DOCUMENT RESUME

ED 405 508 CE 073 770

TITLE	Technology Education in the Elementary School.
INSTITUTION	Henrico County Public Schools, Glen Allen, VA. Virginia Vocational Curriculum and Resource Center.
SPONS AGENCY	Virginia State Dept. of Education, Richmond. Office of Vocational, Adult, and Employment Training Services.
PUB DATE	94
NOTE	119p.
AVAILABLE FROM	Virginia Vocational Curriculum and Resource Center, 2200 Mountain Road, Glen Allen, VA 23060-2208 ($10.46).
PUB TYPE	Guides - Classroom Use - Teaching Guides (For Teacher) (052)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Abstracts; Annotated Bibliographies; British National Curriculum; *Classroom Techniques; Educational Objectives; Elementary Education; *Elementary Schools; *Integrated Curriculum; Learning Activities; Models; *Problem Solving; Resource Materials; Statewide Planning; *Technological Literacy; *Technology Education
IDENTIFIERS	*Virginia

ABSTRACT

This resource guide, which is intended to help Virginia elementary school teachers integrate technology education into their instructional programs, reviews programs and learning activities designed to help students develop problem-solving skills and technological awareness. Discussed in the introduction are the following: the elementary school model; introduction to elementary technology education; integration of technology education in elementary schools; and essential goals for technology education. Section 1 reviews the following elementary school-level comprehensive programs: Virginia Pilot Programs in Elementary School Technology Integration; Total School Technology Integration; Mission 21: Launching Science and Technology across the Curriculum; Project 2061; Technology for Children (T4C); and Design and Technology in the National Curriculum of England. Presented in section 2 are 29 abstracts of learning activities currently being used by Virginia teachers that integrate technology education into the general elementary school curriculum. Each abstract includes the following: description of the activity; school and teacher involved; contact principal; and grade level. Section 3 contains the names/addresses of consultants and resource persons for elementary school technology education and the information needed to order the following: books and resources guides for technology activities; magazines and articles about technology activities; videotapes, software, and multimedia materials; and materials, supplies, and manipulatives. (MN)

TECHNOLOGY EDUCATION IN THE ELEMENTARY SCHOOL

Commonwealth of Virginia
Department of Education
Technology Education
Richmond, Virginia 23216-2120

TECHNOLOGY EDUCATION IN THE ELEMENTARY SCHOOL

Developed by

Technology Education
Virginia Department of Education
P.O. Box 2120
Richmond, Virginia 23216-2120

in cooperation with

James Madison University
School of Integrated Science and Technology
Harrisonburg, Virginia 22807

Produced by

Virginia Vocational Curriculum and Resource Center
2200 Mountain Road
Glen Allen, Virginia 23060-2208

ACKNOWLEDGMENTS

The initial impetus for this resource guide was the publication in 1988 of a curriculum guide titled *Elementary School Technology Education in Virginia's Public Schools*. The authors of that guide included representatives from science, social studies, mathematics, and technology education and a number of elementary teachers, principals, and supervisors. The curriculum guide illustrated technology activities that could be used in teaching selected Standards of Learning in mathematics, science, and social studies, grades K-5.

A second development that spurred the creation of this resource guide was the interest and enthusiasm of an elementary school principal for the addition of technology to her school. Gioia Caiola Forman, Principal of Dranesville Elementary School, worked with her faculty for several years to bring technology into the lives of their students. Mrs. Forman believes that children need to use technology in order to learn. Cindy Etchison, technology resource teacher, also contributed to this publication by sharing her experiences and ideas about materials and activities.

In 1992, a group of six elementary schools were selected to pilot test a variety of techniques for integrating technology. These schools and participating principals and teachers are described in Section 2—Program Review and Research.

Cindy Weisbart, Research Associate in Technology Education at James Madison University, coordinated the guide development. Dr. Arvid Van Dyke, Coordinator of K-12 Partnerships and Technology Education Programs in the College of Integrated Science and Technology, James Madison University, served as curriculum specialist and project director.

Final editing and design were performed by the Virginia Vocational Curriculum and Resource Center, administered by the Department of Secondary and Adult Education, Henrico County Public Schools:

Peggy L. Watson, Director
Anita T. Cruikshank, Writer/Editor
Teresa P. Kieper, Publications Assistant.

George R. Willcox
Principal Specialist
Technology Education
Virginia Department of Education

TABLE OF CONTENTS

	Page
☆ Introduction	1
☆ Section 1: Technology-Based Program Review and Research	11
☆ Section 2: Classroom Problem Solving Using Technology Activities	39
☆ Section 3: Sources of Assistance	99

INTRODUCTION

TECHNOLOGY EDUCATION IN VIRGINIA'S ELEMENTARY SCHOOLS (GRADES K - 5)

Page

☆ The Elementary School Model 3

☆ Introduction to Elementary Technology Education 4

☆ How to Integrate Technology Education in the Elementary School . . . 5

☆ Getting Started with Technology Integration 7

☆ Essential Goals for Technology Education 8

☆ How to Use This Resource Guide 9

THE ELEMENTARY SCHOOL MODEL

Technology education experiences in the elementary school are designed to help pupils learn and achieve the educational goals of the total elementary school program. These experiences orient pupils to technology, develop psychomotor skills, and provide the basis for informed attitudes about technology's influence on society. Technology-based activities, integrated into the total elementary school curriculum, motivate pupils and reinforce learning while pupils gain technological awareness.

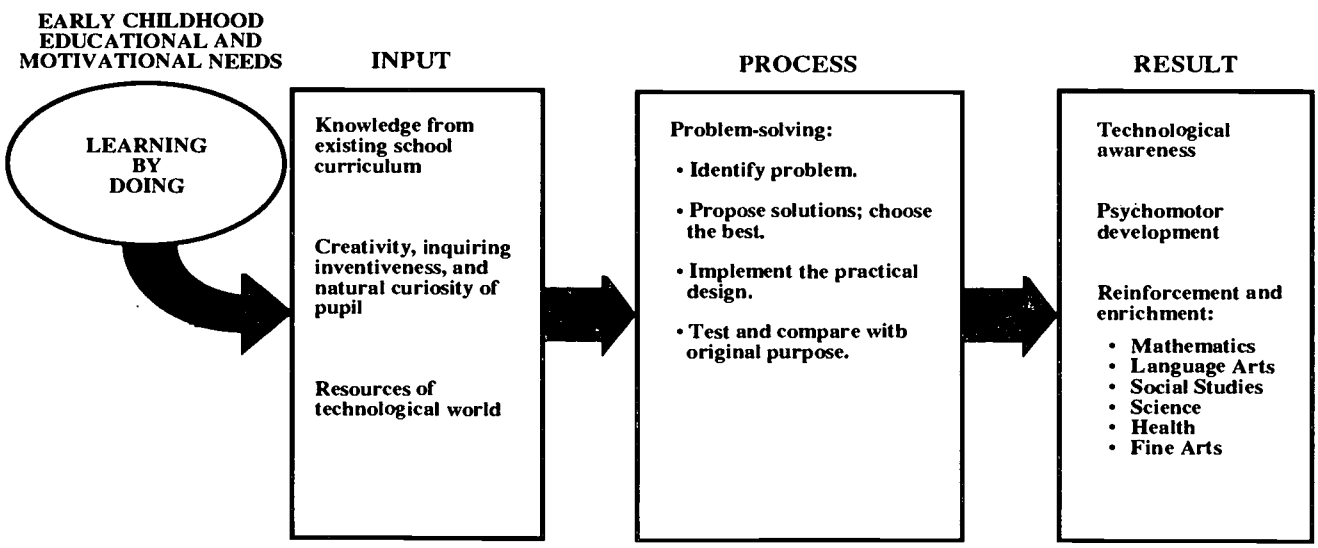
Focus: Technological Awareness

The focus of technology education at the elementary level is to develop a technological awareness and to reinforce learning.

The elementary school child with technology experiences shall . . .

- explore how people create, use, and control technology.
- apply knowledge of mathematics, language arts, social studies, science, health, and fine arts in solving problems associated with technology.
- use tools and materials to explore personal interests with technology.
- exhibit self-confidence through the use of technology.

Curriculum Goals
Elementary School Technology Education

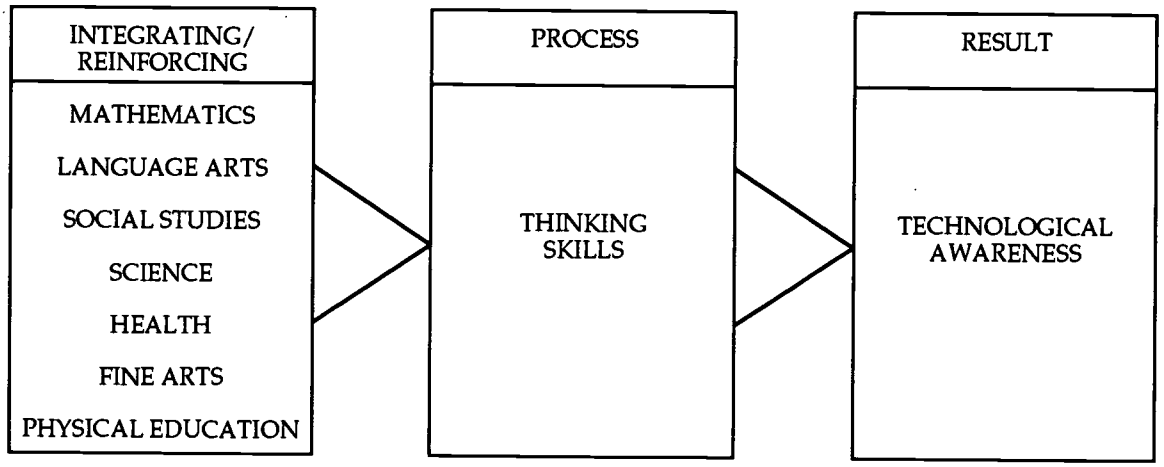


Introduction to Elementary Technology Education

Description

Technology education experiences in the elementary school are designed to help pupils learn and achieve the educational goals of the total elementary school program. These experiences orient pupils to technology, develop psychomotor skills, and refine attitudes about technology's influence on society. Technology-based activities should be integrated into the total elementary school curriculum so that activities motivate pupils and reinforce the subject matter.

