question is not answered satisfactorily, or if answered, it just plain doesn't make sense to the average classroom teacher or school administrator. Any individual interested in elementary industrial arts can usually find numerous references to published and well documented sources providing definitions, concepts, and even objectives of elementary industrial arts. A big problem, however, is that each source will usually give a different philosophy and definition which leaves the reader more confused than when he first initiated his diligent search for information.

The result has been extremely detremental to the efforts of industrial arts educators in attempting to sell their programs to teachers and administrators. The problem has not been in the programs conducted but has apparently emerged from a lack of understanding of the basic philosophy upon which elementary industrial arts operates. It is the purpose of this report to clarify the definitions, concepts and contributions which industrial arts provides in elementary education.

Elementary school industrial arts is an important phase of general education which offers each child an opportunity to become familiar with complex technological concepts found in every aspect of modern society. Through industrial arts, children have an opportunity to explore, experiment and study the ways through which man has changed his physical environment to provide an easier, more comfortable and safer means of working and living. Industrial arts involves children in activities dealing with tools, materials, machines and processes which are reflective of present day technology. Industrial arts, when properly employed, is a vehicle through which the abstract becomes a reality providing meaningful experiences for all children of all levels of ability. When properly integrated in the basic elementary curriculum, industrial arts offers a solution to the existing problem of helping children find their place in society.

Modern textbooks are filled with references to technology, references which are only touched upon by most elementary teachers. Technology is a most important segment of life and living and should be brought out in all learning situations. Industrial arts offers an avenue through which our evolving technological culture can be related to all aspects of a child's world of living. It contributes to the learning process by introducing children, at an early age, to technical concepts of design, instrumentation, tools, materials, processes and products by allowing each child to deal with these concepts as applied to daily life situations.

One of the more difficult processes in education is to create an awareness in students of the necessity for adequate training and education required for future livelihood. Young children see no value in present work or study which will serve them sometime in future years. As educators, we must offer a program meaningful to each child at his level of understanding and applicable to his present needs and desires. Industrial arts can assist in fulfilling this goal because industrial arts activities conducted today will encompass attitudes, disciplines, techniques and abilities which will be of value to any child in many future situations. Through industrial arts, children are encouraged to develop solutions to many problems and are given the opportunity to apply their solutions to immediate situations having meaning to the individuals involved.

Children are by nature, activity oriented but traditional classrooms restrict activity and can lead to confusion or frustration for many children. Elementary industrial arts is activity oriented and child centered and can provide the physical activity necessary in elementary education. It offers children an opportunity to develop self confidence in dealing with a physical environment. Children must be given an opportunity to interact with their technological environment if they are to develop to their fullest intellectual capacity.

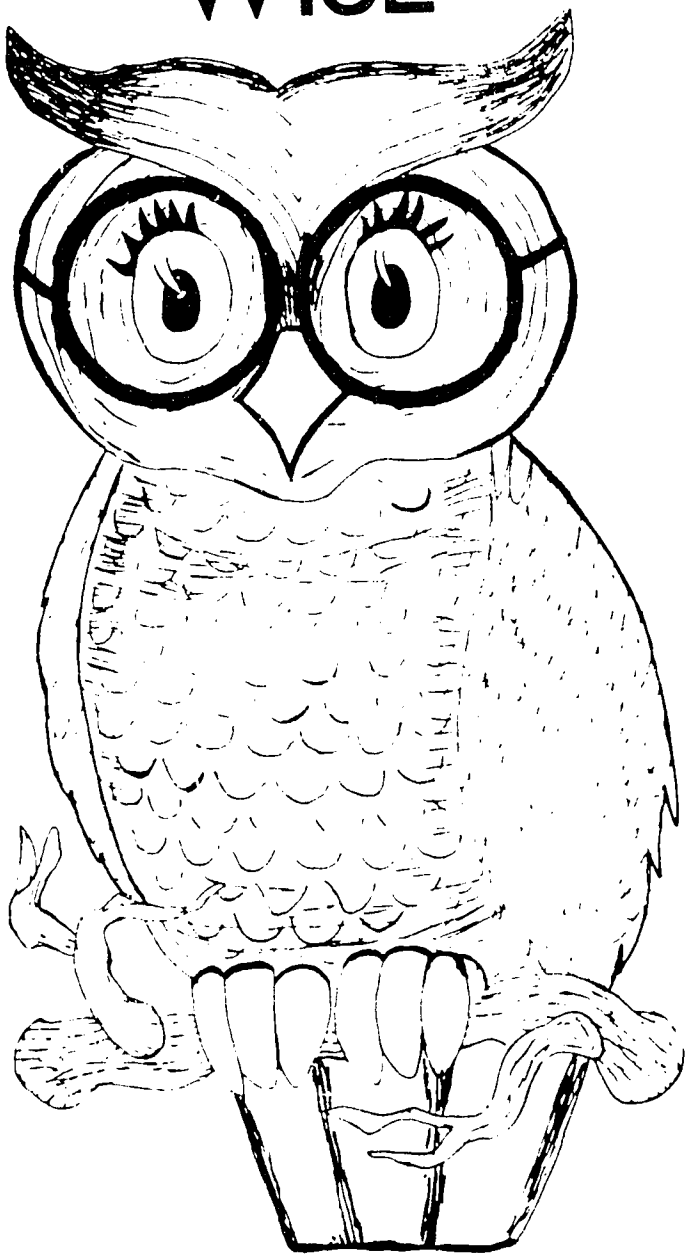
Through industrial arts, educators have an opportunity to take advantage of the natural curiosities, activities and interests of children by providing realistic, physical activities of a technological nature.

Larry T. Ivey

SAFETY FIRST

BE

WISE



GOGGL-IZE

SAFETY IN INDUSTRIAL ARTS

A major objective of education is to prepare individuals for effective life in our society. Included in this objective is the preparation of individuals for a SAFE and effective livelihood.

We cannot overlook the importance of safety in our schools if we expect students to learn safe habits for work or play. Good safety habits learned in school carry over into the life and actions of students when they are outside of the school's influence.

Industries stress safety for their workers and it is imperative that industrial workers follow proper safety regulations. The teaching of safety cannot be started too early in life, therefore. Students in elementary industrial arts should be taught proper safety in working with tools, equipment and people.

Various situations demand various safety regulations and no one set of regulations will cover every situation. Regulations contained in this report are general in nature and should be expanded as each class or situation dictates.

SAFETY RULES

A. General

1. Always wear safety glasses when using equipment that is termed hazardous. ie. saws, sanders, files, and all portable power tools.

2. No horse play while activities are taking place.

3. In event of injury, get treatment immediately.

4. Never leave objects on the floor. If you spill it, wipe it up. If you drop it, pick it up.

5. When you use a tool and finish, replace it in its rightful spot.

6. All rags, filled with combustible materials, should be properly disposed. (Combustible materials: paint thinner, oil, lacquer thinner, gasoline, etc.)

7. Don't work too close together.

8. Think before work is done.

9. Don't be overly enthusiastic while working with tools.

10. Loose clothing is dangerous.

11. Treat tools with much respect.

12. Store flammable liquids in proper containers.

13. Fasten your work securely with clamps or vise when working.

B. Power Tools

1. Wear safety glasses!

2. No more than <u>one</u> person at a time should be allowed to use any power tool.

3. Be sure power tools are unplugged when changing or adjusting blades, bits, or sandpaper.

4. Never attempt to defeat the purpose of the safety ground. Always use the adaptor, if necessary, properly.

5. Make sure work is secure with clamps or vise before using power tools.

6. Before drilling metal, use a center punch to make a start.

C. Hand Tools

1. Always carry sharp objects pointed down.

2. When sawing, make sure no one is near that might be affected.

3. Make sure handles are on files securely. Never use a file without a handle.

4. A sharp tool is safer than a dull one.

5. When using sharp blade instruments, keep hands and fingers away from edge.

6. Always point [illegible] instrument away from your body.

7. Never throw tools.

8. Don't put nails, screws, tacks, etc., in your mouth.

9. Never misuse the tools.

10. When cutting or drilling metal, remove burrs with a file.

USING THE GUIDE

Elementary textbooks contain numerous references to technology and the industrial society of America and the world. This guide is an attempt to assist teachers in a more effective method of utilizing these references for the benefit of students.

The following illustration explains how this guide should be used by elementary teachers:

1. Let us say that a fourth grade class is beginning a study of early American housing as part of their social studies. The textbook being used is Scott, Foresman's <u>In All Our States</u>.

   The teacher should review the course outline for grade four and, in so doing, she will note the following entry:

[illegible]	REFERENCES	SUGGESTED ACTIVITIES
III. Construction - Houses A. American Pioneers	4:51-54 3:79 3:91 9:25-34	Make models of pioneer homes & compare with homes of today. Compare from standpoint of materials, methods of construction & cultural effects on houses.

2. The course outline entry tells the teacher that she has reference to early American homes in several textbooks.

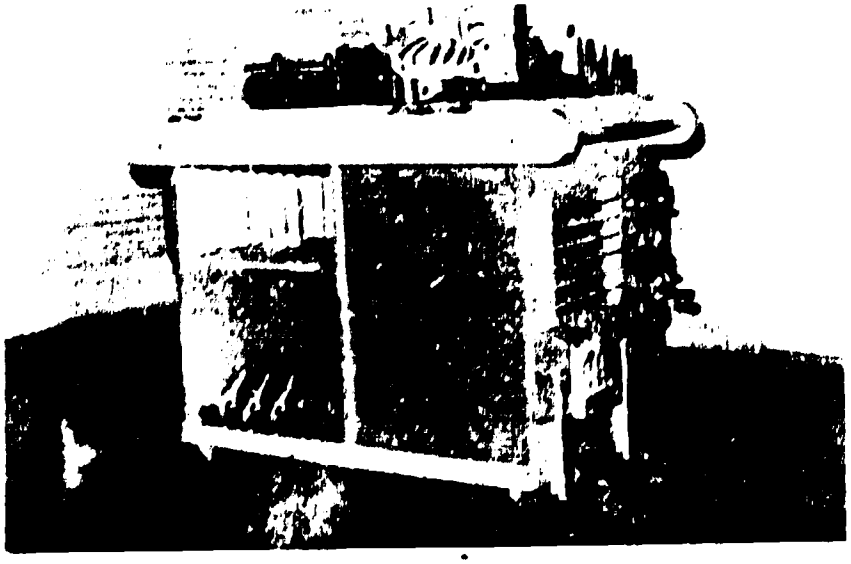
3. The reference indicates a book listed in the textbook bibliography for that grade. In this case 4:51-54. Upon checking the bibliography, the teacher will find that 4:51-54 refers to the Scott, Foresman series, <u>In All Our States</u>, and specific reference to early American houses is found on page 51 through 54 of that textbook.

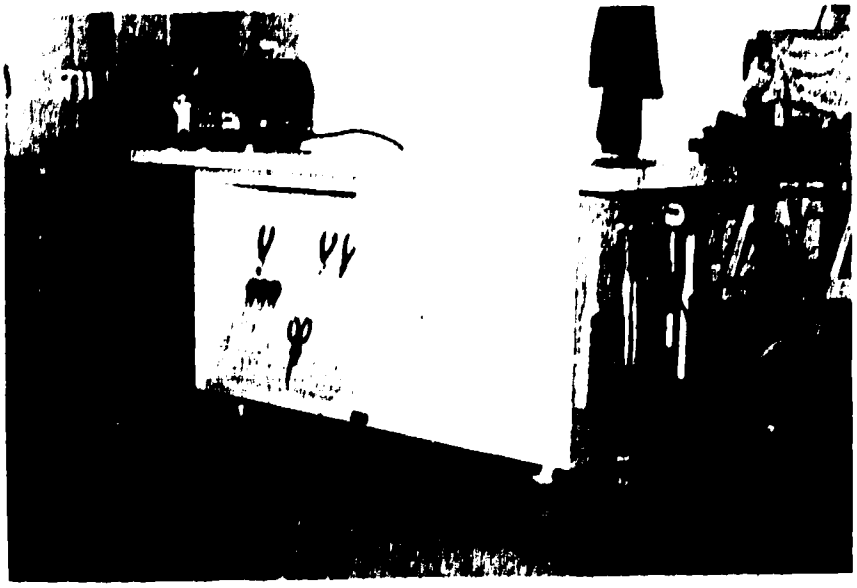
   Other references to the same topic are also listed in the course outline and are included in the bibliography.

5. The teacher and class should now review the suggested activities and plan their unit according to objectives for the unit on early American housing.

6. Teachers are urged to carefully consider student objectives and outcomes in planning all units.

7. An evaluation of all activities should be an integral part of all studies and activities.





TOOLS

THEIR DESCRIPTION AND USE

Auger Bit. The auger bit works on the principle of the wedge and the inclined plane. It is used for boring round holes in wood. Auger bits are made with four types of twists and three types of screws. The coarser the twist and screw, the faster the cutting action and the rougher the cut. The auger with the fine screw and twist is recommended for hard, close-grained woods. The four types of twist are (1) coarse, (2) medium, (3) fine and (4) one on which the twist gradually changes from fine to coarse. The three types of screws are (1) coarse, (2) medium, (3) fine.

The screw is the first part to touch the wood. It draws the bit into the wood on the principle of the inclined plane. The spoors score the circumference of the hole on the principle of the wedge. The twist carries the wood chips to the surface on the principle of the inclined plane. Auger bits are made from 3/16" to 2" or #3 to #32 by sixteenths.

Countersink Bit. Single, double, and rose type bits are available. A cone-shaped cutter widens a hole on the principle of the wedge. It is useful when setting the heads of screws below the surface of the wood.

Twist Drill. A twist drill is a spiral fluted tool with the tip ground to two cutting wedges, used in making round holes in wood and other materials.

As the drill is turned and pressure is applied, the cutting

lips of the drill remove the material on the principle of the wedge. The material is removed from the hole by the flutes on the principle of the inclined plane.

Drills are made from 1/32" to 2".

Bit Brace. The bit brace uses the principle of the wheel and axle in creating its drive force. The pressure on the swing of the bow is in direct proportion to the force applied to the cutters of the auger bit.

This tool is so constructed that downward pressure may be applied on the boring tool while a constant revolving motion directs the cutting action.

The bit brace is used for holding and driving all kinds of boring tools, screwdriver bits, dowel pointers, and countersinks.

Hand Drill. The hand drill works on the principle of the wheel and axle and the inclined plane. Each tooth of the gear train is an inclined plane, using its advantage to create the speed ratio. This speed ratio is equal to about 5 to 1 or in direct proportion to the number of teeth on the gear pinion and the handwheel. The larger the gear ratio, the faster the drill will turn.

There are three sizes of hand drills with chucks of 0-$\frac{1}{4}$" for light work, 0-3/8" for medium work, and 0-$\frac{1}{2}$" for heavy work.

Claw Hammer. The hammer is used to drive and withdraw nails and as a lever in driving apart pieces that have been nailed. Claw hammers are available in head weights of 5 ounces, 7 ounces, 10 ounces,

13 ounces, 16 ounces, and 20 ounces. They are available with straight or curved claws. The claw hammers work on the principle of the lever, whether driving or withdrawing nails.

Ball Pein Hammer. This is also a machinist's hammer and has a ball-shaped pein. The face and pein are hardened; the middle, containing the eye, which [illegible] the hole, is left soft. The face should be rounded a little so that it will not make marks. Ball pein hammers weigh from 1 ounce to 3 pounds without the handle. A hammer weighing 3/4 to 1¼ pounds is used for ordinary work. A light hammer is better for layout work.

Screwdriver. The screwdriver works on the principle of the wheel and axle. The handle represents the wheel and the blade and tip represent the axle. A screwdriver is used to drive and withdraw screws. Screwdrivers come in two basic types. They are (1) regular and (2) phillips. The screwdriver should fit the slot of the screw snugly and the tip should not protrude beyond the head of the screw.

Files. The teeth of a file or rasp cut on the principle of the cutting wedge. The teeth are cut diagonally across the face of the file which permits a shearing cut.

The rasp is used for roughing off surfaces. The file is used for smoother cutting. Both the rasp and file should be used only where space and shapes do not allow the use of sharp edge tools. The various shapes of files are used to file corresponding

curves and cuts in wood.

A third type of file has a frame and a replaceable blade with serrated teeth which may be used as a substitute for a file or rasp. (This is the surform file.)

Wood files are made in the following shapes: flat, half-round, round, square, or three cornered. Files are also made with two shapes of teeth-single cut and double cut.

Wood rasps are made in two shapes - flat and half-round.

File handles are required to fit on the files.

File Card. Files and rasps should be cleaned with a file card after use.

Nail Set. The nail set is used in setting the head of a finished nail, casing nail, or brad. The tip of the nail set has a slightly concave surface. This keeps it from sliding off the nailhead too easily. Nail sets are available in various sizes.

C-Clamps. The C-clamp is an adjustable holding tool. Pressure is applied by means of a screw. C-clamps are made with throat openings from 5/8" to 6¼" and depths of 3/4" to 2½".

Hand Screw. The hand screw works on the principle of the screw and the lever. It is designed for holding stock under pressure. Two jaws are adjusted for size openings by simultaneously revolving the two spindles. Compression is applied by tightening the middle spindle. Tightening the end spindle causes the jaws to pivot on the middle spindle, resulting in pressure at the open end of the jaws.

Hand screws serve as an adjustable pressure device and as an aid in securing stock in position for work.

Crosscut Saw. The crosscut saw cuts as a knife and a chisel. The extreme points on either side of the saw score parellel lines. This action is like two knives, cutting parallel lines across the face of the wood.

As the sawing action continues, the cutting edge on the inside of the teeth comes into contact with the wood, shearing it out of the kerf.

When a full bite is taken the points of each tooth continue to score the outside of the kerf and the sharpened leveled sides of the teeth crumble and shear the wood left between the cutters.

At each stroke of the saw the sawdust is carried out of the kerf in the throat or gullet formed between the teeth of the saw.

The teeth of a saw are set alternately to the right and left so that the cut, or kerf, is wider than the thickness of the saw blade. This off-setting of the teeth is known as "set".

Rip Saw. The teeth of a rip saw are chisel shaped. These teeth have a straight front and cut the fibers at one place only. They do not score either side of the cut. The front edges of the teeth cut the fibers of the wood. As sawing continues, the fibers on the bottom and sides of the cut give way and chips are carried out in the teeth gullets.

Back Saw. A back saw is a fine-tooth crosscut saw with a heavy metal band across the back to strengthen the thin blade. It is used to make fine cuts for joinery and is used in a mitre box.

Compass Saw. The compass saw has rip teeth with a narrow blade. It is useful for cutting interior curves where a coping saw cannot be used. Some of these saws have excha..geable blades, a metal cutting blade and a pruning blade.

Coping Saw. The coping saw has a narrow blade with rip teeth which is held in a steel frame under tension. It is used for cutting curves in thin wood and is not intended for sawing straight lines. It cuts best on a vertical pull stroke, as a jig saw does, rather than as a hand saw.

Vibrating Jig Saw. The vibrating jig saw is an electrical powered saw used for cutting either internal or external curves. The main parts are the base, frame, table, upper and lower chucks, tension sleeve and hold-down device. The size of a jig saw is determined by the horizonal distance between the saw blade and the arm of the frame. The vibrating-type jig saw has practically no danger connected with its use because the blade moves only a very short distance.

Hack Saw. The hack saw consists of a thin, narrow, removable blade with small teeth along one edge, mounted in a U-shaped frame. It is used for sawing all metals except harden steel. The cutting tool must always be harder than the material to be cut.