THE ELEMENTARY TECHNOLOGY EDUCATION CURRICULUM MODEL



Goal: Technological Awareness

The goal of technology education in the elementary school is to develop a technological awareness and to reinforce learning.

Technology education in the elementary school

- provides opportunities for children to learn fundamental concepts of how people create and control technology.
- reinforces and enriches concepts of the elementary school curriculum.
- allows pupils to work with tools, materials, and technological concepts and processes to explore ways in which technology influences society.

How to Integrate Technology in the Elementary School

Technology is an integral part of children's lives at school, at home, and in between.

Learning to use technology is important because ever yone will encounter new technologies. Using technology is only one aspect of learning; children need to understand technology so that they can use it now and in the future.

Technology is a tool or process for solving problems. Children who learn to solve problems should learn to use technology to solve problems. Technology is part of the "learning world."

Technology provides exciting activities for children to learn. Technology integrates fundamental skills in thinking, problem solving, communicating, quantifying, and collaborating.

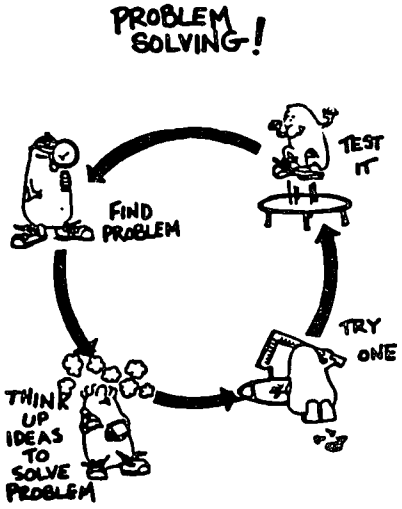
Technology education experiences in the elementar y school are designed to help pupils learn and achieve the educational goals of the total elementar y school program. Experiences with Design and Technology enhance the curriculum through problem solving, hands-on learning, and real world applications. Technology-based activities motivate students, integrate science or mathematics and other subjects, and create awareness of future career opportunities.

Technology Content Descriptors

I Problem solving using Design and Technology
II Interdisciplinar y studies using real-world technology applications
III Creative thinking using inventiveness, engineering, and economics
IV Information technology using computers, telecommunications, videos, and graphics
V Psychomotor development using manipulative materials, tools, and modeling packages
VI Building of self-confidence by talking, writing, and drawing/illustrating for others

Problem Solving Steps for Children

1. Identify and describe the problem you face.
2. Think up creative ideas to solve the problem and collect information.
3. Try out your new ideas to find the best solution.
4. Design, draw, or make the best solution. Test it to see if it solves the problem. Explain it to other people.



Getting Started with Technology Integration

1. Organize a technology committee composed of teachers, other school personnel, and community partners.

2. Review programs and activities in the resource guide.

3. Contact one or more of the schools that are currently integrating technology education.

4. Arrange visits to schools with technology integration.

5. Provide in-service activities and encourage experimentation by teachers with materials and technology.

6. Evaluate and purchase appropriate technologies.

7. Conduct curriculum review for the purpose of integrating the new technologies.

8. Implement integrated program and evaluate annually.

Essential Goals for Technology Education

Consistent with their abilities, interests, and needs, learners will

- explore and experience the evolution of technology.
- explore and experience the resources necessary for technology (people, information, materials, tools/machines, capital, energy, and time).
- explore and experience how people use technology to solve problems.
- gain an understanding of the similarities that exist among all technologies.
- gain an understanding of the all-encompassing nature and impact of technology.
- choose appropriate resources.
- demonstrate how resources are processed using the basic systems concept (input > process > output > feedback).
- understand the function of feedback for technological systems.
- solve problems using a systems approach.
- make decisions and choices about the selection of systems.
- analyze technological relationships using engineering strategies.
- develop creative solutions to present and future societal problems.
- demonstrate processes used in the free enterprise system.

How to Use this Resource Guide

This resource guide will be useful to teachers who want to integrate technology education into their elementary school instruction. Program Reviews and Activity Abstracts are intended to help principals and teachers select and obtain other materials such as Mission 21, which contain everything a teacher (and students) will need.

Section 1 reviews several comprehensive programs that include technology education at the elementary school level. The research source is given so that additional information can be obtained.

Section 2 contains abstracts of activities that are a part of the classroom instruction of many elementary teachers. These abstracts are designed to help other teachers select appropriate technology integration.

Section 3 provides information needed to order books and guides, videos and software, magazines and articles, and equipment and supplies for the activities outlined in this guide. It also contains the names and addresses of consultants and resource persons for elementary school technology education.

SECTION 1

TECHNOLOGY-BASED PROGRAM REVIEW AND RESEARCH

Page

Virginia Pilot Programs in Elementary School Technology Integration . . . 13

Total School Technology Integration 17

Mission 21: Launching Science and Technology Across the Curriculum . . . 21

Project 2061 25

Technology for Children - T4C 33

Design & Technology in the National Curriculum of England 35

Review and Research on Technology-Based Programs

Program Title: Virginia Pilot Programs in Elementary School Technology Integration

Locations

- ☆ Dranesville Elementary School, Fairfax County
- ☆ Fisher Elementary School, Richmond City
- ☆ Irisburg Elementary School, Henry County
- ☆ McIntosh Elementary School, Newport News City
- ☆ Ottobine Elementary School, Rockingham County
- ☆ Salem Elementary School, Spotsylvania County

Overview of Program

During the summer of 1992, the Virginia Department of Education designated six pilot schools to participate in a Technology Education Project funded through James Madison University. The six sites were visited and invited to select one or more instructional techniques for integrating technology into the curriculum. Basic materials and literature were provided to each school, and workshops or visits to other schools were encouraged so that teachers could learn and assess activities.

Objectives of Pilot Schools Project

- ☆ Create a learning environment that will help students build self-esteem, interest in learning, and the ability to make decisions about their future.
- ☆ Establish connections among mathematics, science, and technology content through real life activities, "hands on" manipulative materials, and computing equipment.
- ☆ Increase the use of problem solving and critical thinking instructional strategies using design briefs and realistic contexts from home, school, and literature.
- ☆ Contribute to technological literacy by using and evaluating instructional materials and packages, including Mission 21, UK Design and Technology, and commercial packages and software.

Grade Levels/Ages of Students: K-5

Preparing for Technology Integration

The individual pilot schools used various ways to prepare teachers for technology integration activities:

- ☆ Committees of two or more teachers evaluated or tried out an activity and shared the advantages and disadvantages with the total faculty.
- ☆ One school offered a summer workshop with college credit to all teachers.
- ☆ Consultants with expertise in technology were employed to spend a day in the school working with teachers on lessons and using design briefs with students.
- ☆ Single-topic workshops were held after school to explain a new strategy or technology package.

References for Research or Information

Resource Guide for Elementary School Technology Integration, published by Virginia Department of Education

or Mr. George Willcox, Principal (804) 225-2839
Technology Education
Virginia Department of Education
P. O. Box 2120
Richmond, VA 23216-2120

Dr. Arvid Van Dyke, Coordinator (703) 568-2786
K-12 Partnerships & Technology Education Programs
College of Integrated Science and Technology
James Madison University
Harrisonburg, VA 22807

Principals and Lead Teachers

Fairfax County - Dranesville Elementary School (703) 709-7789
1515 Powells Tavern Place
Herndon, VA 22070
Gioia Caiola Forman, Principal
Cindy Etchison, Resource Teacher

Richmond City - Fisher Model Elementary School (804) 320-2491
3701 Garden Road
Richmond, VA 23235
Dr. Mary L. Murphy, Principal
Donna Fout, Gifted & Talented
Donna Smith, Grade 2

Spotsylvania County - Salem Elementary School (703) 786-8218
4501 Jackson Road
Fredericksburg, VA 22401
Corky Talley, Principal
Yvonne Spencer, Grade 1
Joanne Kelminski, Grade 2

Newport News City - McIntosh Elementary School (804) 886-7767
185 Richneck Road
Newport News, VA 23601
Mary Ann Hutchinson, Principal
Earlyne Mullen, Grade 2
Sandra Seaborn, Grade 3

Henry County - Irisburg Elementary School (703) 650-2183
Rt. 3, Box 120
Axton, VA 24054
Wayne Moore, Principal
Sue Galtress, Kindergarten

Rockingham County Schools - Ottobine Elementary School
(703) 879-9712
Rt. 1, Box 328
Dayton, VA 22821
Dr. Robert P. Grimesey Jr., Principal
Dawn Flora, Grade 1
Julie Propst, Grade 1
Margaret Monk, Grade 3
Linda Ferguson, Grade 4
April Cave, Grade 5
Susan Pollard, Media Specialist
Carol Welch, Gifted & Talented

Review and Research Technology-Based Program

Program Title: Total School Technology Integration

Location:

☆ Dranesville Elementary School (703) 709-7789
Fairfax County Public Schools
1515 Powell Tavern Place
Herndon, VA 22070

Overview Of Program

At Dranesville Elementary School in Fairfax County, the mission statement and yearly objectives emphasize technology, stating a goal to strengthen the mathematics, science, and technology programs at all grade levels. The goal is carried out by integrating technology into all curricula. Technology education is, therefore, not a separate curriculum area, but a vehicle for applying the concepts acquired in math, science, social studies, language arts, and other subjects. The application of technology is used to solve current problems and needs. Technology teaching at Dranesville includes more than just teaching with technology such as computers. It involves teaching about technology in a problem-solving methodology that includes action-oriented situations and uses the students' "know-how" and "ability to do" capabilities in a carefully planned interdisciplinary learning situation.

Objectives of Pilot Schools Project

☆ Strengthen the mathematics, science, and technology programs at all grade levels.

☆ Technology is "the application of knowledge to solve problems."

☆ "Information technology" such as computers and multimedia resources is used to supplement the curriculum and access information.

☆ "Design Technology" involves problem solving and supplemental curriculum areas through real-life applications.

Grade Levels/Ages of Students: K-5

Preparing for Technology Integration

Implementing technology education activities into an elementary school involved many informal in-service activities by the teachers and a technology resource teacher. The following stages were utilized:

- ☆ **Awareness:** Building a philosophy about the relationship of technology education to other disciplines and the learning gains that will result
- ☆ **Research and Resource Development:** Finding what exists, who has experience, gathering materials to share
- ☆ **Piloting:** Teachers trying activities and materials, using resource assistance, with small groups or classes of students
- ☆ **Evaluation:** Debriefing process conducted by teams so that modifications can be made to improve efficiency.

References for Research or Information

Gioia Caiola Forman, Principal
Cindy Etchison, Technology Specialist

"Technology 2000: A Profile of Technology Education at Dranesville Elementary School." Gioia Caiola Forman and Cindy Etchison. *The Technology Teacher,* September/October, 1991.

Obtain magazine from

Dr. Kendall N. Starkweather (703) 860-2100
International Technology Education Association
1914 Association Drive
Reston, VA 22091.

Technology 2000: A Profile of Technology Education at Dranesville Elementary School

Gioia Caiola Forman and Cindy Etchison

Taken from *The Technology Teacher,* September/October, 1991.

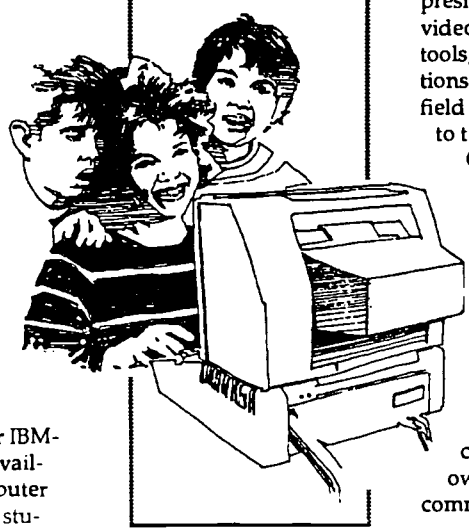
Technology Program

Technology is "the application of knowledge to solve problems." At Dranesville Elementary School, students and staff are encouraged to use a variety of equipment–computers, laser disc and CD-ROM players, hand tools, and manipulative toys–to solve problems and develop critical-thinking skills.

The school's Technology Program involves both information and design technologies. The information that follows summarizes the equipment and activities that are available.

Information Technology

Dranesville Elementary has several types of computer equipment that are used as tools to supplement the curriculum. Classrooms are equipped with Apple IIe or Macintosh LC computers (Kindergarten to Grade 3) and Apple IIgs computers (Grades 4 to 6). Two of the Macintosh LC computer stations have CD-ROM players. The players enable students to use talking books or other multimedia resources. Four IBM-compatible computers are available to students in our computer mini-laboratory. In the lab, students can use computer-aided design (CAD) and animation software to produce illustrations for special research projects or books.

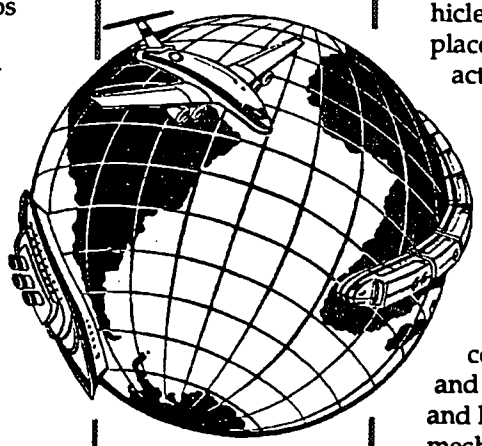


Students use the computers in small- and large-group instruction, as well as individually. The school has more than 200 programs to develop problem-solving skills, participate in simulations, and reinforce the skill areas covered in Fairfax County's Program of Studies.

The library offers many opportunities to use computers and multimedia equipment. Students use the computerized catalog and MANDY (subject-search software) to inquire about an author or book. They use CD-ROM players to access electronic encyclopedias or information about interesting subjects, such as mammals or presidents. Laser disc players and videodiscs are excellent teaching tools, especially for demonstrations, simulations, and electronic field trips. Students can "travel" to the National Zoo, National Gallery of Art, or Grand Canyon!

Telecommunication activities are available to all students. The activities vary from sending valentine messages or participating in treasure hunts to collecting scientific data on weather conditions. Students can produce and edit their own videotapes. The school's communication studio is equipped

with two editing decks and with monitors that allow students to make professional-looking videos for classroom projects. Students can also create graphic presentations with the computer and then add voices or music to complete a video. Students use the video cameras to tape segments that are used for the school's news network, WDES. Closed-circuit television allows all students to view the news, see special guests, or "visit" another classroom.



Design Technology

Design technology is about identifying needs; generating ideas; planning; and creating, testing, and finding the best solutions. Technology activities, using a Design Brief format, help the students become aware of the ways in which technology affects home, work, and lifestyles. Technology activities can supplement a lesson in language, mathematics, science, physical education, music, art, health, or social studies. The activity can be thought of as a real-life application of a mathematic or scientific concept.

A technology activity could involve kindergarten students in designing and constructing ears for Mickey Mouse; first graders could design and test ways of lifting blocks; second graders could create vehicles to move items from one place to another. A technology activity could explore the challenge of a diver using air tanks and weight belts to try to get to the bottom of a body of water. Students could be inspired to design and construct safe diving gear. Students in the upper grades, studying insects, could design their personal bug and describe its purpose, habitat, and living patterns. They could mechanize the bug using electric, pneumatic, or elastic power.

In design technology activities, students use CAD or graphic software to create a design plan or blueprint for their project. The students build their project using their hands and hand tools to assemble paper-towel rolls, rubber bands, string, fabric, straws, wood, manipulative toys (Legos, Gearopolis, Tinkertoys), and simple machines. The design process is documented in reports and drawings that are prepared using desktop-publishing software.

Dranesville Elementary School offers its staff and students a variety of multimedia equipment and activities that use advanced information and design technologies to enhance and improve problem-solving skills.

Review and Research Technology-Based Program

Program Title: MISSION 21: Launching Science and Technology Across the Curriculum

Developer

☆ Funded by a grant from the National Aeronautics and Space Administration - NASA to the Technology Education Program at Virginia Tech

Location

Field tested in Virginia's elementary schools; implemented in U. S. and other countries

Overview of Program

The aim of Mission 21 is technological literacy for elementary students. The program integrates technology and its issues into the elementary curriculum through hands-on problem solving activities. The Teacher's Resource Book and the coordinated student reading materials foster technological understanding in an interdisciplinary fashion, working hand in hand with mathematics, science, aerospace, social studies, language, and other curricula. Teachers may select design briefs with themes that are appropriate to their classes and students.

Goals of the Program

The Mission 21 Program enables children to

☆ explore and practice ways that people create, use, and control their environment to solve problems and satisfy human needs and desires.

☆ apply and enrich concepts and skills in science, mathematics, health and physical education, language arts, social studies, and art by focusing on a central theme of technology.

☆ safely and efficiently use tools, materials, and processes that provide sensory experiences of a visual and tactile nature.

☆ identify and analyze how technology shapes their world and how society and the environment affect technological change.

- ☆ generate creative and practical solutions to present and future problems using technical means.
- ☆ explore values about, and attitudes toward, technological innovation.
- ☆ promote responsible work, leisure, and citizenship roles in a technological society.

Grade Levels/Ages of Students

Level I for grades 1 and 2
Level II for grades 3 and 4
Level III for grades 5 and 6

Preparing Teachers to Use Mission 21

The project directors recommend that workshops be held with elementary teachers who want to implement Mission 21 in their classrooms. Teachers need time to review the *Teacher's Resource Books,* carry out many activities in the design briefs, and scan the student books.