When the blade is put into the frame, the teeth point away from the handle.

Bench Rule. A 12" or one foot rule is known as a bench rule. One side is divided into eights, the other into sixteenths. It is used to make simple measurements and to adjust dividers. Never use a bench rule as a straightedge.

Try Square. The try square is a squaring, measuring, and testing tool with a metal blade and a wood or metal handle. It is used to test a surface for levelness, to check adjacent surfaces for squareness and to make lines across the face or edge of stock.

Combination Square. The combination square consists of a blade and handle. The blade slides along in the handle or head. There is a level and a scriber in the handle. It is used to level a level surface, to check squareness either inside or outside, to mark and test a 45 degree miter and to gauge-mark a line with a pencil.

Dividers. The divider is a tool with two metal legs. One metal leg can be removed and replaced with a pencil. To set the dividers, hold points on the measuring lines of the rule. It is used to lay out an arc or circle, to step off measurements and to divide distances along a straight line.

Scratch Awl. A scratch awl is a pointed metal tool with a handle. It is used to locate a point of measurement and to scratch layout lines on sheet metal.

Smooth Plane. A smooth plane is a 7" to 9" plane. It is used for making surfaces smooth and flat or true. It has a chisel like blade.

Block Plane. A block plane is a 4" to 6" plane with a single, low angle cutter with the level up. It is for one hand use to plane end grain, for small pieces and for planing the ends of molding, trim and siding.

Woodworker's Bench Vise. The woodworker's bench vise is a holding tool. It is fasten to the workbench by means of a screw. The jaws of the vise are opened and closed by turning a handle which is connected to a large screw.

Machinist's Vise. The machinist's vise is fastened near the edge of the workbench by means of a screw. It is used to hold parts while they are being put together. It is also used in holding metal while it is being bent. Vises are measured by the width of the jaws which are made of harden steel. The jaws are closed by turning a handle which is connected to a large screw.

Combination Pliers. The combination plier is used for griping, and for cutting soft, small size wire. The slip joint makes it possible to grip large parts. Pliers come in different sizes. Never use on the head of bolts and nuts.

Chain Nose Pliers. The chain nose pliers have long jaws tapered to nearly a point. It is used for holding extremely small parts or for working in tight places.

Flat Nose Pliers. The flat nose pliers are much the same as chain nose except the jaws are not tapered as much. The tip end is much wider.

Siding Cutting Pliers. The siding cutting is especially useful for cutting wire and nails. It is used by electricians for cutting electric wires. The type with the flat square jaws is useful for bending corners on thin metal. There are different sizes in these pliers.

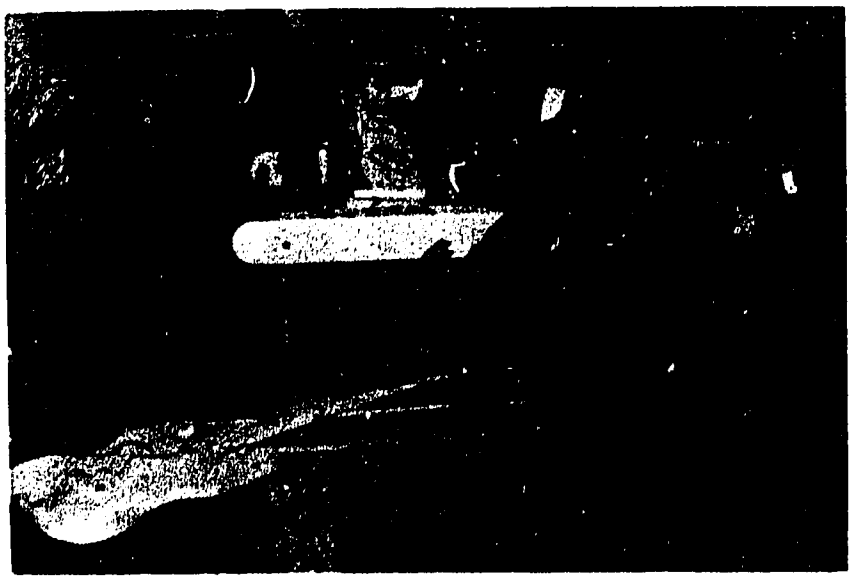
Mallets. The mallets have soft heads usually of wood, rawhide or rubber. They are used when driving force is needed without the chance of damaging the work or the tool, as in aligning parts and driving joints together.

Bar clamps. The bar clamp operates on the principle of the screw. Pressure is applied and maintained by means of tightening a screw. Bar clamps are used in clamping wide glued-up sections such as table tops and in holding parts in assembly.

I-Bar Clamp. The I-bar clamp has 2" jaws. The length of opening may be from 2' to 8' by 12" increments. The I shaped bar or pipe holds and guides clamping mechanism and serves to regulate the length of opening and provides stiffness. Movable forges steel dogs grip the bar and adjust for length of opening. Clutch or pressure plates made of tempered steel grip the I Bar. Sliding steel dogs provide the pressure plate for screw. Screw made of cold-drawn steel, transmits pressure to dogs or jaws. Handle, crank, wing, or wheel aids in turning the screw.

Tinsnip. Tinsnips are used like scissors to cut thin, soft metal. They should be used only to cut 20 gage or thinner metal. To cut to a corner, the snip should be set so that the point will finish the corner. Keep the bolt tight; the blades must fit closely against each other.

SPECIAL EDU[illegible]TION



SPECIAL EDUCATION

COURSE OUTLINE	SUGGESTED PROJECTS
I. Power	
A. Wind	Windmill Model Glider Weathervane Kite Anemometer
B. Water	Waterwheel
C. Electric	Motor Buzzer Switch and light circuit Lamp
II. Transportation	
A. Air	Jet Propeller Helicopter Rocket Airport
B. Land	Trucks Buses Cars Trains Carts Road signs Stagecoach
C. Water	Boats
III. Communications	
A. Electrical	Telegraph Crystal radio Bell Semafore Stoplight Question-answer board Simple telephone

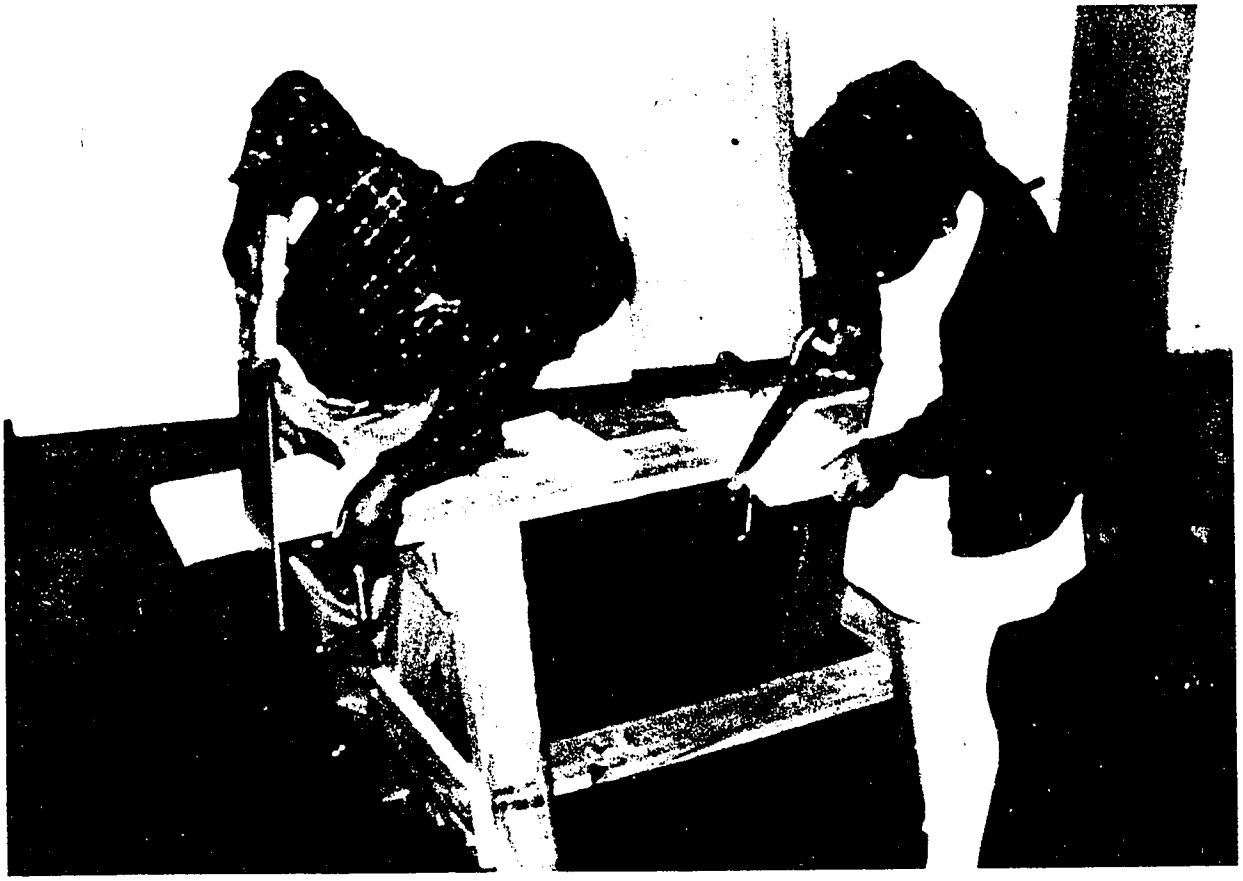
COURSE OUTLINE	SUGGESTED PROJECTS
Graphic	Linoleum block Silk screen Occasion cards T-shirts Aprons
IV Manufacturing	
A. Textiles	Sewing box Weaving loom
B. Foods	Ice cream Butter Cookies or candy Cutting board Hot pads Napkin holder
C. Woods	Paper Shoe shine box Book ends Wall plaque Candle holders
D. Metals	Magazine rack Book ends Name plates Tooling foil
E. Plastics	Napkin holder Salt and Pepper shaker Name plates Package toys
F. Leather	Key cases Wallets Book covers
V. Construction	
A. Houses	Teepee Sod Adobe Log Frame Birdhouse

KINDERGARTEN

KINDERGARTEN

COURSE OUTLINE	SUGGESTED ACTIVITIES
I. Manufacturing	Jig saw puzzles.
	Christmas tree cutouts.
	Valentine cutouts.
	Car cutouts.
	Truck cutouts.
	Animal cutouts.
	Fruit cutouts.
	Felt cutouts.
	Traffic signs.
	Boxes for planting.
	Play with magnets.
	Construct rhythm instruments.
	Clay object models.

GRADE ONE



GRADE I

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
I. Transportation A. Land 1. Truck	6:105 5:112-113 2:111-115 1:16 7pp3:3-5	Construct model of transportation vehicles. The quality of the projects to be determined by the teacher's influence in directing the activities. Given the materials, students will construct their own versions of a vehicle. These vehicles are to be very simple in design. Discuss uses of truck. Visit trucks that come to the school. Make display of city with emphasis on kinds of transportation using models, plastic or wooden. Motivate the students with use of bulletin board.
2. Automobile	1:13 6:104-115 6:157 9:84-85	Emphasize the automobile as a common vehicle.
3. Bus	6:157 3:65-66 3:71-78 3:84 3:103-105 8:24 9:123-128	Describe bus ride and importance of bus to people. Discuss functions on community.
4. Train	6:137-157 9:74-78 10:64-65	Dramatize train ride using desks or wooden boxes. Have students dress according to job they do. What sounds distinguish a train from other vehicles.
5. Bicycle	4A:7-26 4A:37-42 4B:3-24	Discuss care of bicycle.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
6. Cart	4C:43-59	Construct cart. Let one student pull it while others ride. Compare cart with wheels and one without wheels.
Air		
1. Airplane	2:167-177 2:217 5:75 1:1	Dramatize activity at an airport using models of airplanes, runways, towers, people.
	1:9,14 6:22,32,37 7pp3:63-66 8:43	Discuss airplane travel and how it differs from other types of transportation.
	10:106-107 6:58-60	Let students give own experiences in seeing a plane land.
2. Rocket	1:152 1:25 1:52-54 6:51-53 3:128-147 2:181-221 6:61-64	Dramatize launching of a rocket. Teacher provide assembled rocket and let students do actual launching. Give students jobs involved in launching and recovering rockets.
3. Helicopter	2:221	Discuss helicopter in rescuing astronauts.
Water		
1. Boats	5:126-127 3:46-50 3:84	Discuss how boats are powered, whether mechanically, manned or sail power.
2. Sailboats	6:9,19 7pp2:39-42 9:84-85	Provide pictures of sailboats. Let students construct sailboats as shown in text. Provide means of sailing these boats.
3. Stoplight	7pp3:61 10:61 3:103-104 3:106	Construct stoplight from wood. Discuss importance of stop in reference to traffic control.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
II. Manufacturing A. Hammers B. Saws C. Painting	6:13-16 5:120-121 4C:46-48 3:180-187 2:15-17	Provide chart for students to learn the names of the tools. Give them exercises in using the tools. (at beginning of year) They will get to use them in constructing different projects. Exercises will have them familiar with the tools. Finish objects with paint (tempera). Students could paint objects in room needing fresh coat of paint as an exercise. Bring out importance of painting an object.
III. Services A. Mail	2:73-83 4C:3-9 6:142	Discuss effects of mail on community. Discuss proper way of sending a letter. Let students demonstrate how to prepare a letter to be mailed. Discuss proper place to put letter so mailman will get it.
B. Laundromat	7pp2:47-50	Discuss uses of laundromat and its importance to society.
C. Beauty Salon	7pp3:19-22	Discuss function of beauty salon and its importance to society.
IV. Private Servants A. Doctor	7pp2:23	Discuss appearance and function of a doctor. Discuss his importance to society. Dramatize role of doctor.
B. Veterinarian	7pp2:55-58 8:93-98 8:176-181	Discuss the job of a veterinarian. Discuss importance of taking care of pets.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
C. Grocer Man	7pp2:60-62	Discuss grocer's role in society. Dramatize role of a grocer.
D. Delivery Man	7pp2:67 10:146-147 2:74-91	Discuss function of a delivery man. Name equipment he uses in delivering.
E. Barber	7pp3:15 12:90-91	Discuss job of a barber. How does his job play a role in society.
F. Shoe Repairman	7pp3:24-26	Discuss his job and name tools he uses in repairing shoes.
G. Painter	3:180-187	Discuss job of painter. Let students paint some objects or paint the house they will construct.
H. Dentist	3:[illegible]	Discuss his importance to a community. Discuss his appearance.
V. Public Servants		
A. Policeman	7pp3:60-62 5:117 2:74-77 4A:13-16	Discuss job of policeman. List his functions in society. Discuss his appearance.
B. Garbage Man	8:74-79	Discuss new mechanical developments in picking up garbage.
C. Fireman	8:90-91 5:112-113	Discuss importance of his job and list some of the tools he uses.
D. Lightman	6:133	Discuss his function in community. Have someone show the class what he does.
1. Electrical Service Man		Have students act out the part of these public servants to the class. Be sure to emphasize the clothing, tools and equipment these people use. Have these people make classroom visitations if possible.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
VI. Construction (House)		
A. Hammer	8:68-73	Discuss the importance of the hammer in the construction of a house.
B. House	10:42-55 10:90-105 10:113 5:60 2:10-17	Point out machinery used in destroying a house.
	7pp2:11-14 8:56-59 5:120-121	Discuss tools and materials used in repairing a roof. Discuss the tools used by a carpenter.
1. Tree House	8:12-17	Discuss materials used in building a tree house. See if students have ever played in one.
2. Mobile Home	8:30-36	Have students describe mobile home. Name materials used in construction.
3. Apartment House	2:125-132	Discuss advantages and disadvantages of living in an apartment house.
C. Building	10:110-111 5:122-123	Discuss equipment used in constructing large buildings.
VII. Communications		
A. Television	2:41-52 2:220 2:216 7:ppl:7	Study the different means of communication. Dramatic play of television. Discuss function of T. V.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
B. Telephone	2:215 7:ppl:52-53 8:110-111 9:9 10:174-180	Dramatic play of telephone use. Practice dialing telephone using old telephone.
C. Newspaper	7pp3:63-65	Discuss delivery of newspaper. Discuss function of newspaper.
D. Library	8:118-119 8:190-191	Visit library. Discuss function of library to community.
E. Camera	7pp3:67-79	Take pictures and discuss uses of camera. Make visual essays or scrapbooks.
VIII. Foods		
A. Growing	1:62-67 11:44-45 5:28 8:136-141	Grow several plants in classroom. Discuss how the products are harvested.
B. Preparation	12:92 11:84 6:156 7ppl:51	Discuss different methods of preserving foods. Have someone bring in some examples.
C. Supermarket 1. Country store	3:26 8:37-42 12:99-103	Use tools to construct model of a store. Let students bring empty cans of food and practice selling goods. If possible, get a cash register.
D. Cookies	7pp2:15-18 8:39-41	Make cookies. Dramatic play of grocer man and sell the cookies at store.
E. Ice Cream	7pp2:7-10 12:32-33	Make ice cream using home freezer. Students help in mixing the ingredients. Compare their product with store bought ice cream. Visit Maola Dairy.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
IX. Manufacturing		
A. Guitar	7ppl:8-10	Students construct guitar as shown in text. Identify tools.
B. Basketball Goal	7ppl:31-34	Let students learn tools used in putting up a basketball goal.

TEXTBOOK BIBLIOGRAPHY - GRADE ONE

1. Grandwein, Paul F. Concepts in Science I. New York: Harcourt, Brace & World, Inc., 1966.

2. Clark, Mae Knight. Lands of Pleasure. New York: Macmillan Co., 1966.

3. Clark, Mae Knight. Worlds of Wonder. New York: Macmillan Co., 1965.

4. Clark, Mae Knight. (A) Opening Books, (B) Magic Box, (C) Things You See. New York: Macmillan Co., 1965.

5. Mallinson, George G. Science I. Atlanta, Georgia: Silver Burdett Co., 1968.

6. Navarra, John Gabriel. Today's Basic Science I. New York: Harper & Row Publishers, 1967.

7. Sheldon, William D. and others. (PP1) At Home, (PP2) Here and Near, (PP3) Here and Away. Boston: Allyn and Bacon, Inc., 1968.

8. Sheldon, William D. and others. Our Town. Boston: Allyn and Bacon, Inc., 1968.

9. Sheldon, William D. and others. Our School. Boston: Allyn and Bacon, Inc., 1968.

10. Martin, Bill, Jr. Sounds Around the Clock. New York: Holt, Rinehart, and Winston, Inc., 1966.

11. Martin, Bill, Jr. Sounds of Home. New York: Holt, Rinehart, and Winston, Inc., 1966.

12. Martin, Bill, Jr. Sounds of Numbers. New York: Holt, Rinehart, and Winston, Inc., 1966.

GRADE TWO

GRADE II

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
Communications		
A. Telephone	1:56 9:144-147 5:13,205	Discuss jobs connected with the telephone. Set up a telephone communication center in the classroom. Construct telephones with cans. Have conversations over telephone using field phones.
B. Television	2:104	Dramatic play setting up television station and television set. Operation of station. Discuss jobs involved.
C. Sound	5:196-202	Discuss what sounds used in communication between transportation vehicles
D. Printing	10:12-26	Show students how printing press works. Let them use linoleum blocks press in printing blocks already cut.
E. Light	1:56	Construct simple lighthouses and give importance.
Construction		
A. House		
1. Wood	3:1	Study the material that go into house construction. Build a play house using real materials. Visit houses under various steps of construction.
2. Paint	9:200-208	Let students decorate and color their projects with paint.
3. Steel	6:6 7:161-166	Discuss how buildings such as skyscrapers are constructed.
4. Clay	5:150-154	Integrate this section with above model house. Construct model house using clay.

	COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
	5. Concrete	6:6	Construct small mold and pour a concrete slab.
	6. C th	7:96-105	Construct tent. Discuss care of tent.
B.	Sa . Hammer, Plane, e:	2:49 3:3 2:103	Familiarize students with tools of construction. Students may use tools to construct projects to go with holidays of the year.
C.	Bridge	6:10-11	Compare bridges in country with those in city in respect to construction.
III.	Power	9:138-143	Build devices to use various forms of air-wind, compressed air, etc. Construct kites, decorate, and fly them.
A.	Wind - Air	4:52-53 5:169-171	
B.	Steam	1:16-17 5:180-181	Study uses of steam. Show how steam is used.
C.	Coal	1:30-38	Study how cold is used on a train. Heat water with coal or charcoal to show concept.
D.	Electrical		
	1. Discovery	9:92-94 4:85-99 1:16-24 1:60-63	Application of power supply. Field trips to trace power lines from sub station or source to the school.
			Construct simple electrical experiments with switch and light.
	2. Magnetism	5:11	Make temporary magnet from needle and construct compass.
E.	Light	4:9	Ask questions. Can light do work for us? Find answers.
F.	Burning Fuels	1:25-38	Name types of fuel used for power where they are used.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
V. Services		
A. Mail	2:80	Visit post office. Set up post office in room.(dramatic play)
B. Snow Plow	10:224 9:133	Function in time of snow. Let students be able to recognize one.
C. Fire Fighting 1. Fire Warden	9:187-193	Visit fire station if possible. Make models of fire truck. Name tools used by firemen.
D. Library	9:110-115	Visit library to see how it is set up. What is its purpose?
E. Dog Pound	9:118-121	Study services in relationship to new and old ideas and operations.
V. Public Servants		
A. Policeman	6:22-23	Describe policeman in respect to the tools and equipment used.
VI. Private Servants		
A. Barber	8:150	Discuss what type of tools a barber uses.
B. Eye Doctor	9:226-229	Discuss and be able to identify the tools used by an eye doctor. Be able to identify the functions of an eye doctor.
C. Dentist	2:80	Discuss and identify the tools used by a dentist.
D. Nurse	4:114	Discuss the importance of the nurse and her work and be able to identify the tools used by a nurse.
II. Transportation		Using some detail, make models of transportation vehicles.
A. Land		
1. Train	2:47 5:203 2:61 2:51 6:25-32 6:138-147 6:157-164 6:198-200	Construct train engine from old barrels and make cars from boxes and dramatize the train ride. Make hats according to the people who work on the train.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
2. Bus	9:71-73 10:129-130 2:105 7:10-12 7:168	Using chairs, set up a bus and practice carrying people. Discuss busing industry in U.S.A. and its importance to people.
3. Bicycle	8:32-27 2:63 9:28-30 9:73,33-35	Discuss safety on bicycles.
4. Truck	7:142-147 10:132 2:42,23,	Construct plaques shaped like trucks and fill them with consonants and vowels. Discuss uses of trucks.
5. Car	142-147 2:34	Discuss beginning of a car.
6. Wagon	9:206-220	Servicing a wagon. Name uses of a wagon.
B. Air		
1. Balloons	5:134-142	Attach string to balloons and have passenger area attached. Simulation of real balloon.
2. Airplane	6:46-52 5:16 10:139	Dramatize airplane ride, different jobs on airplane. Construct gliders and fly them.
3. Rockets	1:55 1:146-147 9:129-131 4:25 5:119-128	Experience model rocket launching. Construct the rocket. What does man do to survive in space?
4. Helicopter	5:143 3:12,120	Construct a helicopter and discuss its uses.
5. Blimp	5:144	Discuss uses of blimp.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
C. Water		
1. Boats	10:80-81 9:88 9:209-215 2:21-25 2:76	Make different kinds of boats.
D. Highway Signs	2:41	Incorporate with highway construction and construct these signs for display.
E. Highway Safety	2:85	Discuss signs and be able to tell the difference in them and in their uses.
VIII. Foods		
A. Cooking	5:180-186 2:103 9:76-82 6:33-38	Cook some type of food in class. Study technological advances in food preparation.
B. Grinding Corn	9:190-194	Grind corn using stones.
C. Butter	1:100-101	See films on food. Put cream in jar and let students shake it into butter in class.
D. Growing Food	1:174-175 1:76-94 5:58	Point out the need of water in growing things and discuss method man uses in watering his plants.
E. Selling	4:18	Discuss packing and delivering of food. Show films on canning food.
1. Store	6:115-118 4:112	
2. Lemonade Stand	6:6-7	Construct lemonade stand and sell to students.
IX. Simple Machines	5:211-221	Discuss how simple machines help man do work. Construct examples.
X. Pollution		
A. Air	4:60-61	Name causes of air pollution.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
XI. Water Purification	4:113	Discuss process of purifying water.
XII. Manufacturing		
A. Rubber	7:44-45	Have someone bring an old tire to school. Cut a section from the tire for study. Discuss functions of a tire in society.
B. Packaging	8:74-91	Discuss how heavy appliances are shipped.
C. Candle Making	5:194	Make candles from paraffin and drinking cups and wicks. Color cups to desired color.

TEXTBOOK BIBLIOGRAPHY - GRADE TWO

1. Brandwein, Paul F. Concepts in Science, II. New York: Harcourt, Brace and World, Inc., 1966.

2. Bremer, Neville H. Skills in Spelling II. Wichita, Kansas: McCormick Mathers Publishing Co., 1968.

3. Gundlach, Bernard H., et al. Sets, Numbers, Numerals II. River Forest, Illinois: Laidlaw Brothers, Inc., 1965.

4. Mallinson, George G. Science II. Atlanta, Georgia: Silver Burdett Company, 1968.

5. Navarra, John G. Today's Basic Science. New York: Harper and Row Publishers, 1967.

6. Sheldon, William D. and others. Town and Country. Boston: Allyn and Bacon, Inc., 1968.

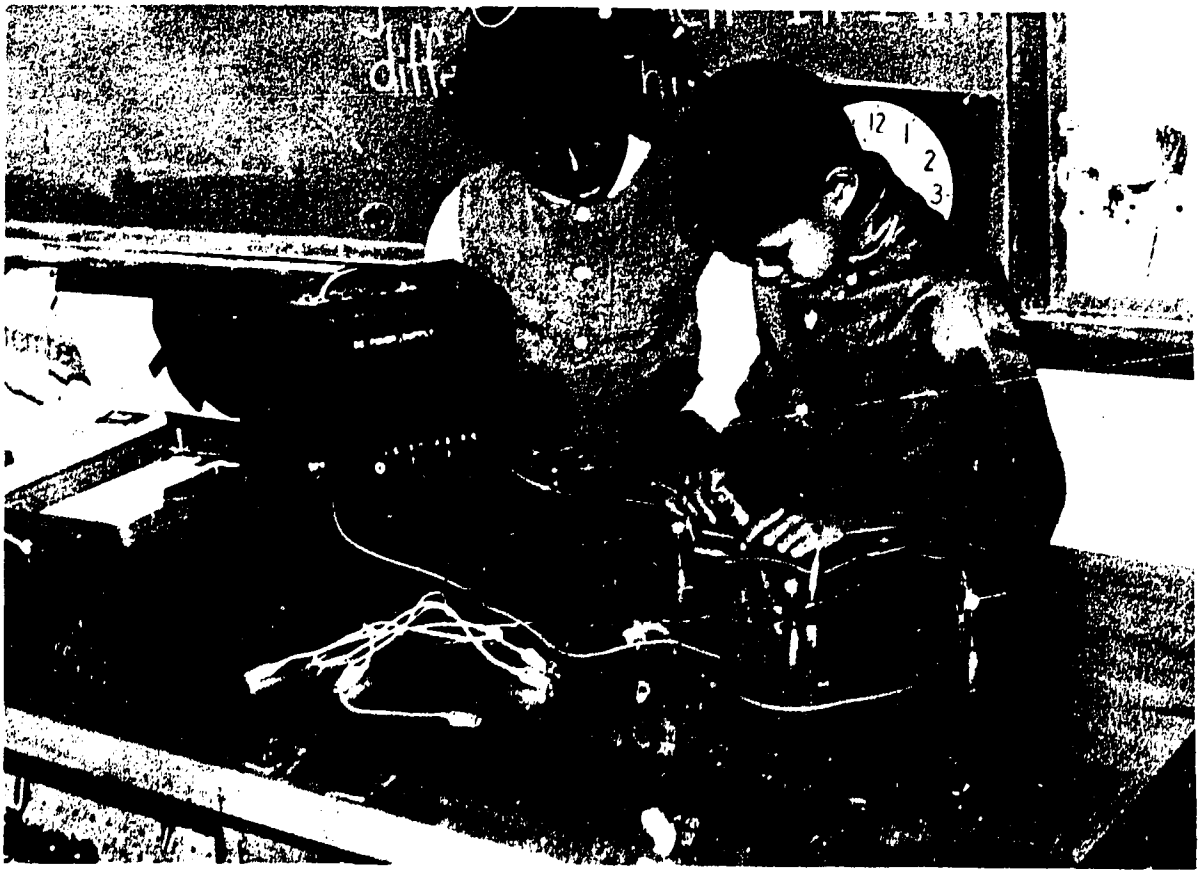
7. Sheldon, William D. and others. Field and Fences. Boston: Allyn and Bacon, Inc., 1968.

8. Martin, Bill, Jr. Sounds of Laughter. New York: Holt, Rinehart & Winston, Inc. 1966.

9. Scipione, Alice M. Enchanted Gates. New York: The Macmillan Co., 1966.

10. Scipione, Alice M. Shining Bridges. New York: The Macmillan Co., 1966.

GRADE THREE



GRADE III

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
Manufacturing	3:146=147	Study, test and experiment with various materials used in manufacturing. Discuss the properties of each.
A. Wood	1:235	
B. Iron	3:103	Discuss function of iron foundry. Reveal jobs in such a plant.
1. Iron Foundry	10:97-110	
C. Clay Products	3:95	Experiment with native clays and compare them with commercial clay. Construct adobe house.
D. Steel	3:102-103	Describe physical changes of steel.
E. Uranium Ore	3:104-105	Discuss the use of uranium.
F. Oil	3:106	Discuss products derived from petroleum. Construct model of oil well.
G. Coal	3:107	Discuss uses of coal.
H. Food	1:21,157 3:102 3:126-127 6:104-105 4:63 1:226	Discuss food industry and how it effects lives of American people. Show films on new mechanical developments in preparing foods. Point out jobs involved in such an industry.
1. Growing	10:55-62 2:85-87 11:50-55 3:56-57 7:131	Using different types of soils grow plants and determine differences if any. Discuss value of water in making things grow.
2. Preparation	6:20-70 4:159 4:56 10:170 10:206 1:4	Discuss new developments in cooking.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
I. Eggs	9:146-147	Discuss new mechanical developments in processing eggs. Show film Eggs to Market.
J. Tools	4:258	Tool identification, make vocabulary list. Familiarize students with operation of tools.
1. Saws	5:42	
2. Hammers & nails	4:1	
3. Sandpaper	4:105-109	
4. Measuring devices		
K. Finishing		Use the finishes in preserving a project. Give reasons for putting a finish on a project
1. Stain		
2. Lacquer		
3. Varnish		
4. Paint	6:5	
II. Power		
A. Simple Machines	3:74-79	Construct simple machines. Construct applications of simple machines ie. Elevator, sled, cart. Compare their uses. Discuss the importance of machines in helping make man's work easier.
1. Lever	3:74-75	
2. Wheel & Axle	3:78-79	
3. Screws	3:76	
4. Inclined Plane	3:76	
5. Wedge	3:76,79	
6. Pulley	5:142-155	
	3:78-79	
B. Machines	3:80-91	
C. Electrical	1:58-71	Construct projects that incorporate electrical power for their operation; motors, buzzers, lights. Construct simple generator.
	2:75	
1. Computer	11:13-21	Study computers and their effects on society.
2. Robot	11:29	Explain the function of a robot.
	11:35-40	
D. Wind	3:45	Discuss the distructive power of wind and how man harnesses wind to do work for him.
	5:20	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
E. Air	1:43 5:20-43	Discuss uses of air. Give examples.
F. Solar	1:22-24	Discuss how man uses Solar power. Construct working model of some item using solar power.
G. Water	1:36-37	Discuss the uses of water power. Construct examples.
H. Burning Fuels		Discuss the power of burning fuels in getting a rocket off the ground.
II. Transportation		
A. Land		
1. Trucks	5:80-85 4:216	Study and discuss trucks, their uses, how they are dispatched and scheduled. Develop a model of facility that requires control similar to a real one.
a. Fire	5:80-84	Construct model of firetruck. Be as realistic as possible. Give equipment used.
2. Train	7:224 8:7 6:41,166 4:216	Construct model of train depot. Discuss dispatching and scheduling of trains. Discuss duties of porter and engineer.
a. Inclined Railway	3:71	
3. Automobile Taxis	3:85 4:171 8:91	Discuss function of a taxi and its importance to people.
4. Sled	10:279	Study old and current uses of sleds. Compare sled with wheeled vehicles.
5. Bus	6:123 6:138 9:58-59 8:82-94	Visit bus station if possible. Discuss the scheduling of buses. Construct models of different buses. Construct models that are as realistic as possible. Discuss jobs of bus driver.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
6. Automobile	9:63 7:131	Discuss purchasing automobile. Let students act part of salesman and sellcars to one another.
7. Buggy	10:234-242	Compare yesterday's and today's vehicles in quality and quantity of construction.
B. Air		
1. Airplane	10:111-123 6:76,219 10:140 11:227-228	Construct models of airplanes and helicopters including as many actual likenesses as possible. Compare functions with those of other transportation vehicles.
2. Helicopter	11:227-228	Discuss functions of each.
3. Rockets & Space Ships	1:52 5:102-113 6:181-227 4:216 2:35 7:182-204 6:227,263	Discuss the type of fuel used. Launching of model rocket using different size engines and see differences in heights of each launch. Dramatic play rocket ride to the moon.
C. Water		
1. Row Boats	10:84	Construct models of water vehicles using as many actual likenesses as possible.
2. Sailing Vessels	1:41,145 10:84-86 11:161 6:60,307 6:125-126 10:186	Have sailboat races if facilities are provided.
3. Freighters	10:43-44 10:275	Discuss advantages of shipping materials by boat.
4. Fishing Vessels	10:125-129 10:136-137 10:142	Discuss the importance of boat in catching fish.
5. Fire Boat	8:50-59	Construct fire boat as near to realistic as possible. Discuss its functions in harbor.
6. Harbors	10:41-45 10:125-138	Construct model of harbor. Discuss its functions.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
D. Bicycle Safety	9:250-252 4:17	Give regulations as to when a bicycle is safe to ride. List safety rules to follow when riding a bicycle.
IV. Communications		
A. Newspaper	10:14-16 6:152 9:69	Visit newspaper office, studying kinds of printing. Make one color silk screen print and linoleum block print. Discuss printing of newspaper.
B. Television	10:16-24 6:187	Visit television station if possible. Show film on the making of a T.V. program. Discuss jobs involved.
C. Satellite	11:69-76 7:161	Discuss satellites in relation to T.V. and telephones. Use kit and construct model.
D. Lighthouse	11:238 11:247-248	Discuss functions of lighthouse.
E. Camera	7:104	Discuss function of camera in world of communications. Take pictures.
F. Sound	3:156-181 5:156-173	Discuss how sound is received by us and how we use sound. Construct objects to show different methods of making sound.
E. Symbolic 1. Traffic lights	6:8 5:99	Construct operating model of stop-light.
F. Library	9:61 5:14	Discuss procedure of checking out books.
V. Construction		
A. House	11:113-117 10:277-279	See different types of homes. Compare different types of homes in different areas. Construct scale model of some of these. Compare in relation to building materials.
1. Stone	3:95	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
B. Public Buildings		
1. Delicatessen Store	7:256-281	Discuss products sold in a delicatessen store. Demonstrate proper way to ring up a sale on cash register.
2. Fruit Stand	8:61-65	Discuss products sold at fruit stand.
3. Apartment	9:50-58	Compare to regular house.
4. Candy Shop	7:88-91	Make candy. Set up candy shop in room. Let students practice selling candy to each other.
VI. Services		
A. Public Servants		
1. Policeman	9:62 7:274-281 8:8-9 10:38 10:47	Discuss a policeman in relation to crime prevention and traffic control. Have policeman come and talk to the students about safety.
2. Fireman	5:80-84	Discuss fireman in relation to fire prevention and household safety.
B. Private Servants		
1. Storekeeper	10:66	Discuss storekeeper's job and his function in the community.
2. Blacksmith	8:47	Discuss duties of blacksmith and why he no longer exists.
3. Veterinarian	9:45	Discuss veterinarian's function in the community.
		Have students design and construct projects incorporating as many of the units as possible. Let them create whatever they wish from what they have studied. They must plan their projects by making a sketch of what they are going to do. The projects have to be reasonable.