References for Research or Information

Teacher's Resource Book and student books are commercially available from
Delmar Publishers Inc. (800) 347-7707
3 Columbia Circle Drive
Box 15015
Albany, NY 12212-5015

Program information and staff development can be arranged through

Dr. William E. Dugger Jr. or Dr. James E. LaPorte (703) 231-6480
Mission 21 Co-Director
Technology Education
Virginia Tech
Blacksburg, VA 24061

MISSION 21 LEVEL I
THEMES & DESIGN BRIEFS

Transportation: A Problem-Solving Theme

1. Sign Language
2. Transportation Detective
3. Wheels
4. Getting Water
5. Just "One" Wheel

Exploration: A Problem-Solving Theme

1. Take It Apart!
2. Hang Up Technology
3. Technology Toy
4. Use It Again
5. Too Much Noise!

Design: A Problem-Solving Theme

1. New Shoes
2. Technology Artist
3. Patches
4. Will It Fly?
5. Weight Detector

Space: A Problem-Solving Theme

1. Technology in Space
2. A Lunch Box for Space
3. Space Stories
4. Cosmic Sunglasses
5. Space Backpack

MISSION 21 LEVEL II
THEMES & DESIGN BRIEFS

Machines

1. A Room Full of Machines
2. Mapping Great Machines
3. Invasion of the Snoids
4. Lunar Mover
5. Transformers
6. Probing the Future

Discovery

1. From Twigs and Stones
2. Switch On!
3. Communicator
4. Space Station Alpha
5. Solar Magic

Community

1. Technology Makes it Happen
2. Turning Trash into Treasure
3. Noise Detector
4. Water, Water Everywhere
5. Earth Town 2091

Connections

1. Technology Changes our World
2. From Trees to Paper
3. Technology to the Rescue
4. Times Sure Have Changed!
5. A Better You
6. I've Been Working on the Line
7. Space Frontier

MISSION 21 LEVEL III
THEMES & DESIGN BRIEFS

Invention: A Problem-Solving Theme

1. The Dollar Sign Dilemma
2. Think Tank
3. Cup Creations
4. Creative Combo
5. From Paper Clips to Space Shuttles
6. Search for Shelter

Communications: A Problem-Solving Theme

1. Symbol Maker
2. Vacation in Space
3. Package It!
4. In 12,000 Days
5. Tune in to WMMI (Channel 2001)

Energy & Power: A Problem-Solving Theme

1. S & T & Me
2. Technology Detective
3. Technology Trap
4. Zonka Alarm
5. Make Your Case

Space Colonization: A Problem-Solving Theme

1. Help Wanted...in Space
2. NASA Cinema
3. Space Flight 21
4. Space Robotics
5. Space Town

Review and Research on Technology-Based Programs

Program Title: Project 2061

Developer

American Association for the Advancement of Science (AAAS)

Location

Nationwide program with 6 sites coordinated by Project 2061 Staff at AAAS

- ☆ Philadelphia, PA
- ☆ Rural districts near Athens, GA
- ☆ McFarland, WI
- ☆ San Antonio, TX
- ☆ San Diego, CA
- ☆ San Francisco, CA

Overview of Program

Project 2061 is a long-term reform initiative of the American Association for the Advancement of Science to transform K-12 education for the 21st century so that all students achieve science literacy. After helping to define what high school graduates should know in the areas of natural and social science, mathematics, and technology, Project 2061 is designing a set of tools (bench marks) for school districts and other developers to use in creating their own curricula to achieve the goals of science for all Americans.

Components of Project 2061

- ☆ Addresses systemic reform in K-12 education for science literacy
- ☆ Includes all natural and social sciences, mathematics, and technology
- ☆ Recognizes the interdependence of the sciences and integrates or makes curriculum connections among the science disciplines and with other disciplines such as the arts and humanities.
- ☆ Proposes long-term reform of the entire K-12 system through blueprints on teacher education, assessment, policy, and other school issues.

☆ Provides alternative models for restructuring curriculum: in parallel arrangement, with little overlap among students; integrated around issues or phenomena; or in mosaic, bound by a variety of organizing principles.

Format and Content

The benchmarks will be under these chapters in the book *Science for All Americans:*

- The Nature of Science
- The Nature of Mathematics
- The Nature of Technology
- The Physical Setting
- The Living Environment
- The Human Organism
- Human Society
- The Designed World
- The Mathematical World
- Historical Perspectives
- Common Themes
- Habits of Mind

Grade Levels/Ages of Students:

K-12 with assessment at grades 2, 5, 8, and 12

Preparing for Technology Integration

☆ Phase I (1985) asked what future generations should know about science, mathematics, and technology. This phase culminated in 1989 with the publication of *Science for All Americans* (SFAA), which spelled out a solid base of learning goals.

☆ Phase II transforms these learning goals into alternative curriculum models and devises Blueprints for Action. The blueprints, dealing with such topics as teacher education, testing, teaching materials, and educational policies, will recommend what changes need to be made, along with curriculum reform in order for school systems to graduate students who meet the goals proposed in SFAA.

☆ Phase III strives to implement reform nationwide.

References for Research or Information

Science for All Americans: A Project 2061 Report on Literacy Goals in Science, Mathematics and Technology. F. J. Rutherford, A. Ahlgren, 1989.

Technology: Report of the Project 2061 Phase I Technology Panel. James Johnson, 1989.

American Association for the Advancement of Science
1333 H Street NW
Washington, D. C. 20005
Project 2061 (202) 326-6666

Benchmarks for Science Literacy—Project 2061 (ISBN 0-19-508986-3)
American Association for the Advancement of Science
Order from Oxford University Press
200 Madion Avenue
New York, NY 10016

Newsletter: *2061 Today* (write AAAS to add name to mailing list)

27

Project 2061's Own Classroom

Taken from *2061 Today,* Spring 1991

After 18 years of teaching mathematics, the most difficult question Bernard Farges has had to answer for his students is not the value of pi or the integral of a curve.

Instead, it is: "Why do we have to learn math?"

For Farges, questions such as these convinced him that schools need to set aside the limitations of the current system and make fundamental changes in how they teach science, mathematics, and technology. Today, he has an opportunity to do just that—as the leader of one of six teams of educators from urban California to rural Georgia that are helping to develop alternative curriculum models for Project 2061.

> *A model, for example, might organize large blocks of instruction by traditional disciplines (biology, algebra), by phenomena (migration, seasons), by technological systems (agriculture, manufacturing)—or by some mixture of them.*

Next month, the 150 educators, ranging from grade school principals to high school physics teachers, will hand off their recommendations to an editorial advisory board. And another major milestone will have been reached in Project 2061's long-term effort to transform education in science, mathematics, and technology.

Project 2061 is unfolding in three phases. Phase I, started in 1985, asked what future generations should know about science, mathematics, and technology. It culminated in 1989 with publication of *Science for All Americans* (SFFA), which spelled out a solid base of learning goals. Phase II, now underway, is transforming these learning goals into alternative curriculum models and devising Blueprints for Action. The Blueprints, dealing with such topics as teacher education, testing, teaching materials, and educational policies, will recommend what changes need to be made, along with curriculum reform, in order for school systems to graduate students who meet the goals proposed in SFFA. Phase III will strive to implement reform nationwide.

Alternative Curriculum Models

For the past two years, the focal point has been on developing the alternative curriculum models. Each model is intended to be a conceptual rendition of the essential premises, content, organization, and approach of a K-12 curriculum that would, if put into practice, produce the learning outcomes defined in SFFA.

A model, for example, might organize large blocks of instruction by traditional disciplines (biology, algebra), by phenomena (migration, seasons), by technological systems (agriculture,manufacturing)—or by some mixture of them. Although the models will include some examples of appropriate learning experiences, they will not be complete curricula with the details needed for planning day-to-day instruction. Rather, a model will be a tool that other teams of teachers can use to develop their own complete curricula.

The teams also are beginning to identify the systemic changes needed for their models to work. How might schools have to be reorganized and restructured? What new tests and instructional materials might be needed? How will each model ensure equity, so that all students receive the benefits of Project 2061? Questions such as these will be explored more fully in ten Blueprints for Action, which will be prepared over the next 18 months by teams of experts now being assembled.

Next Steps

After delivering their proposed curriculum models this June, five members of each team, together with central Project 2061 staff and specialists on curriculum design, will form an expanded editorial board to refine the models over the next year. During the latter half of 1992, the final drafts of the models will be reviewed widely by teachers, school administrators and education policymakers, mathematicians, natural and social scientists, engineers, historians, representatives of business and labor, the Blueprint authors, and the Phase I panels—and then revised accordingly. The models and Blueprints are scheduled to be published in Spring 1993.

Project 2061 expects the models to be used in several ways. One is to guide the development of actual K-12 curricula by groups of school and university people working together. School districts will then soon have available as starting places for their own curriculum reform efforts both curriculum

29

models and worked-out curricula leading to science literacy. The models and Blueprints will also be used to guide the development of a new generation of educational materials, to provide a focus for the preparation of teachers, and to influence the content, design and use of new assessment practices.

What we are proposing may require major changes in the culture of schools and the preparation of teachers. That is going to take time."

Breaking New Ground

To prepare their alternative curriculum models, each team has been given about 40 days of release time for each of two years, plus two summers. In addition, they have had dedicated work space; a budget for reference materials, consultants, and travel; the support of nearby university faculty and resources; and, thanks to IBM, computers at work and at home linking the team members to each other, to data bases, and to the project headquarters in Washington.

The teams have spent hundreds of hours, often giving up evenings, weekends and summer vacations, to work on the project. "I think we have been sustained by this real desire to make a difference," said Wisconsin team leader Deborah Larson. "This is something that as a teacher you only dream about getting to do."