1. Brandwein, Paul F. Concepts in Science III. New York: Harcourt, Brace & World, Inc. 1966.

2. Bremer, Neville H. Skills in Spelling III. Wichita, Kansas: McCormick Mathers Publishing Co., 1968.

3. Mallinson, George G. Science III. Atlanta, Georgia: Silver Burdett Co., 1968.

4. McSwain, E. T., et al. Arithmetic III. River Forest, Illinois: Laidlaw Brothers, 1965.

5. Navarra, John G. Todays Basic Science III. New York: Harper & Row Publishers, 1967.

6. Pollock, Thomas C. The Macmillan English Series. New York: The Macmillan Co., 1967.

7. Sheldon, William D. and others. Story Caravan. Boston: Allyn and Bacon, Inc., 1968.

8. Sheldon, William D. and others. Magic Windows. Boston: Allyn and Bacon, Inc., 1968.

9. Martin, Bill, Jr. Sounds of the Storyteller. New York: Holt, Rinehart & Winston, Inc, 1966.

GRADE FOUR

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
I. Power A. Animal	5:8-9 4:120-121	Encourage students in developmental experiences geared to an understanding of how their lives depend on the different areas of power.
B. Wind	2:91 7:30-35 4:82,84 4:136,156	Discuss and test natural power sources. Compare these with each other and more sophisticated sources. Show films on the kinds of power and their uses.
1. Air	5:30-49 2:99-126	Construct model of windmill. Discuss how it takes natural power and converts it into mechanical power. Show uses of compressed air.
C. Water	2:220-227 2:235-253 5:66-67 5:114-115 4:76,79 13:12 4:184	Discuss and test the power of water. Show how water power is changed to mechanical power.
1. Dams	4:187-188 4:92-93 5:50-77 2:61-95	Discuss the uses of dams. Field trip to Hydroelectric dam.
2. Steam	4:122 4:93	Discuss the uses of steam. Make working model showing how steam is converted into mechanical power.
D. Electricity	5:60 5:100-128 7:206-230 4:184-188 1:137 1:154-155 3:61 4:76,143 7:13-19	Discuss safety in working with electricity. Discuss danger of flying kites around electrical wires. Construct an electromagnet. Tear apart an old motor to see how the field, armature coils are wound. Construct a simple electric motor and label the parts. Advanced students may make a generator. Demonstrate the differences in static and current electricity.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
IV. Water Pollution	2:90 5:22-23 5:92-93 7:180 1:9	Study causes of water pollution. Study methods of control and the effects water pollution has on a community.
V. Air Pollution	5:38-39 5:70-91	Study causes of air pollution. Study methods of control.
VI. Waste Control	5:88-89	Discuss methods used by your community to help solve waste. Have city administrator to come and talk to class on waste control in the city.
VII. Weed Control	5:16-17	Discuss methods used by your community to help solve weeds. Spray weeds around school.
VIII. Manufacturing		Design and plan bulletin board display depicting the different phases of manufacturing seen in a particular region, state, or area. Bring in samples of manufacturing products.
A. Mass Production	4:219	Plan a project and construct a pilot model. Design a flow chart of simple mass production projects. Operate production line. Compare local factories. Field trips to local factories. Students may produce and sell a product to raise money for a class undertaking.
B. Food	4:110-114 4:220 4:207 4:174-175 4:102-107 4:61 4:72-73 1:45	Discuss the foods used by Indians, and how they were prepared. Discuss ways of making and using Indian utensils.
1. American Indian	12:202	Construct tools used by Indians. Grind corn using stones. Compare modern and historical food processes.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
E. Petroleum 1. Oil	4:109 4:93 4:199 4:219 4:144-146	Study uses, sources, suppliers, and processors. Construct model of first oil well.
F. Coal	4:109 7:134 4:148 4:75	Discuss the nature of coal, the making of coke and the uses of coal.
G. Engine 1. Gasoline	4:123	Study the nature and uses of gasoline engines. Use old lawn mower to show construction of gasoline engine.
2. Rocket	13:132 6:122 3:65 7:98-102 3:72	Construct model rocket and fire it. Discuss the types of fuels used in engine.
H. Atomic	4:81	Discuss nature of the atom, production of atomic energy and uses of atomic energy.
I. Energy 1. Heat	5:130-169	Discuss uses of heat.
II. Transportation A. Land 1. Horse a. Stagecoach	4:195	Compare with the following methods of transportation to see how friction is reduced and transportation improved.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
		Read stories on transportation. Have class discussions on methods of transportation, old and new.
		Construct model of stagecoach.
		View films, movies, and slides on transportation.
b. Covered wagon	4:190-191 4:52 4:54,92 4:173 12:216 11:412 13:120	Construct model of covered wagon.
2. Sled	3:77 12:362-364	Build historical and modern transportation vehicles to learn more of the details of the various vehicles.
3. Bicycle	3:103 6:12 8:141,178	
4. Train	13:123 2:233 1:149 4:205 4:93 3:32	
5. Automobile	10:350-356	
a. Manufacturing	4:118-119 4:18-19 4:38,47-49	Study manufacturing of automobile.
b. Traffic Safety	1:24 3:15 8:74	Construct highway signs and possibly set up a modern highway.
c. Ambulance	11:392-393	Discuss the uses of the automobile in industry.
6. Bus	4:13,18-19 3:19 6:145	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
7. Truck	4:18-19	
a. Fire Truck	11:394-396	
Air		
1. Airplane	4:98,199 7:263-280 8:44 9:98-108 9:140-147 11:148-153	Construct model of Wright Brothers plane and other early planes. Discuss the contribution the Wright Brothers made to our modern aircraft. Take trip to Wright Brothers museum and memorial.
2. Rocket	8:201	
3. Helicopter	9:282 11:158-171	Construct models of helicopters.
Water		Make models of as many different types of water vessels as possible. Compare them from the standpoint of basic operation, power, functions, efficiency, and materials. When speaking of functions, tell how progress has affected the world of transportation.
1. Paddle Wheel Boat	13:112 4:200,124	
2. Flatboat	4:91 4:121	
3. Canoe	3:23 4:126 4:123	
a. Outrigger	12:371-373 13:92	
4. Sailing Ships	13:101,108-109 3:39 5:181,28-29 7:189 4:221,156 4:10,82,36 3:21	
a. Sailing	12:336	
5. Ocean Freighters	4:114-115,201,61 3:83 8:204-206 12:303	
6. Tankers	4:114-115	
7. Rowboats	9:244-253 4:143	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
8. Barge	4:97	
9. Commercial	7:189 4:61,67,152-153 3:39 8:186	
a. Whaleboat	11:38-367	
b. Fishing	12:323	
10. Houseboat	9:330-339	
11. Experimental	11:172-179	
12. Ocean Liners	13:116 3:83	
13. Icebreaker	8:84	
14. Canal Locks	4:136 4:86-88	
15. Harbors	4:114-115 4:155,201	Study what takes place at a harbor.
III. Construction - Houses		
A. American Pioneers	4:51-54 3:79,91	Make models of pioneer homes (log cabins, sod houses) and compare with homes of today. Compare from [illegible]ndpoint of materials, methods of construction, and cultural effects on houses. Exhibit various kinds of materials used for shelter.
1. Hammers, Saws, Measurement	1:151 6:151-152 8:228 7:234-254	Design and construct projects.
B. America Today	7:255 4:18-19	Construct projects depicting city and suburban life.
C. Road Construction	4:24-29 8:56	Study methods of road construction. Field trip to a construction site. See slide series on road construction.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
2. Eskimo	12:287	Discuss methods used in getting foods.
C. Wood	4:150 4:176-179	
1. Lumber	15:12-13 5:78-79 2:152-158 13:77	Field trip to forest. Study trees and the different processes that logs undergo. Visit sawmill.
D. Paper	4:149	Make paper. See film on paper-making.
E. Sulfur	4:147	Discuss the mining of sulfur, its uses, and area where sulfur is found.
F. Copper	4:194	Discuss location of copper mines. Discuss the processing of the copper ore.
G. Textiles 1. Cotton	13:18 4:136-138 4:80-81 4:85	Exhibit various kinds of fabrics. Construct simple loom and weave some material on loom. Compare historical and cultural looms. Dye cloth using natural and commercial dyes.
2. Clothing Store	4:127	Discuss the importance of a clothing store to a textile mill.
3. American Pioneers		Compare clothing and methods of producing clothes.
4. American Indians	12:202	
H. Steel & Iron	11:358 4:159 4:108 4:124-125 4:115-118	Discuss the processing of iron ore. Study iron and steel industry and effects on the nation.
I. Bricks	4:85,137	Use resource material to find what goes into making bricks, use authentic materials if possible and make bricks.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
J. Sandstone	4:108	Discuss uses of sandstone.
K. Fishing	4:185-186 4:219 4:58 10:24 13:134 2:175-195	Study processes of preparing fish for customers to purchase. Visit fishery and fish hatchery.
L. Rubber	4:96	Study processes. Have local tire dealer come in and explain the materials and processes used to make a tire.
M. Candle Making	4:80	Make candles as the early Americans did.
IX. Communication		
A. Telegraph	9:208	Discuss the importance of a telegraph and its effect on society Construct telegraph set.
B. Telephone	9:380-389 12:160 8:34	Discuss historical background of telephone. Observe early telephones.
C. Mail	9:383 8:86-87	Discuss the historical background of the mail service.
1. Pony Express	11:232	Discuss the historical significance of the pony express.
D. Printing 1. Letterpress	4:80-81	Compare printing of yesterday and today.
E. Light	2:28-59 5:130-169	Discuss uses of light
F. Sound	2:5-27	Discuss uses of sound.
X. Doctor	9:324-329	Discuss the advanced technology in heart operations.
A. Services		

TEXTBOOK BIBLIOGRAPHY - GRADE FOUR

1. Bauer, W. W. Health For All. Glenview, Illinois: Scott, Foresman, Co., 1965.

2. Brandwein, Paul F. Concepts in Science IV. New York: Harcourt, Brace & World, 1966.

3. Brueckner, Neville H. Skills in Spelling IV. Wichita, Kansas: McCormick Mathers Publishing Co., 1968.

4. Hanna, Paul R. In All Our States. Glenview, Illinois: Scott Forseman and Co., 1965.

5. Mallinson, George G. Science IV. Atlanta, Georgia: Silver Burdett Co., 1968.

6. McSwain, E. T., et al. Arithmetic. River Forest, Illinois: Laidlaw Brothers, 1965.

7. Navarra, John G. Todays Basic Science IV. New York: Harper & Row Publishers, 1967.

8. Pollock, Thomas C. The Macmillan English Series. New York: The Macmillan Co., 1967.

9. Monroe, Marion and others. Open Highways. Glenview, Illinois: Scott, Foresman and Co., 1965.

10. Martin, Bill, Jr. Sounds of Mystery. New York: Holt, Rinehart & Winston, Inc. 1967.

11. Sheldon, William D. Believe and Make-Believe. Boston: Allyn and Bacon, Inc. 1968.

12. Harris, Albert J. The Magic Word. New York: The Macmillan Co., 1966.

13. Mursell, James L. Music Near and Far. Morristown, New Jersey: Silver Burdett Co., 1956.

GRADE FIVE

GRADE V

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
I. Construction		Discuss materials used in construction. Have samples.
A. Materials		
1. Wood	4:167 4:160 4:201	Show pictures of different types of construction of buildings, bridges, and roads.
2. Cement	4:241 4:321 4:298-299 4:306-307	Test different materials in the above construction activities.
3. Steel	4:228-235 4:250	Use films and filmstrips to make these more realistic experiences. Make authentic models.
4. Copper	4:473	Discuss expansion of materials caused by heat and cold.
		Discuss tools and machines used in construction of roads, buildings, bridges and boats.
		Discuss the reasons for selecting certain areas and types of soils for construction of buildings.
B. Roads	4:79,103 4:337-340	Discuss the procedures used in the construction of roads such as surveying, clearing land, roadbed preparation, etc.
C. Fort	4:104	Construct a model fort.
D. Water Related Construction		
1. Canal Locks	4:344-346 4:271,219 4:342 3:51	Show how canal locks work in getting boats through a canal.
2. Boats	4:110-111	Construct boats to be used in a model harbor.
3. Harbor	4:225-227 4:384,475	Construct model of harbor showing the types of materials that are shipped from the harbor and types of boats.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
4. Dams	4:241,321 4:298-299 4:306-307	Construct model of dam.
5. Bridges	6:38-39 4:219 4:329	Draw simple plans of a bridge. Discuss the jobs involved.
E. Rocket and Space Vehicles	2:125-128 4:194 7:233	Construct model rockets having more than one stage. Research and find out what materials are used in construction of a rocket.
II. Manufacturing	4:249-254 4:207-210	Process typical examples of various foods.
A. Foods	6:257-285 1:133-135	Field trip to food processing plant. Films on processing are also available.
1. Fruits & Vegetables	5:98-99 5:112-113 5:267 6:179 5:267 6:257-282 4:232 4:301-302 4:464	Study the retail market. Discuss the processing of each of the products listed.
2. Sugar	4:325-326 4:426-429	
3. Meat Packing	11:202-205 4:263-264 4:270,287,461 4:466,495	Discuss how hot dogs are made and packaged.
4. Syrup	4:205,383	
5. Dairy	7:371-373 3:75 4:232 4:267-268	Make butter using more than one method. Let students do research and find the different methods used in making butter.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
6. Grain	4:197-232 4:257-258	Let students bring to class examples of the different types of grains grown in Bertie County.
a. Production	4:261-266 4:384-386 6:182 4:449 5:112-113	
b. Products	7:224	
7. Seafood	6:143-144	
a. Salt Water	4:315-316	
8. Conversion	6:238 4:206	
Cellulose Fiber Industries		
1. Lumber	4:211,382 4:303-307 13:50-52 13:141 4:103	Visit a saw mill. Make a model of saw mill. Discuss the types of cuts made on a log. Using small limbs from trees duplicate cuts made at saw mills.
2. Types of Trees	11:164-169 13:178-179 13:120-121 6:170 5:92-94 5:264-265	Discuss types of trees, what they are used for and where they are found.
3. Wood Pulp and Paper	4:385,474 5:92-94 4:293-294 4:208,247	Make authentic paper using pulp.
4. Furniture	3:22,31 3:41,45	Construct authentic models of furniture.
5. By-products	4:246-247 4:293-294	Discuss the uses of wood by-products.
Textiles		
1. Cotton	13:64-67	Grow some cotton, harvest and process it.
a. Harvesting	4:162-163 4:243	Make model of cotton gin.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
b. Processing	4:162-163	
c. Spinning and Weaving	7:317-320 4:207-209	Make simple equipment to spin and weave cloth.
d. Clothing	4:244	Compare different materials used to make clothing. Field trip to Blue Bell, Inc. to see phase of clothing industry. See film on the processing of clothing.
2. Silk	2:257	Discuss how silkworm manufactures silk.
D. Guns	4:181-182	Discuss the role that interchangeable parts play in the factory today.
E. Tobacco	4:29 6:282	Study processing and harvesting of tobacco by colonial people and by people of today. Construct a colonial drying shed.
F. Petroleum	5:69 2:35,334	Make an oil drilling rig. Show different stages of fuel processing.
G. Glass Making	4:227,404, 4:406	Study the processes of making glass.
III. Power		
A. Hydroelectric	6:83	Make model of a dam with a hydroelectric generator.
B. Electric	6:292 6:296-308 5:20 5:176,178	Make model of some form of electrical equipment such as an electric motor, buzzer, heater, light circuits, etc.
C. Pneumatic	9:17	Discuss use of pneumatic tools in making work easier.
D. Atomic	5:8-9 6:293	Make models of the atom. Construct a model of a reactor.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
E. Power of Burning Fuels	5:188-189 2:81 5:66-69	Construct model of service station.
1. Engines	6:62-82	Discuss the difference in these engines.
a. Diesel	6:73-75	Discuss the likenesses of these engines.
b. Rocket	2:[illegible]-110 2:125 6:80-81 5:16[illegible]-163	
c. Internal Combustion	6:69-76	Show the strokes of internal combustion.
d. Jet Engine	6:77-80	
1. Ramjet	6:79	
Turbojet	6:79	
e. Steam	6:64-68 4:169	
f. Steam Turbine	6:67-[illegible]	Construct model of steam turbine.
F. Heat Energy	5:22,188 5:176,195 6:25-58	
G. Light Energy	5:22,94 5:106-108	
H. Water	3:1[illegible]0	
IV. Communications	6:315-336 2:316-336 5:223-225 5:228-229	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
A. Telegraph	4:363-369 3:34 2:322 5:223	Construct a model of a telegraph.
B. Telephone	4:183,366 6:327 8:36 8:41-42 8:219 9:98	Study and use a telephone. Discuss importance in mass communications.
C. Computer	4:198	Explain that the computer helps man solve problems.
D. Lighthouse	4:202	Construct a model of a lighthouse.
E. Smoke	4:357	
F. Telestar	9:47 4:369	
G. Television	4:357,366-369 7:268,33 8:217 6:334-336	
H. Pony Express	4:358-359	
I. Printing	4:362-363 8:177	Study printing. Perform some printing operation.
J. Radio	4:366-369 6:330-334	Construct crystal radio. Do research on history of radio. Produce and broadcast radio program.
K. Writing	8:25	Study the various styles of writing and writing instruments and materials. Do reports on various kinds of communication. Construct quill pens.
L. Sound	8:218-219 5:223-233	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
V. Transportation		
A. Air		
1. Airplane	4:336,311 4:332,337 3:56 4:380,387 4:413,440 4:475,311 4:354	Construct model airplanes and airports.
2. Space Travel	9:122-178 5:158-159 2:97-106 5:162-167 5:295 3:81 4:236	
3. Airport	4:94 4:354 4:380	
B. Land		
1. Automobile	4:350-351 3:08-99	Construct models of cars. Visit a car dealer, car service department.
2. Train	4:347-350 11:97 12:120-131 9:243-249 13:100 4:180	Discuss types of cars in a train giving their uses. Show films if available. Construct models of different types of cars. Discuss dangers involved in building a railroad.
C. Water	4:341-340 10:345 9:370-381 13:124-125 12:69 12:82-91 4:119 4:123-125 4:132-133 4:299 4:111 4:157159 4.169 4:185	Construct models of different boats and study boat building. Field trip to marina.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
VI. Industries of Other Countries		Study these industries as if they were in the U. S. Find out how the products originated, and how how they were processed and distributed. Discuss the importance of importing goods from these countries.
A. South America		
1. Cattle Raising	4:446,451 4:463-465 4:471-472 4:479 4:493-494	
2. Dairy Farming	4:464	
3. Foods		
a. Wheat	4:462	
b. Coffee	4:482	
4. Mining		
a. Copper	4:473-474	
b. Coal	4:446 4:482 4:487 4:492	
5. Petroleum	4:466 4:473 4:479-480 4:482	
6. Coal	4:473	
7. Iron & Steel	4:479-480 4:446,466 4:474	
8. Railroads	4:440,452 4:460-466 4:476,483 4:487,494	
9. Tobacco	4:434	
10. Electric Power	4:451	
B. Mexico		
1. Food	4:400-403 4:397-398	
2. Cattle Raising	4:401,415	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
3. Coal Mining	4:399	
4. Steel	4:404	
5. Oil	4:401	
C. Central America		
1. Cattle Raising	4:415,418	
2. Railroads	4:413	
3. Goal Mining	4:417	
4. Lumbering	4:417-418	
D. Carribbean Region		
1. Sugar Cane	4:421 4:426-427	
E. Peru		
1. Copper Mining	4:487	
F. Bolivia		
1. Farming	4:490	
G. Uruguay		
1. Sheep Raising	4:494	
H. Canada		
1. Fishing	4:373	
2. Dairy Farming	4:382-384	
3. Railroads	4:385-390	
4. Highways	4:391	
5. Lumbering	4:381-387	
6. Grain		
a. Wheat	4:385	
7. Fur Trading	4:373-374	
8. Steel	4:382-385	
9. Oil	4:386	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
10. Coal	4:82 4:386-387	
11. Alum	4:388	
12. Goal	4:382-389	
13. Cattle Raising	4:385,387	
14. Electric Power	4:385,388	

TEXTBOOK BIBLIOGRAPHY - GRADE FIVE

1. Bauer, W. W. Health For All. Glenview, Illinois: Scott, Forseman Co., 1965.

2. Brandwein, Paul F. Concepts in Science V. New York: Harcourt, Brace & World, Inc., 1966.

3. Bremer, Neville H. Skills in Spelling V. Wichita, Kansas: McCormick Mathers Publishing Co., 19[illegible]

4. Brown, Gertrude S. Your Country and Mine. Boston, Massachusetts: Ginn and Company, 1965.

5. Mallinson, George G. Science V. Atlanta, Georgia: Silver Burdett Co., 1968.

6. Navarra, John G. Todays Basic Science V. New York: Harper & Row Publishers, 1967.

7. McSwain, E. T., et al. Arithmetic. River Forest, Illinois: Laidlaw Brothers, 1965.

8. Pollock, Thomas C. The Macmillan English Series. New York: The Macmillan Company, 1967.

9. Monroe, Marion and others. Open Highways Readers Book 5. Glenview, Illinois: Scott, Forseman and Co., 1966.

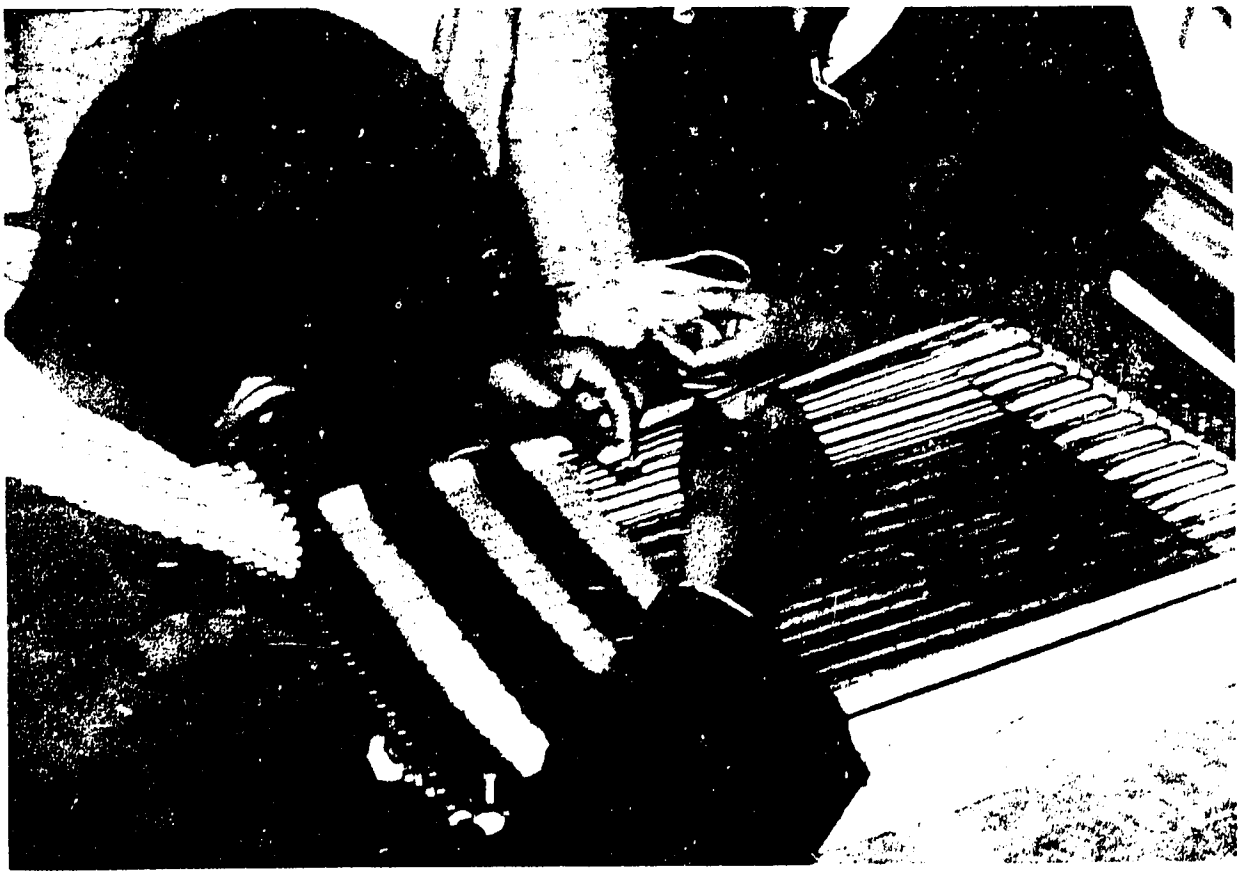
10. Harris, Albert J. Bold Journeys. New York: The Macmillan Co., 1966.

11. Martin, Bill, Jr. Sounds of a Young Hunter. New York: Holt, Rinehart and Winston, Inc. 1967.

12. Sheldon, William D. Finding the Way. Boston: Allyn and Bacon, Inc., 1968.

13. Murs[illegible]l, James T. and others. Music In Our Country. Morristown, New Jersey: Silver Burdett Co., 1956.

GRADE SIX



GRADE VI

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
I. Communications		
A. Writing	4:51-52	Compare the different styles of writing.
1. China	4:89-90 4:139	
2. Japanese	6:65 4:151	
3. Roman	4:461 4:159,93 4:97,202	
4. Papyrus	4:71,90 4:97	Prepare paper, parchment, papyrus.
5. Paper	4:240,249 4:289,370 4:372,452	
6. Printing	4:239-240	Study different types of printing. Design and make a print using the linoleum block process. Two color.
B. Electronic		
1. Electrical Safety	1:168-169 1:166	Discuss the safety factors that deal with electrical safety.
2. Television	2:272-279	Discuss transmission of television waves, method waves are received, and how we are able to see a picture.
a. Television Camera	5:233	
b. Telestar	5:220-221 5:231	Visit television station. Produce TV program on video recorder.
3. Computer	8:253-254	Discuss the job of a computer and what it takes for it to solve a problem. Visit a place of business which has a computer if possible.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
4. Radio	2:68	Discuss the transmission of a radio signal and how it is received. Discuss the uses of a radio. Study equipment that uses radio waves for operation.
a. Radio Telescope	2:270-273	
b. Radio Telephone	2:381	Construct crystal radio using sliding tuner.
c. Radio Waves	5:14 5:16-17 5:233,276 5:220 5:229-230	
5. Telephone	2:261-268 5:15 8:105 3:34 6:4 2:270-271	Set up telephone communication. Discuss the jobs involved and the new mechanical developments in telephone system.
6. Satellite	7:133-134 5:9,14 5:259,276 2:272 2:275-277	
C. Electrical 1. Telegraph	2:257-261	Set up telegraph communication system from class constructed models. Send telegrams to each other using International Code.
II. Construction A. Houses	3:119 4:41,49 4:93 4:148 4:320 6:171 6:200-202 6:239	Study construction materials used in building houses. Compare the materials used in colonial days to the ones used today. Discuss the materials used to build houses in other countries. Construct models of different types of houses.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
1. Ancient Egypt	4:96	Make adobe bricks, modern bricks, concrete bricks.
2. Finland	4:374	Study the factors that are considered in what type of house is to be built. (climate, materials, location, etc.)
3. Iraq	4:58	
4. Ireland	4:322	
5. Italy	4:189	
6. Japan	4:468	
7. Middle East	4:49 4:33 4:40-41	
8. Roman	4:200	
9. Sumaria	4:51 4:20-21	
B. Aquiducts	4:54,57,186,197	
C. Road	4:73,148,158	Study materials and machines involved in road construction. Use slides. Construct a model highway having a bridge.
a. Assyrian	4:54-55 4:51	Discuss the construction of roads in other countries. Compare with U.S.
b. Roman	4:187 4:191-192 4:196-198 4:270	
c. Russian	4:443	
d. Swiss	4:408-409	
III. Manufacturing A. Metal 1. Iron	2:74-80	Study refining process of the various types of metals.
a. Cast Iron	2:78 5:143 2:90,93 5:34,195,265 5:267 4:20	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
	4:54,151 4:190,216 4:256 4:260-261 4:288-299 4:308-312 4:344-347 4:366,368 4:370-371 4:389,391 4:405,419 4:423,446 4:448,471 4:482,488 4:504,508 4:514	Make reports on the types of metals giving their characteristics. Collect samples of the different metals. Construct projects using the different metals to discover the characteristics. Construct model of refining operation. Show films of the metals being processed. Experiment with metals to test for hardness, wear, flexibility, etc. Name the uses of the various metals and where they are found. Make projects using tooling foil.
2. Steel a. Stainless	2:79 2:76-80 5:35 4:216,288 4:311-312 4:347 4:368,370 4:391 4:447 4:450-451 4:470	
3. Copper	5:272-273 5:282 2:49 2:51-52 2:70-76 2:80 4:51,70 4:151 4:81 4:176-177 4:190	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
	4:258 4:260-261 4:405,488 4:508,511	
4. Gold	2:80,82 2:92 4:51,71 4:251 4:405-451 4:471,480 4:483,502 4:505,508 4:514-515	
5. Silver	4:51,190 4:251,355 4:405,488 4:514 4:195 2:50-51 2:80,82	
6. Tin	4:51,71 4:130,151 4:258,261 4:476-477 4:508 2:10,76 2:80-81	
7. Chromium	4:451,508 5:38,240	
8. Manganese	4:51	
9. Bronze	4:51 2:76,80	
10. Brass	4:176-177	
11. Bauxite Aluminum (Aluminum Oxide)	4:181,451 4:505 2:48-505 2:55 5:34,240 5:282 2:93	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
12. Mercury	2:73 4:261	
13. Nickel	4:372,451 4:480,482 5:265	
14. Uranium	5:208,210,275,204,235 4:508 2:287,291,299,310 2:369,302,308 2:295-296	
15. Lead	2:73,92	
B. Glass		
1. Machines	4:367	Construct bulletin board showing process of manufacturing glass. Study machines involved in making glass. Collect samples of raw materials used.
2. Blowing	4:367	Experiment with glass blowing using glass tubes and old bottles.
3. Stained	4:237,284	Discuss the process of staining glass.
C. Clay Products 1. Pottery	4:30,35,51 4:61,55,312 4:338,415 4:355,356	Collect native clay, form, fire in kiln. Compare projects using commercial non-kiln dried clay and native clay.
2. China		
D. Coal	2:206,279 2:370 5:37,203 4:20,151 4:190,216 4:258	Study the mining of coal. Describe tools used. Study the role of coal as a fuel in production of iron ore.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
	4:298,299 4:309-310 4:344,389 4:391,405 4:419,423 4:446,448 4:459514 4:486-488	
E. Petroleum	4:47,59-60 4:64,508 4:83-84 8:200-201	Examine the types of fuels that are extracted from crude oil. (gasoline, kerosene, fuel oil)
1. Countries		
a. Africa	4:496,499	
b. Austria	4:405	
c. Burma	4:126	
d. Indonesia	4:477	
e. Middle East	4:47,49-50 4:59,64,74,83	
f. Rumania	4:180	
g. Russia	4:449	
h. Sicily	4:189	
2. Products		
a. Kerosene	2:218-219	
F. Textiles	4:2,59 4:35-36	Compare historical and cultural looms.
1. Natural fibers		Discuss process of cotton.
a. Cotton	4:115,453 4:58-59 4:98,115 4:118,122 4:123,176 4:311,344 4:453,468 4:507	Construct spinning wheel and try spinning cotton. Construct loom with hand shuttles. Weave some cloth.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
b. Silk	2:86-88 4:138-139 4:145-146 4:285,287 4:273.453 4:469	Discuss the processing of silk, caring for silk worms. If possible, obtain samples of silk cocoons. Have examples of silk clothing.
c. Wool	4:35-36 4:61,63 4:69 ,123 4:299,307 4:311,334 4:359,483 4:497,499 4:515	Discuss the processing of wool, shearing, washing, picking, carding, spinning and dyeing wool. Do as many of these processes as possible. Experiment with burning test for wool.
d. Flax	4:35,71,96 4:323,344	Study the making of linen from flax, construct model of flax breaker, carding blocks.
2. Spinning and Weaving	4:35-36 4:59,61 4:138,273 4:285 4:286-287 4:344,423	
G. Wood Products		Study the methods of logging.
1. Lumber	4:1,78,124 4:126,141,362 4:366.368 4:371,372 4:374 4:380-381 4:405,415 4:419 4:441-442 4:469,481 4:481,499 4:503,505 4:507,510 7:176	Study the methods of drying lumber, open air, kiln. Discuss the sizes for cutting trees

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
2. Lacquer	4:138	Study lacquer as a finish for wood. Compare to varnish
		Study the processes of lacquer.
3. Paper	4:452	Study the process of dyeing paper. Do some actual dyeing.
II. Foods	1:69-73 4:12,34 4:58,86 4:138-139 4:144-145 4:178,181 4:259-260 4:440-441 1:75-80	Study the process of preparing foods. (modern & historical)
1. Preparing	1:156 2:70,92	Study food preparation in other countries.
2. Pasteurization	1:75-78 1:37 2:.31	Attempt to pasteurize cow's milk. Describe the process.
3. Milk a. Goat	12:16	Construct model of a dairy.
4. Livestock a. Pigs	12:88-99 4:33,144 4:181,399 4:450	Study the processing of pork.
b. Cattle	4:120,29? 4:453,483 4:505,511 4:515	Study the processing of beef
c. Sheep	4:47 4:60-63 4:180-181 4:123-124 4:205	Study the processing of mutton.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
	4:161 4:247,261 4:299,307 4:310,359 4:504	
5. Banana	12:301-309	Study the story of the banana.
6. Tomatoes	12:70-79	Study the processing of tomatoes.
7. Marketing	9:192-197	Discuss marketing in various countries.
8. Chocolate Fudge	11:61-62	Make chocolate fudge as described in text.
9. Tea	4:119-120 4:125,138 4:144,473 4:477 1:159	Brew some tea.
10. Sugar Cane	4:120,122 4:128,262 4:471,480 5:98-99 5:131,140	Study the processing of sugar cane.
11. Sugar Beets	4:181,344 4:347,399 4:419,447 4:453	Study the processing of sugar beets.
I. Rubber	4:128 4:504-505 4:119 4:128-129 4:476-477 2:508	Study the processing of rubber. Name the by-products.
J. Plastics	2:82,84 3:65	Discuss the various types of plastics. Discuss the different processes of molding plastics.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
K. Coffee	4:262,473 4:479,504 4:511	Study the processing of coffee. Make coffee. Name countries where we get our coffee.
L. Fishing	7:209-211 7:13 4:143	Study the fishing industry of the various countries listed. Make written reports.
1. China	4:143	Discuss the fishing industry in reference to processing and affects on the economy.
2. Iberian Peninsula	4:256 4:259 4:261	
3. Iceland	4:359	
4. Italy	4:190	
5. Japan	4:469	
6. Norway	4:360-361 4:366	
7. South Pacific	4:479	
8. Soviet Union	4:450	
IV. Power		
A. Electricity	7:153 5:260-268 5:282-284 5:209,275 5:279	Study the different sources of electricity.
1. Bell	2:248-253	Construct electric bell
2. Electric Circuit	2:244-245 2:248 2:250-251	Experiment with different types of circuits.
3. Electric Current & Copper Plating	2:51-53	Do some copper plating.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
4. Electrical Energy	2:189,236 2:252,279 2:308-309	Describe how we get our electrical energy.
5. Electric Generator	7:362-363 2:189,202 2:237-246	Make a simple electric generator and use multimeter to test its efficiency.
6. Electromagnets	7:110-111 5:268 2:244-255	
a. Circuit	2:244-255	
b. Electric Bell	2:249-253	Study the transmission of various sources of power.
c. Electric Motor	2:253-255	
d. Telephone	2:263-264	
B. Steam	4:308-309 2:200-206 2:210	
1. Steam Engine	8:260 2:200-203 2:218	
2. Steam Power	2:200,205	
C. Gasoline Engine	2:207-211 7:38,185 5:200	
D. Rocket Engine	7:9-10 7:121-133 7:144-148 2:220-221	
E. Jet Engine	2:218-226	
F. Atomic	2:302,305 2:310,390 5:177-198	
G. Water	5:291,196,142 4:308,405,408 5:102 2:206,208,210 2:366-367	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
1. Turbine	3:199 2:279 4:86-89 4:209	
H. Light	7:285-310 5:10,12 5:14,16 5:69	Study the uses of light energy.
1. Laser	5:215,239	Discuss the uses of laser beam.
I. Heat	5:15,255 2:57	Study uses of heat energy.
J. Other	7:336-340	
V. Services		
A. Water System	2:131-138	Discuss the type of water system of your community.
B. Weather Instruments	2:415-419 5:82-87 7:51-74	Construct working models of weather instruments.
C. Oil Distributor	8:200-201	Study the importance of these groups in our society.
D. Police Department	1:207	Distinguish these groups as being public or private services.
E. Fire Department	1:207,225 1:133	
F. Moving Van	12:27-43	
VI. Transportation		
A. Nuclear Submarines	5:304 2:310-311	Construct model of nuclear sub. Compare to fuel powered sub.
B. Early Man		
1. Cart	4:27,36	Construct authentic model of an early cart. Study its uses and the designing according to its function.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
2. Boats	4:70,142 4:259,261 8:41,123 8:308-309	Construct models of types of boats used by people of different countries being studied. Study the designs and their uses.
C. Canal	4:98-99 4:177 4:308-309	Construct model of canal locks. Study effects of canal locks on movement of boats.
D. Automobile	4:513 12:166-177 11:130-148	Discuss the beginning of automobiles. List the names of automobiles.
1. Racing	12:340-351	Study the construction of race cars.
E. Truck	8:310	Study the qualifications of a truck driver.
1. Truck Driver	11:8-16	
2. License	11:17	Describe the driving test of a truck driver.
		Discuss the licensing of a truck.
F. Train	3:24	Study importance of truck and train lines in delivering materials to and from industries.
G. Space Travel	7:119-148 2:94,218 2:220-221 2:268 12:448-453 11:184-186 11:191-192 11:210-211 10:133-145 7:119-148	Study space travel in respect of the types of vehicles used. Construct plastic models of the types of vehicles.
H. Camel	11:78-104	Discuss the uses of camels and elephants in transporting people and goods.
I. Elephants		
VII. Water Pollution	1:61-68 7:20	Discuss the pollution of water in your community.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
a. Purification	1:55-56 1:17-18 2:131-132 2:134,137 2:140	List methods of water purification.
b. Industrial waste disposal	7:23	
VIII. Air Pollution	7:38 1:54	Discuss air pollution and effects on community.
A. Smog	1:88-91 5:36	Describe what N. C. is doing about air pollution.
IX. Sewage Disposal	1:24 1:45-46 1:54 1:63-68 7:20-21	Discuss the type of sewage disposal in your community.