Team members are conscious that they're helping to break new ground in many ways. "We've worked on ways of integrating subjects before, but never on as vast a scope as this program," said Joan Kunzler, a member of the San Diego team.

Team members say they are encouraged by the level of interest expressed by other teachers looking to improve the schools. Still, they also recognize that the kinds of designs they are developing will take time to implement.

"People are anxiously waiting to see the models, but I think they have to remember that we are not proposing a short-term fix," said Clara Tolbert, Philadelphia team leader. "This is not a project you can just put in place. What we are proposing may require major changes in the culture of schools and the preparation of teachers. That is going to take time."

30

Working Together for Reform

Taken from *2061 Today,* Spring 1991

Project 2061 is not alone in its efforts to improve mathematics, science, and technology education and has been working with other groups engaged in related reform efforts.

While many of the other reform projects differ from Project 2061 in that they tend to target one specific subject area for a shorter-term program of reform, many of the groups share similarities with Project 2061. Cooperation between Project 2061 and other national groups has included reviewing each other's draft reports, collaborating on curriculum development, and attending each other's staff meetings.

Some groups have tried to integrate Project 2061 themes into their own work. "In addition to endorsing each other's projects, we are trying to do the content part of our program in terms of the themes identified in *Science for All Americans,*" said Russell Aiuto of the National Science Teachers Association's Scope, Sequence and Coordination (SS&C) project.

In an effort to foster cooperation, the National Council on Science and Technology Education, Project 2061's oversight group, passed a series of resolutions last fall in support of other curriculum projects and reform efforts. Those cited are:

☆ **The National Science Teachers Association's Scope, Sequence and Coordination (SS&C) project**. SS&C is working to distribute the study of topics in biology, earth science, chemistry, and physics over grades 7 to 12. Contact: Russell Aiuto (202) 328-5810.

☆ **The Mathematical Sciences Education Board (MSEB) of the National Research Council**. MSEB is helping to coordinate mathematics education reform efforts and has called for fundamental curriculum changes starting in kindergarten. Contact: Kathleen Holman (301) 588-6168.

☆ **National Council of Teachers of Mathematics (NCTM)**. NCTM has proposed and is working to implement a wide range of mathematics education reform activities, including the use of technology in the classrooms to connect mathematical ideas to real-world situations. The group also advocates changes in evaluation, assessment, and teacher training. Contact: James Gates (703) 620-9840.

- **International Technology Education Association (ITEA)**. To introduce and improve technology education in American schools, ITEA is supporting curriculum development efforts nationwide. Contact: Kendall Starkweather (703) 860-2100.

32

Review and Research on Technology-Based Programs

Program Title: Technology for Children—T4C

Location

New Jersey's Public Elementary Schools

Overview of Program

The Technology for Children project was originally funded by the Ford Foundation in the early 1960s and continues to be used in New Jersey elementary schools to provide technological experiences for many children. The T4C curriculum is developmental. Students select and use tools and materials appropriate to their age and physical maturation.

Objectives of the Program

- ☆ To achieve a better self-awareness and to become more responsible for one's own learning
- ☆ To develop a better understanding of technology and the world of work
- ☆ To attain at a more meaningful level the traditional basic educational skills.

Grade Levels/Ages of Students: K-5

References for Research or Information

Contact: Dr. Robert Weber (609) 771-2776
Trenton State College
Hillwood Lakes
Trenton, NJ 08650-4700

New Jersey Mini/Innovation Team
c/o Ms. Joan W. Dilger
Harmony Elementary School
Murphy and Harmony Roads
Middletown, NJ 07748

Review and Research on Technology Based Programs

Program Title: Design & Technology in T-E National Curriculum of England

Location

All schools in the UK

Overview of Program

In 1988, the Education Reform Act established a national curriculum comprised of core subjects in English, mathematics, and science, with other foundation subjects in technology, history, geography, music, art, and physical education for all pupils. Technology requires pupils to apply knowledge and skills to solve practical problems. The two components are Design and Technology and Information Technology.

Components of the UK National Curriculum

Foundation Subjects: By law these must be included for all pupils.

1. English
2. Mathematics
3. Science
4. Technology (including design)
5. History
6. Geography
7. Music
8. Art
9. Physical Education
10. Modern Foreign Language (secondary pupils only)

Grade Levels/Ages of Students

Key Stage 1: 5-7 year olds
Key Stage 2: 7-11 year olds
Key Stage 3: 11-14 year olds
Key Stage 4: 14-16 year olds

Preparation for Research or Information

Appropriate and adequate training of teachers involved in teaching technology is vital to the success of the program in UK.

☆ School-based training is used to meet needs of a school and teachers.

☆ County or state teacher in-service centers are set up to provide training in one-day or multiday hands-on workshops.

References for Research or Information

National Curriculum from Policy to Practice Technology in the National Curriculum Publication Dispatch Centre Central Office of Information
Department of Education and Science Department of Education and Science

Honeypot Lane
Canons Park
Stanmore HA7 1AZ UK

Elizabeth House
York Road
London SE1 7PH UK

For assistance with international publications and information, contact

Dr. Ronald Todd
TIES Magazine
Trenton State College
CN 4700
Trenton, NJ 08650-4700
(609) 771-3333 or (609) 771-3330

Primary School Design and Technology Activities in Great Britain

The **processes** of design and technology activities

☆ Identifying needs and opportunities

☆ Generating a design

☆ Planning and making

☆ Evaluating

The **products** of design and technology activities

- ☆ Artifacts (objects made by people)
- ☆ Systems (sets of objects or activities which together perform a task)
- ☆ Environments (surroundings made or developed by people)

The **contexts** of design and technology activities (situations in which design and technology activities take place)

- ☆ Home
- ☆ School
- ☆ Recreation
- ☆ Community
- ☆ Business and industry

The **materials** of design and technology activities

- ☆ Construction materials (wood, metal, plastic, clay)
- ☆ Graphic media (paint, paper, photographs)
- ☆ Textiles
- ☆ Food

The **cross-curricular** (interdisciplinary) **aspects** of design and technology activities

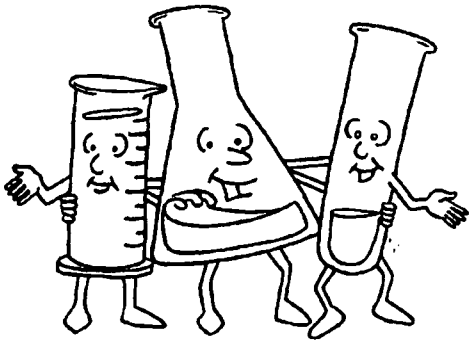
It is important to note how well design and technology activities lend themselves to cross-curricular and thematic approaches to teaching and learning.

- ☆ Integrated with other subjects
- ☆ Thematic
- ☆ Whole child

SECTION 2

CLASSROOM PROBLEM SOLVING USING TECHNOLOGY ACTIVITIES

	Page
AIMS	41
Assured Readiness for Learning (ARL)	43
AT&T Learning Network	45
Beaver Construction System	47
Big Books	49
Business/Education Partnerships	51
Computer-Aided Drawing	53
Computerized Spreadsheet	55
Electricity Through Stories	57
Invent America	59
IRIS Telecommunications Network	61
LASY Plastic Building Kits	63
LEGO and LEGO TC LOGO	65
Mentorships for Younger Children	67
Mission 21 Design Briefs or Student Books	69
Model Rocketry	71
National Geographic Kid's Network	73
Overhead Calculator	75
Problem Solving from Contexts in Literature	77
Science-By-Mail	79
Sentence Pathways Kit	81
Stimulating Hallways & Student Areas	83
Talents Unlimited	85
TechnoKids Kit	87
Using Recycled Paper	89
Va. PEN	91
Whole Language Theme: Weather	93
Windows on Science	95
World in Motion Kit	97



Technology Activity Abstract

AIMS

Description	AIMS is an organization in California that develops instructional materials for teaching mathematics and science in the elementary grades. AIMS materials are well illustrated to show hands-on technology activities, which are used to engage the students in the learning and discovery of the science or mathematics concept.
School Involved	Salem Elementary School Spotsylvania County Public Schools 4501 Jackson Road Fredericksburg, VA 22401
Teachers Involved	Teri Hanson
Contact principal	Corky Talley (703) 786-8218
Grade level	All grades

Subjects Integrated

☆ **Technology Education**
☆ **Mathematics**
☆ **Science**
Social Studies
Language Arts
Physical Education
Reading
Music
Art

Resources needed

- AIMS teachers' notebooks
- Books with integrated activities
- Newsletters that contain lists of materials needed and illustrate hands-on learning activities

Order from

AIMS Education Foundation
P. O. Box 8120
Fresno, California 93747
(209) 255-4094

Technology Activity Abstract

Assured Readiness for Learning (ARL)

Description

ARL uses a multisensory approach to encourage student attention to detail and to inspire "thought before action." Teachers believe that development of these basic skills in primary grades promotes success in more advanced technology programs in later grades, especially among at-risk students. The visual component of the program challenges primary aged students to use blocks, "geoboards," and other manipulatives to complete or duplicate simple and complex images. Student test scores have increased through use of these ARL materials.