TEXTBOOK BIBLIOGRAPHY - GRADE SIX

1. Bauer, W. W. Health For All. Glenview, Illinois: Scott, Forseman Co., 1965.

2. Brandwein, Paul F. Concepts in Science VI. New York: Harcourt, Brace & World, Inc., 1966.

3. Bremer, Neville H. Skills in Spelling VI. Wichita, Kansas: McCormick Mathers Publishing Co., 1968.

4. Cutright, Prudence. Living In The Old World. New York: The Macmillan Co., 1966.

5. Mallinson, George G. Science VI. Atlanta, Georgia: Silver Burdett Co., 1968.

6. McSwain, E. T., et. al. Arithmetic. River Forest, Illinois: Laidlaw Brothers, 1965.

7. Navarra, John G. Today's Basic Science VI. New York: Harper & Row Publishers, 1967.

8. Pollock, Thomas C. The Macmillan English Series. New York: The Macmillan Co., 1967.

9. Martin, Bill Jr. Sounds of a Distance Drum. New York: Holt, Rinehart and Winston, Inc. 1967.

10. Harris, Albert J. Into New Worlds. New York: The Macmillan Co., 1966.

11. Robinson, Helen M. & others. Open Highways Book 6. Glenview: Illinois: Scott, Foresman and Co., 1966.

12. Sheldon, William D. Arrivals and Departures. Boston: Allyn and Bacon, Inc., 1968.

GRADE SEVEN

GRADE VII

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
I. Communications		
A. Newspaper	7:414-415 7:144-145 7:245,326 7:439,523 7:526,545 8:133-136 8:216 4:230	Visit a newspaper printing establishment, print a booklet or class newspaper using the available printing methods (typewriter, spirit duplicator, mimeograph machines, silk screen printing, lineoleum block printing Visit A. V. center and observe offset press. If possible use it to print newspaper.
B. Photography	1:5 6:237-245	Use walk-in camera to make negatives and prints. Discuss photography, use instamatic cameras if possible.
C. Television	8:158 9:192-195	Discuss what takes place at a television station. Explain the jobs involved. Let the students organize and produce a T. V. skit. Using tools and materials, construct the scenery and different equipment used. Let students write the script. Visit a T. V. Station if possible.
D. Telephone	8:230-232 6:134	Acquire telephone system from Carolina Tel. & Tel. or use army field phones in setting up a telephone system in classroom. Dramatic play, operator and others using the telephone. Make emergency calls.
E. Electronics 1. Computer	2:18-19 9:22-28	Construct simple transmitter.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
. Construction		Construct scale of model house.
A. House	7:31	Construct homes of the early
1. Colonial	7:69-70	settlers of N. C. as well as a
	7:107,112	modern house. Compare the houses
	7:118-119	in respect to type of construction
	7:376	and materials used.
	7:257-258	
	7:115	
	7:49	
	7:20-23	
	7:216	
	10:501	Construct model of Swiss family village.
B. Bridges	7:99,225	
	7:365,367	Study types of bridges (old &
	7:370,380	new) Compare for structural
	7:386	strength. Construct models of
	9:43-47	different types of bridges.
	9:182-191	
	8:102-103	Visit construction site of bridge
	8:392	if possible.
C. Roads	7:70,246	Study road construction. Describe
	7:212,342	the equipment and materials used.
	7:364-368	
	7:381	Construct model road using
	7:443-444	authentic processes and materials
	7:45,99	where feasible.
	7:114-115	
	7:192,210	
	7:214,218	
	7:224,228	
	7:232,273	
	7:304,320	
	7:342,363	
	7:367,421	
	7:446-448	
	7:467,523	
	7:453,529	
	9:170	
	5:119	
D. Railroads	7:70	Study the different methods used
	7:237-245	in construction of railroads.
	7:264	Describe the methods used in N.C.
	7:361-363	both old and new.
	7:341-342	Construct model railroad, make
	7:528,526	roadbed, using rock, wooden ties
	7:341,295	and rails. Construct different
	7:300,304	types of cars and list their
	7:322-323	uses. View film on railroads.
	7:337,352	
	7:358,371	

1. [illegible]	[illegible]	[illegible] model of different [illegible]. Collect samples of different metals.
	[illegible]	
	[illegible]	
	[illegible]	
2. [illegible]	[illegible]	
	1:8	
	11:16	
	7:41-42	
	7:23[illegible],232	
	7:232-235	
3. Copper	1:8,280	
	11:16,309	
	11:529	
4. Manganese	11:309	
5. Silver	11:16	
	1:8-9	
6. Zinc	11:529	
7. Aluminum	11:16	
	1:8-9	
B. Wood	7:266,446	Learn the trees that grow in N.C.
1. Types of Trees	7:40-41	Discuss the uses of these trees.
	7:58,62	
	7:110-111	Discover the types of trees grown in your community.
	1:54,89,91	
a. Hickory	1:201-202	Categorize the trees (hardwoods, deciduous, softwoods, coniferous)
	11:247	
	10:47	
b. Oak	1:201-202	
c. Palm	1:195	
	11.240-241	
	10:289	
d. Douglas Fir	10:54	
	11:2[illegible],267	
	11:24[illegible],230	
	11:468	
	[illegible]:203	

[illegible]	REFERENCES	SUGGESTED ACTIVITIES
a. [illegible]	[illegible]	
b. [illegible]	11:273,431	
c. [illegible]	[illegible]	
d. [illegible]	[illegible] 11:[illegible],249	
[illegible]	[illegible]	
f. [illegible]	11:131,133 11:24 1:2[illegible] [illegible] 11:249 [illegible] 1:2[illegible]4 [illegible] 7:[illegible],59,93 7:111,210,423,428	
g. [illegible]	11:37-38	
h. Heart	11:244	
i. Redwood	1:202-204	
2. Cutting & Harvesting	1:234-235 1:458,461 10:141,282	Discuss the methods used in selecting timber to be cut. Define timber cruising. Describe the equipment used in cutting timber. Describe annual rings of a tree and what they mean.
3. By-products a. Lumber	12:430 1:232,234 7:423,424 7:252,253 7:210 7:40-41 7:110-111 7:452 1:232-235 11:32.449 11:451 1:459-460	Work with wood observing its characteristics. Design projects to be constructed from wood. May be incorporated with other units of study.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
a. Naval stores	7:40,50,[illegible] 7:[illegible],100-116 7:142,153 7:209-210 7:423	Discuss products produced by these naval stores.
b. Bark	11:124-127 10:128-129 10:137-139 10:282 1:91-92	Discuss the uses of bark.
c. Cork	10:137,139	Describe the type of tree cork comes from. Discuss the processing of cork.
d. Paper	[illegible],34 [illegible],210 7:253,405 7:423	Make paper using authentic materials and processes. [illegible] different materials and discuss the quality in the paper.
f. Furniture	7:257	Construct model furniture observing methods of joinery and other construction features.
1. Colonial	7:110,117 7:119	
2. Pioneer	7:179,216	
3. Manufacture	7:253,337 7:340,343 7:361,377 7:393,405 7:423,527	
g. Conservation	7:423-426 7:432,458	Discover what is being done to conserve our forest. Describe the methods used.
C. Tobacco		
1. Production	7:20,31,68 7:104,112 7:209-210 7:233 7:250-251 7:275,382 7:334-335 7:394,405 7:396-397 7:399-401 7:445 1:60	Study the production of tobacco. Describe the steps involved in the production tobacco.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
2. Manufacturing	7:252-253 7:337-340 7:343,361 7:376-377 7:382,390 7:395,543 7:396	Study the manufacture of cigarettes
D. Textiles	7:361,393 7:451	
1. Natural Fibers		
a. Cotton	11:12,32 11:53,451	Study the manufacture of cotton.
	11:448-449 1:49,54	Construct looms and do some weaving.
1. Manufacture	7:252-255 7:291,343 7:337-338 7:374-376 7:405,443	Dye cloth with commercial and natural dyes.
2. Colonial	7:113,151 7:116,117 7:119-120	Study the methods of making clothing of the colonial America.
3. Cotton Gin	7:112,443 7:274-275	Construct a cotton gin. Separate the cotton from seed.
4. Cottonseed Oil	11:53	Study the processing of cottonseed oil. Discover its uses. Describe the processes.
b. Wool	7:112-113 7:119,253 7:374-375	Study the processing of wool. Bring in examples of woolen goods. Make reports.
c. Flax	7:112-113 7:119 1:60 11:83-84 11:449	Study the process of breaking flax and production of linen. Describe the processes involved. Make Reports.
d. Silk	7:374 9:288B	Study the processing of silk. Describe the processes involved. Bring in examples of clothing made of silk. Make reports.

		Study synthetic fibers. Compare to natural fibers. Bring examples of clothing made from synthetic fibers.
	7:51 7:53 7:111,114 7:119 7:114-114	Study the trading industry in N. C. Discuss the making of clothing from furs. Discover the processes fur has to go through before it can be used to make clothing. Experimen with animal hide to see how process works.
	7:11 .112 7:12 .21 7:253,304	Describe the types of tools man uses.
	11:402-471	Discover how technology helped man to make better tools.
	11:398-40 1 :499-498 1 :502-505	Compare early man's tools with modern man's tools.
Hand Tool Safety	2:140-141	
	10:180-181 10:04	Discuss the people who produce food for our society.
a. Farmers	7:111-113 7:120.399 :444	
b. Indians	7:48-50 7:52-53	Study the methods the Indians used in producing food. Grind corn using methods of Indians.
c. Pioneers	7:120.179	Study the methods the pioneers used in producing food.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
d. Modern	2:52-53 2:61-62 2:64-71 2:86-87 1:84a-84h 1:285-301	Compare methods of modern and historical food processing.
2. Grain	1:49,50 1:80-81	
a. Wheat	2:112 7:209-210 7:250,300 10:237-288 11:115,441 11:443 11:448-451	Discuss the harvesting of wheat. Name areas that raise wheat. Study the process of making flour from wheat.
b. Soybean	10:242 11:31,[illegible] 11:308	Study the process of making soybean oil.
3. Herbs a. Peanut	12:189	Discuss the uses of peanuts. Study the process of making peanut oil.
4. Sugar	12:421 12:425-426 1:7,287 7:275,290 7:300 2:58-60 2:69	Study the refining process of sugar.
5. Coffee	2:80,88	Study the processing of coffee beans. If possible, grind coffee beans.
6. Livestock a. Cattle	7:113-114 7:119,209 7:304 7:394-398	Study production of livestock. Study foods obtained from livestock.
1. Dairy	7:398	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
b. Poultry	7:394-398	Visit a hatchery. Construct incubator and hatch some eggs in class. Study the new mechanical developments in egg production. See film Eggs to Market.
c. Hogs	7:113-114 7:119 7:209-210 7:252,398	
7. Fishing	1:186 7:39,71 7:111,121 7:253,380 7:398	Study the fishing industry. Visit a fishery and a fish hatchery.
a. Conservation	7:426	Study importance of fish conservation and what is being done in your community.
8. Fruits	7:39,62 7:117,120 7:367,395	Determine the types of fruits grown in N. C.
9. Blubber	10:412	Study uses of blubber.
H. Consumer	2:182-203	Study wise purchasing of foods. Visit super market.
I. Minerals		Study the minerals in N. C.
1. Mica	7:388,451	
2. Limestone	11:414-415	
3. Feldspar	7:388	
4. Granite		
J. Petroleum	1:15,54 1:65 11:24,27 11:100	
a. Gasoline	10:62 11:27 1:15-16	Study how the different octanes are derived. Construct model of service station.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
K. Coal	1:54,251 7:253	Study location of coal mines. Describe formation of coal.
L. Brickmaking	7:69-70 7:114,388	Study the manufacture of bricks. Study materials used. Manufacture bricks if possible.
M. Chemicals	10:242 12:472	Study how bacteria is used in making vinegar and certain types of alcohol.
N. Leather	7:114.253 7:388	Study the tanning of leather. If possible. tan a hide. Do leatherwork.
O. Kaolin (China Clay)		Study the production of China.
. Transportation	6:220-2 6:279 8:120	Construct historical and modern transportation models.
A. Air		
1. Airplanes	5:373 7:379 6:280-288	
a. Airport	4:197 7:368-369	
b. Airlines	6:220 7:405	
2. Rocket	1:386,443 1:447 4:194 6:385-388 9:197-206 1:437-448 6:53-59 11:505,521 11:527	Describe the moon flight. Describe the lunar module. Construct model of lunar vehicles from kits.
a. Space Travel	11:285,505 11:513,527 2:292-296	Do reports whenever needed.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
1. Space Walk	11:501,515 11:524,534 1:408,415 1:422B,439 1:447 1:437,487 1:2-3,25 1:380-387	
B. Water	7:68,114 7:196,208 7:209,211 7:214	
1. Ship	9:127 7:67-68 7:10,14 7:450 6:271,287	Study the shipping industry of N. C. Name the ports of N. C.
2. Canoe	9:104 7:52 6:211,288	
3. Houseboat	6:271	
4. Atomic Sub	1:25	Study the advantages of an atomic sub over a fuel powered one.
5. Harbors	7:453-452 3:37 7:70,88 7:94-95 7:368-370 7:159,208	
6. Inland Waterway	7:67,370 7:529	Discuss the importance of inland waterways.
7. Canals	7:233,237 7:525	How are canals used in N. C.?

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
C. Land		
1. Automobile	9:102-108 1:16 7:364-368 7:309,467	Describe the production of an automobile, type of people who work at an automobile factory, and equipment used in manufacture of automobile.
V. Power		
A. Water	7:41-42 7:44-45 7:57,68 7:210,225 7:372,426 7:459	Construct model of a dam. Dam can be made outside by digging a trench and constructed so cement can be poured to make the dam. Construct at least one turbine and connect it to a generator.
B. Electric	7:44,388 7:372,374 7:379,393 7:405,528 7:489-490	Visit a power plant. Describe how the electric power gets to the school.
1. Rural	7:398 7:445-446 7:543	Describe how people in rural areas get their electricity.
2. T.V.A.	7:446	Discuss the function of the Tennessee Valley Authority.
3. Safety	2:142	Discuss the safety rules in working with electrical equipment.
C. Burning Fuels		
1. Engines	1:16	Discuss the chemical changes that take place with an internal combustion engine.
D. Nuclear	7:410	Describe a nuclear reactor. Construct a model of one.
VI. Services		
A. Service Station	4:189	Visit a service station, study services performed.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
B. Postmaster	4:105	Study the mail services, construct model of a mail truck and mail box.
C. Forest Ranger	4:103 7:424	Study the forest services and fire fighting methods. Describe the new developments in fire fighting.
D. Library	7:210-217 7:220,420 7:413-414 7:428,435 7:477,484 7:489	Describe the services of a community library. If not one in community, visit one in another community.
1. Bookmobile	7:414,420	Describe the services of a bookmobile. Construct a model of a bookmobile.
E. Water Conservation	[illegible]	Describe the services of a conservation system in your community. Describe the methods used in preventing water from doing destruction.
VII. Tourist	7:56-66 7:195 7:259-260 7:381 7:384-388 7:425-428 7:435	Discuss the N. C. tourist industry. Describe the way it functions.
VIII. Air Pollution	11:474-475 10:513-516	Describe how industry pollutes the air. Discuss what federal authorities are doing about air pollution.
IX. Water Pollution	1:228-229 11:474 10:514-516 2:53	Describe how industry pollutes our rivers and streams. Discuss what federal authorities are doing about water pollution.
X. Desalting Plant	11:473	Describe the method of removing salt from salt water.

TEXTBOOK BIBLIOGRAPHY - GRADE SEVEN

1. Brandwein, Paul F., et al. The World of Living Things. New York: Harcourt, Brace & World, Inc., 1964.

2. Bauer, W. W. Health For All. Glenview, Illinois: Scott, Foresman Co., 1965.

3. Bremer, Neville H. Skills in Spelling VII. Wichita, Kansas: McCormick Mathers Publishing Co., 1968.

4. Eicholz, Robert E., et. al. Basic Modern Mathematics. Palo Alto, California: Addison-Wesley Publishing Co., Inc., 1965.

5. Kelly, Marvin L., et al. Exploring Modern Mathematics Book 1. New York: Holt, Rinehart and Winston, 1968.

6. Kenscheloe, Isabel M., et al. Adventures For You. New York: Harcourt, Brace & World, Inc., 1962.

7. Lefler, High T. North Carolina History, Geography, Government. New York: Harcourt, Brace & World, Inc., 1966.

8. Pollock, Thomas C. The Macmillan English Series. New York: The Macmillan Co., 1967.

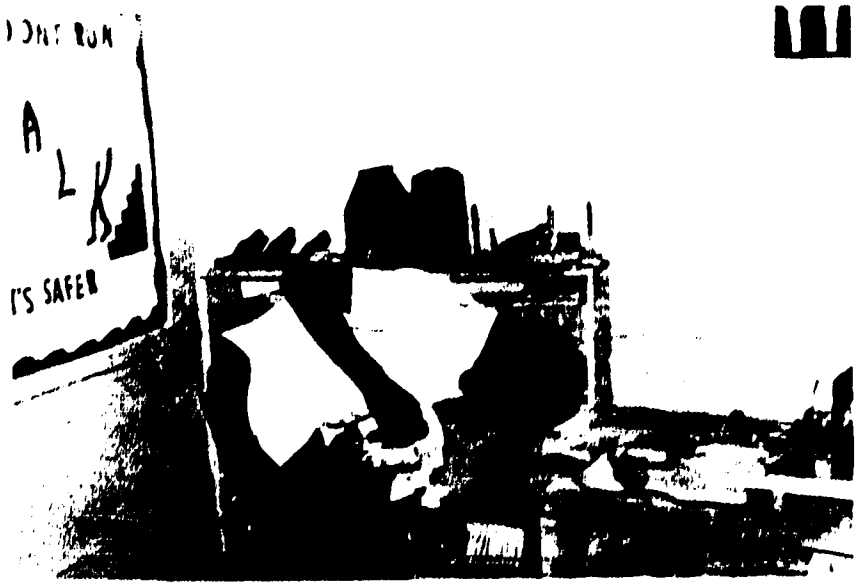
9. Pooley, Robert C., et al. Wide, Wide World in Literature. Chicago: Scott Foresman and Co., 1963.

10. Brandwein, Paul F. and others. Life It Forms and Changes. New York: Harcourt, Brace & World, Inc., 1968.

11. Brandwein, Paul F. and others. The Earth: Its Living Things. New York: Harcourt, Brace and World, Inc., 1970

12. Thurber, Walter A. and Robert E. Kilburn. Exploring Life Science. Boston: Allyn & Bacon, Inc. 1970.

GRADE EIGHT



GRADE VIII

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
I. Manufacturing	8:250	
A. Introduction		
1. Assembly Line	8:370,411 8:439,603 2:252-262	Study how the assembly line got its start. Describe the effects it has on manufacturing.
2. Automation	8:595-597	Describe the effects automation has on labor.
3. Mass Production	8:250-251 8:350 8:409-411	Describe the effect mass production has on manufacturing.
4. Natural Resources	8:29-31 8:252-253 8:439,440	Describe the effects that natural resources has on manufacturing, and on industrial developments.
5. Labor		Discuss the problems of labor in our society both past and present.
a. Changes in hours and wages	8:431	Discuss how conditions and other factors has changed.
b. Conditions in early industry	8:408,421 8:431-433	Set up mass production of an item. Include management, research and development, production sales, etc.
c. Modern conditions	8:603	Take field trips to various industries to study mass production.
d. Relations with employer	429-431	
e. Shortage of skilled workers	110	Discuss what effect labor unions have had on labor.
f. Unions	8:432-433	
B. Wood Products		
1. Lumber	7:74 5:467-468 8:396-397 2:51,141,159	Design and construct projects from wood.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
	2:370-381 3:397 11:134,169	
a. Pulpwood	2:313,378 2:376-378	Discuss the uses of pulpwood.
b. Plywood	2:313-314	Discuss the manufacturing of plywood. Take field trip to a plywood corporation.
c. Wood using industries		
d. Trees		
1. Fern	11:166	
2. Paper	2:310 2:303,313 2:315	Discuss how paper is made. Discuss how the different grades and textures are derived.
a. Kraft	2:313-315	Visit Albemarle Paper Company.
3. Furniture		Discuss the different designs in furniture.
a. Frontier	3:259	
b. 19th Century	3:464-465	Describe the different periods of furniture. Compare in types of of construction.
c. 20th Century	3:464-465	
4. By-Products	3:79	Describe naval stores and how their products were used.
C. Leather	2:308	Study the process of tanning leather. If possible tan a hide.
1. Tanning	2:80,304	
2. Shoes	3:409	Describe the different types of leather and what they are used for.
D. Rubber	2:109 2:256-258	Study the processing of rubber.
1. Vulcanization	3:251	Describe the beginning of vulcanization.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
B. Plastics	2:266-267	Describe the types of plastic. Using the plastic equipment, make projects from plastics.
F. Glass	11:56-57	Discuss the manufacturing of glass. Experiment with glass blowing.
G. Food Products		
1. Seafoods	5:23 3:79 2:318-324 2:382-384	Discuss the processing of seafoods, meats, vegetables, grains, coffee, peanuts, milk & sugar.
a. Fish	9:225 9:399-400 9:406 3:58,97 2:323-324 2:149,318	Describe the packaging of foods. Describe new developments in processing of foods. View films.
b. Clams	2:318 2:382-385 2:296	
c. Oysters	2:318,322-323 2:383	
d. Shrimp	2:318 2:323-324	
2. Food Processing	3:398-399 9:97 2:278,86-87	
3. Meats	3:251,302 3:388-389 2:69,72 2:297 2:303-305 2:329 2:372-374 4:176 3:391-392 3:394-395 3:389-390 3:395	Describe the salting and smoking of meat. Discuss the importance of preserving meats. Visit a meat packing plant if possible.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
	2:296-298 2:300-306 2:302-305 2:373-374	
4. Fruits and Vegetables	3:30,493 2:278-288 2:328,371 2:296,155 2:295-297	Let students can fruits and vegetables. Visit Lutze and Scram Pickles.
5. Dairy	3:388,250 2:297,300 2:298,302 2:296-297	
6. Grain	2:56-57 2:271,276 2:352,269 2:368-371 3:399,396 3:398 2:269-270 2:74-76 2:268-270 2:270-294 2:373,74-75	Describe the new developments in harvesting grains. Grind as many types of grains as possible.
7. Herb a. Peanuts	2:78,295	Describe the new developments in harvesting peanuts. List the uses.
8. Coffee	2:111-112 2:142-156 2:129-130 2:152-154 2:158,175-185	Display coffee beans. Grind the beans to make coffee. Serve the coffee.
9. Frozen Foods	2:278,288	Identify and perform preparation of foods before freezing. Describe the process of quick freezing.
10. Sugar	2:295-296	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
H. Textiles 1. Cotton	3:274,278 3:328 3:406-410 5:467-468 3:248-250 3:274-275 3:348 3:406-407 2:97,110 2:189,258 2:288-292	Set up loom and weave various patterns in different materials. Use advanced techniques. Study related industries.
a. Cotton Gin	3:248-250 3:274-275 3:407	Gin cotton using a hand cotton gin.
b. Carding Machine	3:408	Construct a carding machine to card the cotton.
c. Spinning Jenny	3:406,258	If knowledge provides, construct a spinning wheel. Distinguish between spinning jenny and spinning wheel.
d. Power Loom	3:406-408	If students' relatives have a spinning wheel, get them to demonstrate it.
2. Wool	5:296-308 3:406 2:300,304 2:314 2:305	Have students design and make some clothing using sewing machine. Students preserve hides.
3. Fur	3:55,57 3:65,92 3:305-306 3:308-309 2:211,385	Display examples of wool and different types of furs.
4. Flax	2:63,68 2:78,371	Display linen.
5. Synthetics	2:257 2:267-361	Display clothing made from synthetic fibers.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
o. Clothing	5:103 3:258-259 3:409 3:408-409 3:410 3:102,114 4:129	Discuss the clothing industry. Discuss the proper way to dress for certain occasions. Have fashion show.
i. Metals and Minerals	9:148-1[illegible] 9:143-147 2:248,256	Study the processing of the various metals. Display samples if possible.
.. [illegible] and Steel	9:416-419 3:141 2:61,120 2:124 2:[illegible] 2:[illegible]242 [illegible],355,363 9:147,153	View Films. Design and construct projects from metal. Use the bending machines.
a. Open Hearth Process	2:241-245 2:417,441	
b. Bessmer	2:243 3:417 11:44,63 11:41-42 11:62,48	
. Blast Furnace	11:44,59	
2. Bauxite	10:415 10:229,280	
a. Aluminum	10:447-450 10:473 2:247	
3. Copper	9:69,142-147 9:277,281 2:247-248	
4. Gold	9:144-147 9:277 2:70-71 2:105,96 2:120,124,132,360	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
5. Nickel	9:36	
6. Silver	9:145,277,281 3:397-398	
7. Tin	9:142,147	
8. Titanium	9:438	
9. Zinc	9:147,277,281	
10. Platinum	9:147	
11. Brass	2:248	
12. Bronze	2:248	
13. Uranium	2:250 10:375,439 11:154-155 3:30 9:143,238,373-374	
14. Feldspar	10:418,464 9:98-100 11:31,38,61	
15. Limestone	2:90,132,86,265	
16. Sulfur	2:90,62,265	Discuss operations of Texas Gulf Sulfur at Auroa, N. C.
17. Marble	10:267-268 10:425-426 9:133,148 11:27-28,42-43 11:62	
18. Emerald	10:456	
J. Tobacco	3:248 2:292-293	
K. Galvanizing	2:248	
1. Barbed Wire	3:392,394-395	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
L. Chemical	2:265	
II. Power		
A. Animal	3:130,213 3:308 3:354-355 3:444-447 7:112 7:542-543 2:69,128 2:149,156 2:301	Harness as many of these sources of power as possible to simple machines. Field trips to sources of power where applicable.
B. Wind	3:395,533 6:112,113 9:112,309 10:14,355 10:357,361	
C. Water	4:25 3:368,416 3:29-30 3:251,406 3:408,412 2:224,238	
D. Electric	5:641-643 4:455-456 3:414-416 3:513 2:16-17 2:244,338 3:465 2:155,224,236	
E. Steam	3:405,412	
F. Atomic	8:36-37 8:242 2:339-345 3:593-596 7:176C 2:238-240 2:250	Discuss the functions of the atomic energy commission.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
G. Petroleum	3:412-414 2:123,188 2:254,266 2:354,361 2:238 9:150-152 9:51-53 9:217 10:452-454 11:165-169 11:173-176 3:396,413 3:418 2:224,228 2:253-256	
H. Coal	3:30,412 3:417-419 2:237,236 2:358-360 2:224,255 10:450-452 9:116,151 11:166-169 11:175	
I. Heat	9:168-172,428	
J. Burning Fuel 1. Gasoline Engine	3:376-378 3:413,468	
III. Transportation A. Land 1. Train	3:32,257 3:371-372 5:363-370 5:101,116 8:139 2:130,365 3:389-391 3:372-375 3:33,605 3:446-447 2:206 2:331-332	Set up model train layout with a minimum of two circuits, operate with dispatcher. The more complex the layout, the more it wi help the pupils understand the complexity of trains and the railroad.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
2. Automobile	5:632-638 8:134-135 2:223,231 2:251 2:416-420 2:134-135 4:371,412 3:375-377 3:383,411 3:587,362 3:439-440 2:250-253	Study the various systems of the automobile. Make working models. Compare differences between the three in light of the function.
3. Trucks	3:566,605 2:330	
4. Bus	4:418 2:116,231	
5. Pony Express	3:371,379	Compare early transportation methods to today's, using working models.
6. Covered Wagon	3:308,335 3:218,310-311	
7. Stagecoach	3:253-354 3:379 3:369-371	Construct authentic models of these early forms of transportation.
B. Air		
1. Aviation	3:33-34	Construct early forms of air transportation.
a. Commercial	3:369,376 3:378-379	
b. First Solo Flight to Europe	3:378	
c. Industry in Los Angeles	3:440	
d. World War I	3:377-378	
e. World War II	3:378-379 3:541-550	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
2. Airplane	2:33,377-378 3:384,597 3:605 7:26,38,82 7:464 8:26-27 8:174-178 8:180-190 5:639-641 2:259 2:260-262 2:333,364 2:180-190 2:229,167 3:34,369	Study the effects of areodynamics. Build simple wind tunnel and test model planes. Design and fly models to test difference.
3. Helicopter	2:131,262,333	
4. Rocket	2:248-258 2:260-262 2:350-358 8:248-258 8:260-263 4:90-97 6:42-43 9:464-467 5:302 3:34,378-379 3:558,598-600 7:176g-176h 7:182,213,221 7:248-249 1:90 3:397-399 3:597-599	
5. Spacecraft	9:457-458 9:465 3:369,379 3:596-600	
a. Explorer I	10:495	
b. Lunar IX	10:519	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
c. Lunar Orbiter Series	10:221,519	
d. Mariner II	10:154,171	
e. Mariner IV	10:36,172-173,545	
f. Ranger Series	[illegible]:517	
g. Sputnik 1	10:215	
C. Water		
1. Boats	3:32,573 3:256 5:302	Build working models of different sailing vessels, ships, etc. and compare functions, design, etc.
a. Canal Boat	2:85 3:218-219 3:255 3:371	
b. Flatboat	3:488,376 3:219-220 3:255 7:131	
2. Ships		
a. Sailing	7:206,328-331 7:86,155 5:32,47-48 5:159,363-370 3:117,231-232 3:238-241,372 3:38,48,59,66 3:100-101 3:109-110	
b. Steam Ships	3:255	
c. Submarines	3:521,594 7:176C 1:191	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
d. Harbors	3:56,460 2:74,79 2:121,138,150 2:243,325	
e. Canals	3:32,256-257 3:281,371,441 3:488-490,508	
f. Dams and Waterways	3:29-32,367 3:370,434,539 2:255-256	
V. Communications		
A. Printing	3:14-15 3:261-262 8:300-302	Explore printing, utilizing available materials and methods.
1. Movable Type	3:44	Field trip to printing establishments.
2. Postal	3:379 7:30-31 6:168-169	Use every available printing method and compose a booklet of years activities.
B. Television	3:382-383 6:205	
1. Telegraph	3:380-382 8:312-313 2:334	Construct and evaluate telegraph system.
C. Radio	3:382 7:192-197 5:143 6:205 10:42,170-171 10:549	Investigate and construct different types of radios using tubes, transistors, printed circuits.
1. Telephone	3:381-382 7:96 2:334	Study advances of telecommunications, make models of telstar and other devices.
2. Phonograph	3:415,465	

COURSE OUTLINE		
D. [illegible]		
E. [illegible]	[illegible]	[illegible]
1. [illegible]	[illegible]	
2. [illegible]	[illegible]	
F. [illegible]	[illegible]-472	[illegible] newspaper [illegible]
1. [illegible]	[illegible]	
2. Modern	[illegible]	
[illegible]	[illegible]	
2. Brick	11:[illegible]	
3. Concrete	[illegible]:53,[illegible]	
4. Fiberglas	11:57,61	
5. Mortar	11:53-63	
6. Asphalt	2:170	
7. Cement	2:149	
B. Houses	3:68-69,73 3:277,306 3:394 2:310,119 8:190 11:42 [illegible]447-448	Construct sections of house using actual size material, wall section, door section. Write bill of materials. Field trip to house construction sights.
1. Log Cabin	:79,259	

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
C. Roads	3:254-255 3:282 2:130,332 2:342,333 2:206	Build and experiment with different types of road materials.
1. Colonial	3:253-254	
2. Forbe's	3:103	
3. Turnpikes	3:254	
D. Canal	3:256-257 3:488-490 3:584 2:332	
E. Railroad	3:257 3:372-375 2:98,146	Investigate building railroads, study feasibility of laying tracks near industry. Build railroad layout.
F. Bridges	3:417 2:234 4:59 9:279-309	Construct different types of bridges using authentic materials, designs and processes.
G. Building	7:21-26 2:36,160 8:293,298 8:319,320	Study construction of buildings, and materials used in the construction of buildings.
H. Dams	11:117-118 11:131	
I. Dykes	11:75-76, 132	
VI. Water Pollution	9:281	
VII. Services		
A. Fire Department	3:447	Have fireman come to classroom and demonstrate use of fire extinguisher. Describe the services of the fire department.
B. Post		Discuss the growth of postal service through the years.

COURSE OUTLINE	REFERENCES	SUGGESTED ACTIVITIES
[illegible]	[illegible]	
[illegible]	[illegible]	
[illegible]	[illegible]	

TEXTBOOK BIBLIOGRAPHY - GRADE EIGHT

1. Bremer, Neville H. Skills in Spelling VIII. Wichita, Kansas: McCormick Mathers Publishing Co., 1968.

2. Drummond, Harold D. The Western Hemisphere. Boston: Allyn and Bacon, Inc., 1965.

3. Eibling, Harold H. History of Our U. S. River Forest, Illinois: Laidlaw Brothers, Inc., 1968.

4. Eicholz, Robert E., et. al. Basic Modern Mathematics. Palo Alto, California: Addison-Wesley Publishing Co., Inc., 1965.

5. Kudy, Marvin L., et. al. Exploring Modern Mathematics (Book 2) New York: Holt, Rinehart and Winston, Inc., 1968.

6. Pollock, Thomas C. The Macmillan English Series. New York: The Macmillan Co., 1967.

7. Pooley, Robert C. et. al. All Around America Through Literature. Chicago: Scott, Foreseman and Co., 1963.

8. Pumphrey, Eva M., et. al. Adventures Ahead. New York: Harcourt, Brace, and World, Inc., 1962.

9. Bishop, Margaret S., et. al. Focus On Earth Science. Columbus, Ohio: Charles E. Merraill Publishing Co., 1969.

10. Hibbs, Albert R. and Albert E. Eiss. The Earth-Space Sciences, Investigating Man's Environment. River Forest, Illinois: Laidlaw Brothers Publishers, 1969.

11. Oxenhorn, Jospeh H. and Michael N. Idelson. Pathways In Science, The Earth We Live On. New York: Globe Book Co., Inc., 1968.

RESOURCE MATERIAL

The Title III office, located in Windsor Elementary School, has a quantity of resource material and information available for use in classroom instruction.

This material is in the form of books, pamphlets, magazines and films and is available on a request basis to all elementary industrial arts teachers.

Teachers should address their requests for resource material to:

Title III, ESEA
Bertie County Schools
P. O. Box 10
Windsor, N. C. 27983

or telephone collect

Windsor 794-2016.

RESOURCE MATERIAL

Meyer, Jerome S. Paper, Cleveland, Ohio: The World Publishing Co., 1960.

The history of papermaking is traced from its invention in China in 105 A.D. to the present time. The modern methods of papermaking and the making of paperboard for boxes and cartons are discussed.

Mix, Floyd M. 101 Easy Jig Saw Projects, Chicago: The Goodheart-Willcox Co., Inc., 1959.

The projects in this book are intended especially for students in school shops, camp craft classes and for home workshop owners interested in simple but attractive projects.

Olson, Delmar W. Industrial Arts for the General Shop, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968.

The book is intended to open the eyes of the student to the breadth of experience and activity and to the opportunities of learning, in industrial arts based on American industry and technology. Also, to acquaint the student with his technological environment through a study of certain manufacturing industries and to set him thinking about his own responsibility for discovering and developing his own potential.

Folmer, John L. & John R. Lindbeck. I. A. Metalwork, Peoria, Ill: Charles A. Bennett Co., Inc. 1965.

I. A. Metalwork teaches students about the metalworking industry, how to design, plan and carry through a project, the basic hand and machine skills and it encourages students to develop their own talents and interests as they relate to metals both vocationally and avocationally.

Olson, Delmar W. Woods and Woodworking for Industrial Arts, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1965.

This book considers woods and woodworking from a modern technological point of view, with emphasis on research and development in wood.

Hammond, James J., Edward T. Donnelly, Walter F. Harrod & Norman A. Rayner. Woodworking Technology, Bloomington, Ill: McKnight & McKnight Publishing Co., 1961.

The content of this book is technical and cultural. It ranges from simple, interesting facts to complex principles of wood technology. Facts and principles are given on the general topic of wood and uses of more than twenty-five woods are covered specifically.

Moore, Frank C., Carl H. Hamburger & Anna-Laura Kingzett. Handcrafts for Elementary Schools, Boston: D. C. Heath and Co., 1953.

This book provides the basic fundamentals of craft experiences. It shows how crafts may be correlated and integrated with academic subjects and how crafts may become a vital part of the experience of children. Designs and patterns for many crafts are included. The book contains detailed suggestions for classroom organization and administrative procedures.

Zim, Herbert S. Things Around the House, New York: William Morrow & Co., 1954.

This book is designed to help children understand the everyday things around the house, some of which are truly great inventions.

Hunt, De Witt, Shop Tools Care and Repair, Princeton, N. J.: D. Vann Nostrand Co., Inc., 1958.

This book offers formal instruction in the processes of sharpening, reconditioning and maintaining the tools and machines which shop workers use daily.

Cherry, Raymond. General Leathercraft, Bloomington, Ill: McKnight & McKnight Pub. Co., 1955.

This book was written to be used as a guide and as a source of information so that the reader may develop a worthwhile hobby in leathercraft. This book will instruct you in many of the old methods to work leather and also introduce you to some new ones. A selected book list is given for those who desire to expand their interest and pleasure in working with leather.

Smith, Robert E. Patternmaking and Founding. Bloomington, Ill: McKnight &McKnight Pub. Co., 1955.

The units discussed in this book cover a wide range of activities and engage the services of a million or more workers. Founding not only includes producing castings by the casting method, but it also includes a whole host of activities involved in the reduction of metal-bearing ores to a metallic state.

Hague, C. W. Printing Instruction Sheets, Set No. 1, Milwaukee: The Bruce Publishing Co., 1961.

This book is a concise text of instructional material including type composition, proofing and correcting forms, imposition and lockup, platen presswork, and stock cutting. It contains a graded series of 15 composition projects in job sheet form.

Hague, C. W. Printing Instruction Sheets, Set No. 2, Milwaukee: The Bruce Publishing Co., 1960.

The purpose of this set of instruction sheets is to train the student in the art of display typesetting in accordance with the rules of typographic design.

Lindbeck, John R. Design Textbook, Bloomington, Ill: McKnight & McKnight Publishing Co., 1963.

This book has as its leading purpose the upgrading of the level of design in the creative arts instructional programs in our schools.

Aluminum Company of America. Welding Alcoa Aluminum, Pittsburgh, Penn., 1958.

In addition to basic, practical data on individual processes, this book includes information on choice of method to assist the welding engineers, shop men and designers.

Aluminum Company of America, Brazing Alcoa Aluminum, Pittsburgh, Penn., 1967.

This book presents practical shop data on brazing methods. Up-to-date knowledge of aluminum brazing processes can affect design, and this book will aid engineers and designers in selecting the best method at the drawing board stage.

Ford Motor Company. Evolution of Mass Production, Dearborn, Michigan, 1956.

This is a story of mass production - how it originated, developed and became a vital part of our daily lives.

Ford Motor Company. The Automobile Engine, The American Road, Dearborn, Mich.

This has been prepared for those interested in learning the general operating principle of the modern automobile engine.

Laboratory Experience Power Mechanics, Section II Small Gasoline Engines. Albany, N. Y.: Delmar Publishers, Inc., 1967.

This series of twenty-eight Laboratory Experiences in Power Mechanics deals only with Section II - Small Gas Engines as presented in the reference text, Power Mechanics by George E. Stephenson.

Stephenson, George E. Power Mechanics, Albany, N. Y.: Delmar Publishers, Inc., 1963.

This instructional material is largely a study of prime movers, the inventions of man which use Nature's energy to do his work.

Miller, Rex and Fred W. Culpepper, Jr., Energy, Electricity and Electronics, Bloomington, Ill: McKnight & McKnight Pub., Co., 1964.

This textbook is designed to accelerate the learning process, offer the student accurate technical information and provide appropriate, challenging manipulative experiences.

Littrell, Joseph J. Guide to Industrial Arts Teaching, Peoria, Ill: Charles A. Bennett, Co., Inc. 1966.

This book has been written to help establish guiding principles in the early secondary school phase of industrial arts, with application to technical and vocational education.

Marcus, Abraham. Radio Projects, Englewood Cliffs, Prentice-Hall, Inc., 1955.