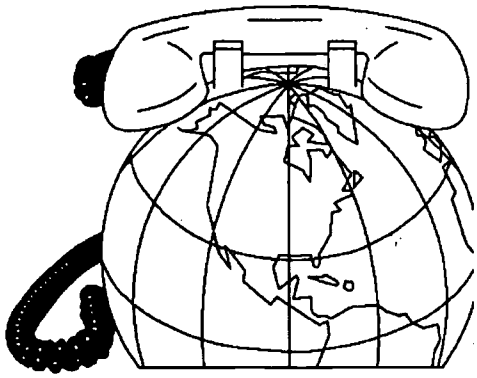
School involved

Ottobine Elementary School
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved

Bonnie Berry
Maria Lahman
Lisa Stefancin
Dawn Flora

Contact principal	Dr. Robert Grimesey Jr. (703) 879-9712
Grade level	K-5 with special emphasis on visual component in kindergarten
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Science** ☆ **Social Studies** Language Arts Physical Education Reading ☆ **Music** Art
Resources needed	Blocks, geoboards, rubber bands, pegs
Order from	Dr. Phillip McInnis Assured Readiness for Learning 2452 Potter Road Rt. 364 Penn Yann, NY 14527



Technology Activity Abstract

AT&T Learning Network

Description

This program links teachers and students in elementary and secondary schools worldwide to a telecommunications network, joining them with groups around the world. All participants benefit from cooperative efforts to achieve their educational goals. The program develops the students' curiosity to learn, the creativity to experiment, and the intellectual sensitivity to understand the complex world around them. The curriculum options are called "learning circles"; examples are Classroom Connections, Energy and the Environment, and Society's Problems.

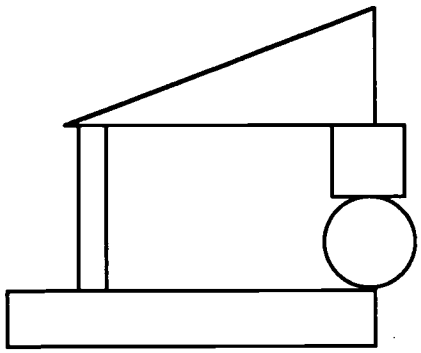
School involved

Ottobine Elementary School
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved

Barbara Borntrager
Linda Ferguson
Kathy Reynolds

Contact principal	Dr. Robert Grimesey Jr. (703) 879-9712
GRADE LEVELS	3, 4, 5
Subjects Integrated	☆ **Technology Education** Mathematics ☆ **Science** ☆ **Social Studies** ☆ **Language Arts** Physical Education ☆ **Reading** Music Art
Resources needed	• Apple, Macintosh, or IBM-compatible computers with hard drive or two disk drives • Modem • Phone line to call the 800 number to access the network
Order from	AT&T LEARNING NETWORK P. O. Box 6391 Parsippany, NJ 07054 (800) 367-7225, ext. 4158

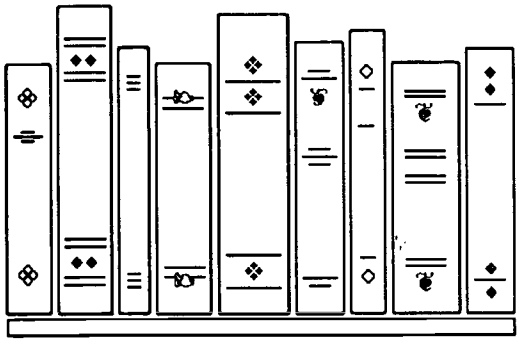


TECHNOLOGY ACTIVITY ABSTRACT

BEAVER CONSTRUCTION SYSTEM

Description	Beaver is a collection of special jigs, tools, materials, and publications which together form a construction system. Beaver enables children to build an object or vehicle by cutting, shaping, or bolting the materials together. Children use these activities to show easily how problems are solved.
School involved	Dranesville Elementary School 1515 Powells Tavern Place Herndon, VA 22070
Teacher involved	Cindy Etchison
Contact principal:	Gioia Caiola Forman (703) 709-7789
Grade level	K-5

Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** Music ☆ **Social Studies** ☆ **Art** Language Arts Physical Education
Resources needed	Unilab Beaver Construction Kit (contains tools, publications and materials)
Order from	Gary Beer, General Manager UNILAB, Inc. 1604 Walker Lake Road Mansfield, OH 44906 (419) 747-1040 or Robert Wyatt, President Diversified Education Systems, Inc. P. O. Box 388 Berryville, VA 22611 (703) 955-2782



Technology Activity Abstract

Big Books

Description

Big Books in the Realization Technology series are problem-solving books about technology for children of all ages and abilities. Each book integrates language learning, science, and technology with a problem-solving interactive approach. Both Big Books and Small Books encourage children to discuss, draw, write, and perhaps build their own solutions to intriguing puzzles. Teacher's Notes provide one possible solution to each story or page with a problem.

School involved

Ottobine Elementary School
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved

Lisa Stefancin
Margaret Monk

Contact principal	Dr. Robert P. Grimesey Jr. (703) 879-9712
Grade level	2-5
Subjects Integrated	☆ **Technology Education** Mathematics ☆ **Science** Social Studies ☆ **Language Arts** Physical Education Reading Music ☆ **Art**
Resources needed	• Big Books ($35 each) and Small Books ($36 for 6) • *The Paper Skyscraper: The Technology of Materials* • *What Should I Use: The Technology of Simple Machines* • *The Cat on the Chimney: Solving Problems with Technology* • *Alone in the Desert: The Science of Survival*
Order from	Rigby Books P. O. Box 797 Crystal Lake, IL 60039-0797 (800) 822-8661

Technology Activity Abstract

Business/ Education Partnership

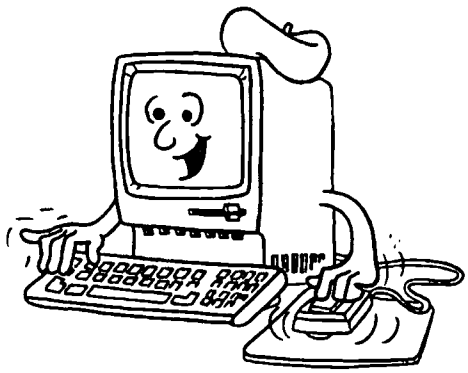
Description

"Technical mastery" is one of several goals incorporated into the mission statement of the "Strengthening Our Future" partnerships among the school, Rocco Enterprises, Inc., and James Madison University. A steering committee participates in on-going assessment of staff needs related to technology. The committee also works to facilitate acquisition of needed resources, such as staff development, hardware, software, and subscriptions.

School involved

Ottobine Elementary School
Rt. 1, Box 328
Dayton, VA 22821

Steering committee	Bonnie Berry, Kindergarten Karin Good, Physical Education Susan Pollard, Technology Specialist
Contact principal	Dr. Robert Grimesey Jr. (703) 879-9712
Grade lelve	All grades
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** ☆ **Music** ☆ **Social Studies** ☆ **Art** ☆ **Language Arts** ☆ **Physical Education**
Resources needed	Donated time and resources from partners who are employees of businesses, corporations, or colleges/ universities
Request information	Valley of Virginia Partnership for Education John Noftsinger, Executive Director Office of Continuing Education and External Programs James Madison University Harrisonburg, VA 22807 (703) 568-7088



Technology Activity Abstract

Computer-Aided Drawing

Description

Students use computer software to draw plans for building a project. Toys are designed first on *Autosketch* or *Generic CADD,* and the plans are then given to another student to build.

School involved

Dranesville Elementary School
1515 Powells Tavern Place
Herndon, VA 22070

Teacher involved

Cindy Etchison

Contact principal

Gioia Caiola Forman (703) 709-7789

Grade level

5

Subjects Integrated

☆ **Technology Education**
☆ **Mathematics**
☆ **Reading**
Science
Music
Social Studies
Art
Language Arts
Physical Education

Resources needed

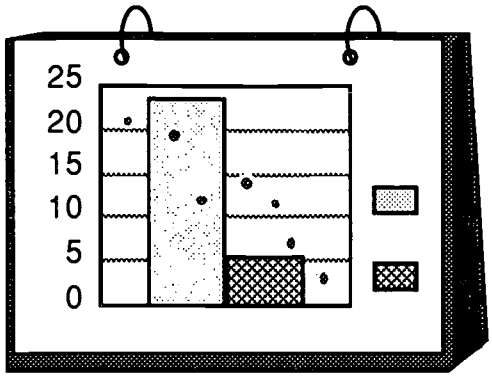
- *Autosketch Software for Computer-Aided Design* (MS-DOS Platform) or *Generic CADD* (Macintosh Platform)
- IBM-compatible or Macintosh computer with 512K RAM, 2 floppy drives or hard disk, graphics card or adapter (IBM only), mouse, and printer
- Materials for building models or solutions to problem

Order from

Ronald Williams, Ltd.
P. O. Box K34
Richmond, VA 23288
(804) 282-8239

or

Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965
(415) 332-2344



Technology Activity Abstract

Computerized Spreadsheet

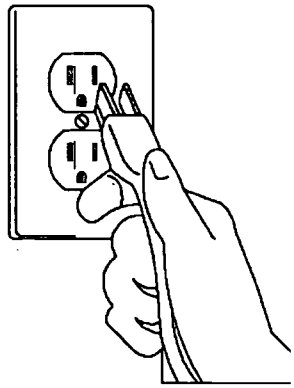
Description

Teams use spreadsheet software such as Excel to compare the number and colors of M&Ms in a package. Students first predict the results, then organize M&Ms by color and input data into spreadsheet. They compute the average number of M&Ms for each bag, create charts and graphs, and write letters or articles about their analysis. Teams also design and build a solar cooker by keying in data on heat; absorption by color, materials, and containers; and daily temperatures into a spreadsheet for interpretation and presentation of charts and graphs. Students use *PowerPoint* software to prepare a slide show about the activities.