The organization of this book follows that of Elements of Radio. Starting with the construction of the simple crystal detector receiver, it proceeds through the diode receiver, triode regenerate receiver, and tuned-radio-frequency receiver up to and including the present day superheterodyne receiver.

Spielman, Patrick E. Modern Projects in Wood, Metal and Plastics, Milwaukee: The Bruce Publishing Co., 1964.

This book has been prepared to give the home craftsman and schoolshop student an up-to-date selection of project designs with tested working plans in the areas of wood, metal and plastics.

Marcus, Abraham. Basic Electricity, Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1964.

This book is a text on the fundamentals of electricity. It is intended for beginners.

Fraser, Roland R. & Earl L. Bedell. General Metal, Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1962.

The content of this book was selected with the following objectives in mind:
1. To develop an interest in and an understanding of the place of the metals industries in the social and economic life of the community.
2. To develop consumer knowledge.
3. To develop safe work habits.
4. To provide opportunities for developing independent planning and following through a job to successful completion.
5. To foster appreciation of good design, good material and good workmanship.

ABC's of Hand Tools. General Motors Corporation.

This book has picked out some of the most common hand tools and points out how to get the best use out of them.

Croneman, Chris H. General Woodworking. New York: McGraw Hill Book Co., 1964.

Book provides suggestions for special classroom activities, including discussion topics at end of each unit, numerous problems or projects and series of demensioned working drawings.

Amon, Martha Ruth & Ruth Haltz Rawson. Handcrafts Simplified, Bloomington, Ill: McKnight & McKnight Pub. Co., 1961.

Book provides information on the character of the major crafts, information concerning the proper tools to use and advice to the best procedures and techniques to employ.

Spence, William P. Architecture: Design, Engineering, Drawing, Bloomington, Ill: McKnight & McKnight Pub. Co., 1967.

Book provides introductory experience in the complexities of the building construction industry.

Ludwig, Oswald A. Metal Work Technology and Practice, Bloomington, Ill: McKnight & McKnight Pub. Co., 1962.

Book furnishes elementary information in metalwork describing tools, materials and operations common to many metalworking occupations.

Fierney, William F. Modern Upholstering Methods. Bloomington, Ill: McKnight & McKnight Pub. Co., 1965.

The book furnishes information for units on upholstery for industrial arts. These units bring out the problems, processes and operations involved.

Swanson, Robert S. Plastics Technology Basic Materials & Processes. Bloomington, ILL: McKnight & McKnight Pub. Co., 1965.

Book furnishes information on the materials of the plastic industry and processes by which raw materials are converted into finished products.

Cogolie, John E. Photo-Offset Fundamentals, Bloomington, Ill.: McKnight & McKnight Publishing Company, 1967.

Book furnishes working knowledge of offset printing. It illustrates the methods and practices used in doing offset printing.

McCarthy, Willard, J. & Robert E. Smith. Machine Tool Technology, Bloomington, Ill: McKnight & McKnight Pub. Co., 1968.

Book includes information and procedures in machine shop theory and practice.

Cherry, Raymond, General Plastics Projects and Procedures, Bloomington, Ill: McKnight & McKnight Pub. Co., 1967.

Book furnishes technical information and instruction on methods of working plastics, operations and experiments involved.

Perry, Kenneth and Clarence T. Baab. The Binding of Books, Bloomington, Ill: McKnight & McKnight Pub. Co., 1967.

Book furnishes information in book binding describing the materials, processes and products involved.

O'Neill, James M. Early American Furniture, Bloomington, Ill: McKnight & McKnight Pub. Co., 1963.

Book furnishes information on construction of early American furniture, the materials used and how finishes are applied. The book also has drawings and pictures of different pieces of early American furniture.

Capron, J. Hugh. Wood Laminating, Bloomington, Ill: McKnight & McKnight Pub. Co., 1963.

Book furnishes information concerning the experimentation and collection of details about wood laminating industry. Book also gives opportunities that can be gained through wood lamination. Projects are given in Section II.

Metzel, Guy F. Automotive Diagnosis and Tune-Up, Bloomington, Ill: McKnight & McKnight Pub. Co., 1965.

Book presents the basic theory necessary for an understanding of the automotive power plant. It analyses each component part of the power plant giving the correct function and maintenance. Specific usage and operation of various test instruments utilized in trouble finding and repair and tune-up are provided.

Silvius, G. Harold and Ralph C. Bohn. Organizing Course Materials for Industrial Education, Bloomington, Ill: McKnight & McKnight Pub. Co., 1961.

Book provides guide material to assist teachers, supervisors and administrators in preparing curriculum guides, courses of study and instructional materials.

Duffy, Joseph W. Power Drive Mover of Technology, Bloomington, Ill: McKnight & McKnight Pub. Co., 1964.

Book provides information on the sources of power, from the muscle of animal and man, wind and water, steam and atom to newer exotic generators.

Beeler, Samuel C. Understanding Your Car, Bloomington, Ill: McKnight & McKnight Pub. Co., 1967.

Book provides information on how a car works, how to maintain it and how to inspect it.

Lindbeck, John R. Design Textbook, Bloomington, Ill: McKnight & McKnight Pub. Co., 1963.

Book provides the reader a basic understanding of what design is, what it means and how it is implemented in school curriculum.

Anderson, Author D. A Designer's Notebook, Bloomington, Ill: McKnight & McKnight Pub. Co., 1966.

Book provides problems and designing information for individual and group projects.

Gerbracht, Carl and Frank E. Robinson, Understanding America's Industries, Bloomington, Ill: McKnight & McKnight Pub. Co., 1962.

Book provides information to help in learning the major industries of the country, what they do, how they are organized and how they relate to one another. Helps one to better understand our modern industrial society.

Feirer, John L. Woodworking for Industry, Peoria, Ill: Charles A. Bennett Co., Inc., 1963.

The book presents current information on materials, tools and processes. Technological developments in products, tools and building techniques are given great emphasis.

NewKirk, Louis V. General Shop For Everyone, D. C. Heath and Co., 1967.

This book gives information about the industry and its workers, explains how to use common hand tools and simple machines, calls special attention to safety precautions and gives valuable consumer information, provides projects, problems and review questions, and describes and illustrates tools and materials which can be developed into hobbies for leisure time enjoyment.

Silvius, G. Garold & Estell H. Curry. Teaching Multiple Activities in Industrial Education, Bloomington, Ill: McKnight & McKnight Pub. Co., 1956.

This book deals with the history, development and trends of the general shop movement, and an interpretation of the background and projection of multiple activity programs.

Leavitt, Jerome. The True Book of Tools for Building, Chicago: Children's Press, 1961.

This book furnishes us with a description of the various woodworking and metalworking tools. It suggests some safety measures and stresses the care of the tools.

Miller, Rex and Fred W. Culpepper. Experiences With Electrons, Bloomington, Ill: McKnight & McKnight Pub. Co., 1966.

This book furnishes us with information on electricity: a form of energy, energy at work, measuring of energy, the use of electricity for communications and control, and it also provides us with information on the future of electricity and experiments with electricity.

Hanna, Lavonne A., Gladys L. Potter and Neva Hagaman. Unit Teaching In The Elementary School, Chicago: Holt, Rinehart and Winston, 1963.

This book describes the methods used in developing a unit of work and the educational theory supporting those methods.

Burns, William A. A World Full of Homes, New York: McGraw-Hill Book Co., 1953.

This book tells of the ingenious ways that man from the earliest of times has used the raw materials he could find to shelter himself and his family from rain, snow, heat, cold and wind. It brings to life the fascinating history of man's progress in sheltering himself.

Smith, Tavon Benson and Marion E. Moddox, Elements of American Industry, Bloomington, Ill: McKnight & McKnight Pub. Co., 1966.

Book provides materials used by Industrial Arts teachers including skill and procedures gained in use of industrial materials.

PAMPHLETS

1969 Industrial Education Catalog
Electricity and Wheels
A Power Primer
Clamps Their History and Their Uses
Diesel the Modern Power
How the Wheels Revolve
Optics and Wheels
A Better Way
American Trucking Trends 1967
The Retail Automobile Business
The Automobile Story
Mathematics at Work in General Motors
Science at Work in General Motors
Your Introduction to Scale Model Railroading
Short Stories of Science and Invention
A to Zero of Refrigeration
Transportation Progress
Adventures of the Inquiring Mind
Can I Make the Production Team?
Can I Be a Craftsman?
Can I Be a Draftsman?
Can I Be an Engineer?
Precision A Measure of Progress
The Story of Power
Basic Facts About U.S. Steel
The World of Steel
Flow Chart Showing How Steel is Made
Flow Chart Showing How Coal Chemicals are Made
Principal Alloying Elements in Steel
Steel Making in America
Major Steps in Steelmaking
Catalog and Manual of Screen Process Printing
The Development of a Course of Study for Industrial Arts Education at the Elementary School Level
Alcoa Extruded Aluminum Truck and Trailer Flooring
The Many Faces of Aluminum
Painting With Aluminum in Color
The Story of Aluminum
Color and Texture for Aluminum
Aluminum Pipe and Fittings
The Handbook on Aluminum Traffic Control Devices
Catalog of Literature
Alcoa Architectural Stocks
N. C. Industrial Arts Association Bulletin
Safety in the Machine Shop
Safety Education - Cutting Implements
Safety in the Woodshop
Welding and Cutting Safety
1967-1968 Catalog of Non-Occupational Safety Materials

The Transistor
The Birth and Babyhood of the Telephone
The Story of the Bell Solar Battery
Win More Friends by Telephone
How to Make Friends by Telephone
We Learn About the Telephone
How the Telephone Works
The Telephone at Your Command
Voices Around the World
The Telstar Experiment
The Transistor Age
Coaxial Cable - A Modern Communications Medium
Machine Talk
How to Use Eric
Signals in Space
The New Light
Facts About Depa Plywood and Its Properties
Solox the Perfect Household Cleaner
Malite Plastic-Finished Paneling
How to Work Plywood
Plywood for Today's Construction
Why Model Rocketry
A Teacher's Guide to Model Rocketry
Model Rocketry
Model Rocket News
Model Rocket Altitude Prediction Charts
Basement Bombers

MAGAZINES

School Shop
Industrial Arts and Vocational Education
The Journal of Industrial Arts
American Handicrafts

TITLE III FILM CATALOG

Eggs to Market: The Story of Automated Egg Processing

The film shows what happens to eggs from the time they are laid until they are delivered to a market, 24 hours later. We see a farmer collecting the eggs. We see the automatic machines that clean, weigh, sort, and package the eggs. We see the trucks that take them from a processing plant to deliver them to markets. Many skilled workers and many automatic machines make it possible for us to eat fresh eggs every day.

Silk Screen Fundamentals

The construction of the silk screen frame is explained step by step, all necessary equipment shown, and instructions given for using the basic paper stencil block-out method of silk screen printing. Methods are demonstrated for stretching the silk onto both the commercial and the homemade frames. After the fabric is stretched taut evenly, it is sealed around all edges with brown paper tape and waterproofed with coats of shellac. This prevents seepage of paint out of the screen and also protects it against solvents. After the silk is slightly sponged of with water, the screen is ready for the first printing. For printing, the registration marks must be established, a test paper inserted, the screen lowered, squeegee placed in position and the paint applied to the screen. The first stencil is printed and the papers hung to dry. Cleaning the screen is demonstrated and the second stencil is put in place for printing the next color. The film also shows how to make a simple registration board for classroom use and describes the commercial screen registration board that attaches with removable hinges.

How Is Clothing Made: The Story of Mass Production

Who makes our clothes? How are they made? To find out, we go to a factory and follow the making of a boy's shirt from the designer's sketches to its shipment to a store. The style of a new shirt is first created by a designer at a sketchboard. From these drawings, patterns are made, and an original sample shirt is hand-sewn by a sample maker. When the sample is approved for mass production. the factory takes over. Each operation in the factory has a particular job to do and a specialized machine with which to do it. Many people work together to make the clothes we wear.

The Factory

The film illustrates the many steps involved in the manufacture of a typical factory product. Starting with the planning board of a toy factory, it follows the manufacture of a toy from the initial idea, through its experimental development, its engineering, production, assembly, and final sale in a retail store. In factories, people work together at machines to manufacture many of the things that help make life better, easier, and more fun for all of us.

Electromagnetism and Electric Motors: Classroom Science

The electric motor is a machine that changes electrical energy into mechanical energy to do work. There are many kinds of electric motors, but they all depend on the principle of electromagnetism - magnetism produced by electric current. Some of the characteristics and properties of magnets are reviewed, and the relationship between electricity and magnetism is demonstrated. The film shows the student how he can design his own electromagnet and direct current electric motor using such simple materials as iron bolts, thread spools, nails, and aluminum foil.

What is Automation

Today we have automatic machines that work in sequence - one taking over where the other leaves off. This is automation. Automation has tremendously increased both our ability to produce and our leisure time. This film takes us into an automated factory where we see automation in action. A few skilled workers supervise the machines and check the quality of the product. In the future, as more and more production becomes automated, man will have more leisure time. But the demand for workers with the skills needed to supervise automated factories will greatly increase.

School Shop Safety

Safety is the first lesson taught in school shops. In order to work safely without injuring yourself or others, it is important to develop a "safety first" attitude. This film emphasizes basic safety practices to be observed when using various materials, hand tools, power tools, heated materials, and electricity. Paying careful attention to safety rules is the first good habit of safety in any school shop.

Hand Tools for Woodworking

This film presents an overview of the safe and correct use of a variety of hand tools commonly used in the school shop and at home. Particular emphasis is made on safety practices for each of the hand tools. The claw hammer, ballpein hammer, bit and brace, wood rasp, planes, hand drill, crosscut saw, rip saw, screwdrivers, and others are demonstrated. The film carefully identifies each piece of equipment and, where applicable, shows the methods of adjusting the tool for its most efficient use. Care in treatment of hand tools is illustrated.

Portable Power Tools

This film presents an overview of the safe and correct use of a variety of portable power tools commonly used in the school shop and at home. Particular emphasis is made on safety practices for each of the power tools. The electric drill, the belt sander, the orbital sander, and the saber saw are demonstrated. In most cases, accessory parts and attachments and their uses are shown with each of the tools. The film carefully identifies each piece of equipment and, where applicable, shows the method of adjusting the tool for its most efficient use. Care in treatment of power tools is illustrated.

How to Make a Linoleum Block Print

This film introduces the use of block printing for Christmas cards, home furnishings and clothing. The different steps in making a block print are reviewed. A block printed Christmas card is made, showing the planning, transferring, cutting, and printing of a mounted linoleum block. Possibilities for using unmounted linoleum are also shown. Several methods of printing and different ways of adding interest in the printing process are detailed. The vocabulary used in the film is simple, the block printing steps are clearly presented and safety, organization and care of materials are carefully covered. The film reviews the many useful articles of clothing, accessories, household furnishings, and school projects that can be made by linoleum block printing, but the audience is challenged to explore many more ideas and to put their own creative expressions to use in practical arts.

Blast Furnace, Story of Steel

This filmstrip tells and shows the first encounter man had with iron. It shows the process by which steel is made, from mining, transporting, and the actual process itself. It also shows a lot of different uses for steel in our society today.

The Busy Wind, Our Invisible Friend

This filmstrip tells how wind is formed, giving the full process. It also tells how, in some cases, the wind is helpful and in other cases how the wind is very destructive and dangerous.

Safety First

This filmstrip is dealing with safety in a community or town. It demonstrates how you can be safe when you are at home, at school, riding a bicycle, riding in a car, walking and playing. It also shows how you can prevent an accident by being careful.

Flash, Crash and Glow: Electricity in a Bulb.

This filmstrip starts by telling when man first encountered lighting, which is electricity in its natural form. It tells about the many things electricity can be used for. It illustrates the basic composition of an atom of electricity. The origin of electricity and how it is now produced and transmitted to your house is discussed next. There are some safety rules you should follow when using electricity.

Our Community Utilities

Gas

This filmstrip shows the complete process of gas production. It shows how the gas is extracted from the earth and piped to the factories where it is processed and made ready for commercial use. It shows how the gas is transported to homes and other small businesses, and how a network of pipes carries the gas from an outside tank to various machines or utensils which work by gas. It also shows some consumers transacting business at a business office.

Water

This filmstrip shows a large body of water near a filtration plant and shows all the different processes which make the water safe to use. Then it shows how the water is piped to different places such as the hom , reservoirs, and different businesses. It also shows ho' people use to get water from hand pumps for home use, as compared with the way we get water today.

The Telephone

This filmstrip shows how the telephone is installed in homes and offices, and the different types of telephones that are made to fit the needs of different people. It shows the correct way to use the telephone and how to find numbers in the telephone book. It shows the three different methods by which messages are carried over the telephone (satellites, radio waves, and undersea cables). It shows the telephone company and the different jobs that are associated with the telephone company, such as, switchboard operators, secretaries, installation men, and service men.

Electricity

This filmstrip shows a hydroelectric dam and the different processes it carries on to produce electricity. It shows how the electric current is carried to our homes and some of the many things electricity can be used for. It also shows some of the occupations that goes along with the production and transmission of electricity.

America Grows With Iron And Steel

This filmstrip shows how the processing of iron and steel has progressed from early colonial times to the great iron and steel factories of today.

SLIDES

Slides are available of students in the different elementary schools of Bertie County, involved in different industrial arts activities.

FIELD TRIPS

Contact	Industry	Address	Grade Level Accepted
John Bealle	Stanley Power Tools	New Bern, N.C.	8th
	Maola Dairies	New Bern, N.C.	All
	Hamilton Beach	Washington, N.C.	7 & 8
	Greenville Motor Serv.	Greenville, N.C.	5 & up
	Greenville Utilities Comm. Power Plant	Greenville, N.C.	5 & up
Charley Hasty	Blue Bell, Inc.	Windsor, N.C.	4 & up
Jack Goldstein	Produce Processors	Windsor, N.C.	4 & up
H. E. Bunce	H.E. Bunch Pattern Works	Lewiston, N.C.	4 & up
	Harrington Mfg. Co.	Lewiston, N. C.	8th
Robert Spivey	Lea Lumber Co.	Windsor, N. C.	7 & 8
	Edinberg Industries	Chocowinity, N.C.	
	Albemarle Paper Co.	Roanoke Rapids, N.C.	6,7,8
	VEPCO Power Plant	Roanoke Rapids, N.C.	5 & up
	United Piece & Dye Works	Edenton, N.C.	
	WNCT Radio	Greenville, N. C.	
	WNCT Television	Greenville, N. C.	
	Burlington Mills	Tarboro, N. C.	6,7,8,
	Phoenix Trim Shop	Tarboro, N. C.	6,7,8
	Carter's Ink	Edenton, N. C.	
	Chris Craft Boat Works	Edenton, N. C.	
	Grady-White Boat Works	Edenton, N. C.	
	National Spinning Co.	Washington, N. C.	
	Union Carbide	Greenville, N. C.	
	Long Manufacturing	Tarboro, N. C.	

WIAM	Williamston, N.C.
Empire Brush Co.	Greenville, N.C.
Cox Armature	Greenville, N.C.
Ahoskie Herald	Ahoskie, N.C.
Kelford Coca Cola Bottling Co.	Kelford, N.C.
Carolina Tel. & Tel.	Williamston, N.C. Ahoskie, N.C.
Hardee's	Rocky Mount, N.C.
Colbourn Lumber Co.	Windsor,N.C.
WITN	Washington, N.C.
Colonial Williamsburg	Williamsburg, Virginia

Note: If a contact person is not named, you should contact the Personnel Manager or Public Relations Director.