School involved

Cooper Elementary School
Hampton City Public Schools
200 Marcella Road
Hampton, VA 23666

Teacher involved	Kathleen Nugent
Contact principal	John Pauls (804) 825-4645
Grade level	4
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** Reading Science Music Social Studies Art ☆ **Language Arts** Physical Education
Resources needed	• Spreadsheet software such as Microsoft *Excel* • Microsoft *PowerPoint* • M&Ms or other items to count • Materials to build solar cooker
Order from	Local Macintosh or IBM dealer



Technology Activity Abstract

Electricity Through Stories

Description

This technology package contains three fully illustrated story books which children read and then use simple electrical circuits to apply their knowledge. Students are motivated to use switches, lights, buzzers, and motors powered by batteries. The *Teacher's Book* has information about safety, assessing children's' learning, and helping children record their work.

Contact

Dr. Arvid Van Dyke (703) 568-2786

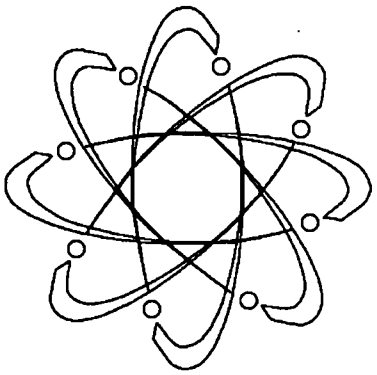
Grade levels

1 and 2

Subjects Integrated

☆ **Technology Education**
Mathematics
Science
☆ **Social Studies**
☆ **Language Arts**
Physical Education
Reading
Music
Art

Resources needed	*Economatics Kit* with *Teacher's Book* and three books with stories for children
Request Information	Modern School Supplies, Inc. P. O. Box 958 Hartford, CT 06143 (800) 243-2329, Fax (203) 286-0186



Techology Activity Abstract

Invent AMERICA

Description

Invent America is a national program that challenges students to use their problem-solving and critical-thinking skills to create new products they think will solve a problem in the home, school, or community. Students use all of the basic skills during the invention process by thinking, creating, drawing, writing logs or advertisements, and building models of their inventions. Invention Conventions are held for local schools in May, with regional and national competitions in June or July.

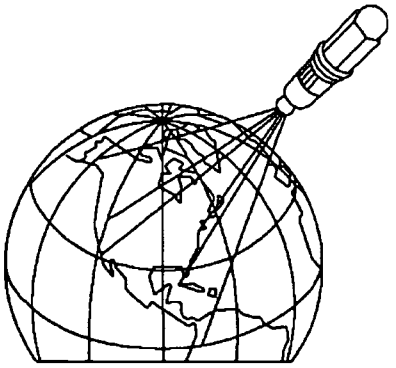
School involved

J. B. Fisher Model School
3701 Garden Road
Richmond, Virginia 23235-1299

Teacher involved

Donna Fout

Contact principal	Dr. Mary L. Murphy (804) 320-2491
Grade level	4 and 5
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** Reading ☆ **Science** Music Social Studies Art ☆ **Language Arts** Physical Education
Resources needed	Invent America with starter kit (free—include $2.95 for postage/handling), rules and registration forms included
Order from	Invent America U. S. Patent Model Foundation 510 King Street Suite 420 Alexandria, VA 22314 or contact Store Manager at local K-Mart.

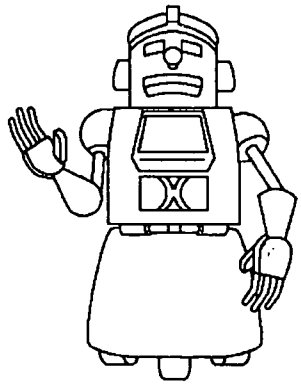


Technology Activity Abstract

IRIS Telecommunications Network

Description	Students use this telecommunications network to link with other students and schools and share information and ideas.
School involved	Dranesville Elementary School 1515 Powells Tavern Place Herndon, VA 22070
Teacher involved	Cindy Etchison
Contact principal	Gioia Caiola Forman (703) 709-7789
Grade level	
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** ☆ **Music** ☆ **Social Studies** ☆ **Art** ☆ **Language Arts** ☆ **Physical Education**

Resources needed	Subscription fee (approximately $198.00 per year) for access to IRIS, modem, computer with *ProComm* or other telecommunications software, access to a long distance telephone line
Order from	IRIS On-Line Network P. O. Box 29424 Richmond, VA 23242-0424 (202) 298-0969, Fax (703) 841-9798



Technology Activiity Abstract

Lasy Plastic Building

Description

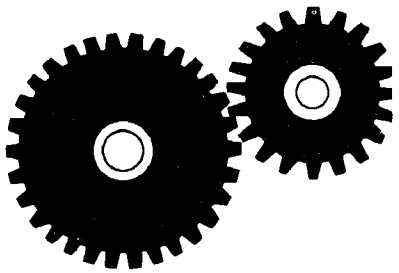
LASY building products contain hundreds of pieces that fit together and provide opportunities to integrate engineering skills with science, mathematics, and language arts. A modeling system is used to build static structures or motorized devices. One kit allows students to build interactive vehicles controlled by computer. LASY figures come in three ethnic groups; numbers and letters are complemented by *Activity Books* and puzzles that stimulate student interest in language arts. LASY promotes curriculum integration.

School involved

Ottobine Elementary School
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved	Maria Lahman Julie Propst Linda Zimmerman Kristi Thurmond
Contact principal	Dr. Robert Grimesey Jr. (703) 879-9712
Grade level	K-5
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** Reading ☆ **Science** Music ☆ **Social Studies** Art ☆ **Language Arts** Physical Education
Resources needed	*LASY Technical Set* containing pieces, gears, motor, switches, battery box, leads, and *Activity Books* (approximately $250)
Order from	John S. Taylor, President AMTEK Company 778 Holly Drive Arnold, MD 21012 (800) 926-8359

Technology Activitiy Abstract



Lego and Lego TC Logo

Description	Lego and TC Logo mechanical and pneumatic building systems stimulate the study of communications, transportation, manufacturing, and construction by providing a wide variety of problem-solving challenges. Simple machines, motorized vehicles, pneumatic devices, and computer-controlled models all contribute to the range of possible activities.
School involved	McIntosh Elementary School (video available) 185 Richneck Road Newport News, Virginia 23602
Teacher involved	Karen Whitaker
Contact principal	Mary Ann Hutchinson (804) 886-7767
Grade level	5

Subjects Integrated

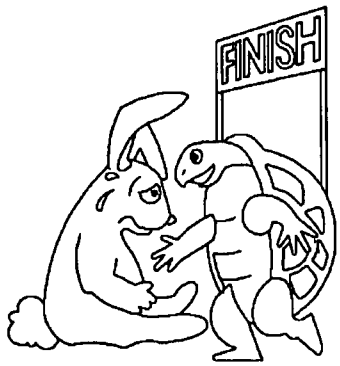
☆ **Technology Education**
☆ **Mathematics**
☆ **Science**
Social Studies
Language Arts
Physical Education
Reading
Music
Art

Resources needed

- *Lego, Lego TC Logo Kits* (various sizes) with *Activity Cards* and *Teacher Guides*
- *Duplo Toolo* brick kits for pre-school-grade 2 with idea books and figures to build and simulate community and environments

Order from

LEGO dacta
Mr. Ronald Revere
Learning Development Representative
401 Montpelier Drive
Stafford, VA 22554
Office: (800) 527-8339
Home: (703) 752-8339
Voice Mail: (800) 344-5341

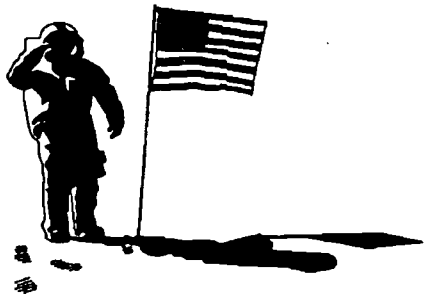


Technology Activity Abstract

Mentorships for Younger Children

Description	Students in higher grades go into classrooms of younger students to assist them with activities and programs. Fifth graders help with technology activities such as making a paper weave basket, using a computer to learn letters and words, or designing a home or bed for stuffed animals.
School involved	Salem Elementary School 4501 Jackson Road Fredericksburg, VA 22401
Teachers involved	Alana Paramore Bea Wondree
Contact principal	Corky Talley (703) 786-8218
Grade level	5 and K

Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** Reading Science Music Social Studies Art ☆ **Language Arts** ☆ **Physical Education**
Resources needed	Time for teachers to plan activities and schedule visits by older children to younger classes



Technology Activity Abstract

Mission 21 Design Briefs or Student Books

Description

Mission 21 materials consist of Teacher's Resource Books and four student books for each level. The Design Briefs and materials help teachers and students understand the important role that technology plays in our world. Students learn facts and concepts about technology and other subjects by reading the student books and solving the problems provided in the Design Briefs. This promotes curriculum integration.

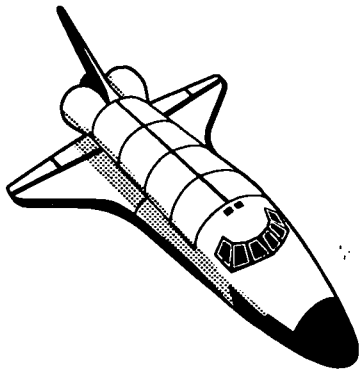
School involved

Ottobine Elementary School
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved

Margaret Monk
Linda Harpine

Contact principal	Dr. Robert Grimesey Jr. (703) 879-9712
Grade level	1-5
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** Music ☆ **Social Studies** Art ☆ **Language Arts** Physical Education
Resources needed	*Mission 21 Resource Book* and *Student Books* Level I: grades 1 and 2 Level II: grades 3 and 4 Level III: grades 5 and 6
Order from	Delmar Publishers 3 Columbia Circle Albany, NY 12212-5015 (800) 998-7498



Technology Activity Abstract

Model Rocketry

Description

Model rocketry is a safe, inexpensive way to introduce students to mathematics and geometry with "hands-on" learning experiences, activities, and experiments. Building a rocket motivates all students to learn and excites them with meaningful mathematics skills.

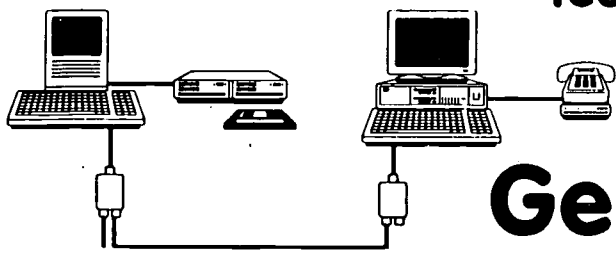
Teacher involved

Dr. William E. Schall, Dean
College of Education and Human Services
Longwood College
201 High Street
Farmville, VA 23909
(804) 395-2051

Grade level

4 and 5

Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** Reading ☆ **Science** Music Social Studies Art Language Arts Physical Education
Resources needed	• *Countdown: Mathematics and Model Rocketry* by William E. Schall (booklet) • *Projects to Enrich School Mathematics: Level 1* (booklet) • Model rocket kits with materials to build
Order from	National Council of Teachers of Mathematics 1906 Association Drive Reston, VA 22091 (703) 620-9840



Technology Activity Abstract

National Geographic Kid's Network

Description

National Geographic Kid's Network is a computer and telecommunications-based program that allows students to investigate new ideas and exchange information with other students around the world. Students on the NGS Kid's Network conduct original research and then use the computer to share their results with other classes anywhere. The data is mapped and charted for all participating classes. Units include *Hello* (local info), *Weather in Action* (temperature conditions), *What's in Our Water*, and *Too Much Trash*.

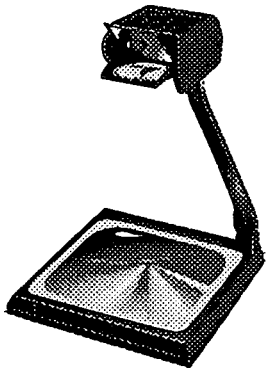
School involved

Ottobine Elementary School
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved

Margaret Monk
Linda Zimmerman
April Cave

Prinicipal	Dr. Robert Grimesey Jr. (703) 879-9712
Grade level	4 and 5
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** Music Social Studies Art ☆ **Language Arts** Physical Education
Resources Needed	National Geographic Kid's Network subscription includes program disks for each unit, teacher guide, and activity sheets. Schools need computer and modem with access to long distance to telephone line and *ProComm* or other telecommunications software.
Order From	National Geographic Kid's Network Educational Media Division National Geographic Society Washington, DC 20036 (800) 368-2728, Fax: (202) 429-5770



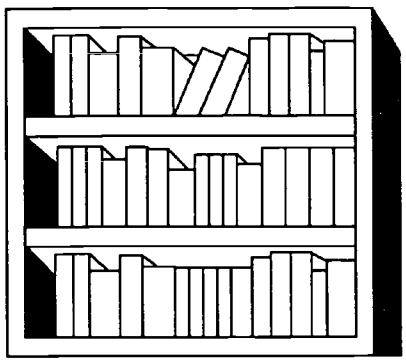
Technology Activity Abstract

Overhead Calculator

Description	The overhead calculator is an adaptor that fits on the overhead projector and projects onto a screen. This technology gives students an interesting/exciting way to follow the teacher and to be involved in lessons on mathematics.
School involved	Ottobine Elementary School Rt. 1, Box 328 Dayton, VA 22821
Teacher involved	Kathy Reynolds
Contact principal	Dr. Robert Grimesey Jr. (703) 879-9712
Grade level	5

Subjects Integrated

- ☆ **Technology Education**
- ☆ **Mathematics**
- Science
- Social Studies
- Language Arts
- Physical Education
- Reading
- Music
- Art



Technology Activity Abstract

Problem Solving From Contexts in Literature

Description

Students "brainstorm" ideas for solving problems they encounter in their literature (e.g., how to get the honey out of Pooh's pot, how to keep Humpty Dumpty from falling off the wall). They plan a "schematic" or flow chart to break down the problem, draw it, and then produce a three-dimensional model. The making of a model allows the students' creative ideas to come off the page. Learning comes to life as students use and learn other subject areas such as mathematics and social studies and work together to complete a presentation.

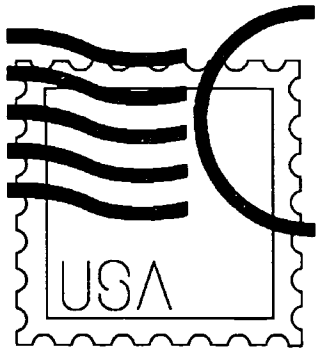
School involved

Dranesville Elementary School
1515 Powells Tavern Place
Herndon, VA 22070

Teachers involved

All

Contact principal	Gioia Caiola Forman (703) 709-7789
Grade level	K - 5
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** Reading ☆ **Science** Music ☆ **Social Studies** Art Language Arts Physical Education
Resources needed	• Design Briefs written by teachers to fit context of storybook or novel • "Technology 2000." *The Technology Teacher,* September/October, 1991.
Order from	International Technology Education Association 1914 Association Drive Reston, VA 22091-1502 (703) 860-2100 Fax: (703) 860-0353



Technology Activity Abstract

Science-By-Mail

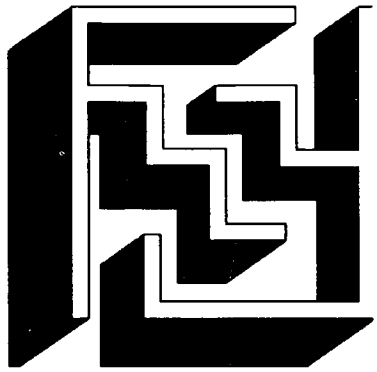
Description

Science-By-Mail is designed to be noncompetitive, nonjudgmental, and fun. The goal of the program is to interest a wide variety of children in science and engage them in technology-related activities such as simple machines, photography, map-making, and inventing new solutions to everyday problems. Students write letters and receive replies from a volunteer scientist. Activity packets are mailed to each group of four students for the hands-on experiments. Teachers serve as coaches rather than instructors.

School involved

Ottobine Elementary School
Route 1, Box 328
Dayton, VA 22821

Teachers involved	April Cave Linda Zimmerman
Contact principal	Dr. Robert Grimesey Jr. (703) 879-9712
Grade level	4 and 5
Subjects Integrated	☆ **Technology Education** Mathematics ☆ **Reading** ☆ **Science** Music Social Studies Art ☆ **Language Arts** Physical Education
Resources needed	Most materials are provided in each activity packet.
Order from	Science-By-Mail Museum of Science Science Park Boston, MA 02114-1099 Charlotte Pritchett Science-By-Mail Science Museum of Virginia 2500 W. Broad Street Richmond, VA 23230 (804) 367-8956



Technology Activity Abstract

Sentence Pathways Kit

Description

The new *Sentence Pathways Kit* enables young students to develop their problem-solving skills through analysis, experimentation, deduction, realization, and testing of solutions. Students use plug-together word boxes with remote sensors and output devices to build sentences that express the solutions to problems. Creating a sensible sentence gives a working system. The kit includes a unique 2D modeler into which sensors and outputs can be fitted to create a working picture of a problem and its solution.

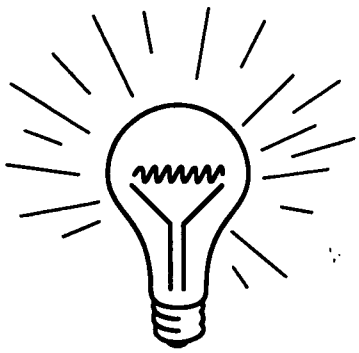
Contact

Dr. Arvid Van Dyke (703) 568-2786

Grade level

1 and 2

Subjects Integrated	☆ **Technology Education** Mathematics — Reading ☆ **Science** — Music ☆ **Social Studies** — Art ☆ **Language Arts** Physical Education
Resources needed	*Sentence Pathways Starter Kit*
Order from	UNILAB, Inc. 1604 Walker Lake Road Mansfield, OH 44906 (419) 747-1040 Diversified Educational Systems P. O. Box 388 Berryville, VA 22611 (703) 568-6822



Technology Activity Abstract

Stimulating Hallways & Student Areas

Description	The activities make use of equipment and space already found in the average school. A "how it works" poster is attached to a wall near a technological device in the school, such as an architectural feature, an elevator, or a heater. A Lego board is set up in an area where children have time to solve a problem of the day or week. The lunch room or playground are good places for learning and using technology in groups or alone.
School involved	Dranesville Elementary School 1515 Powells Tavern Place Herndon, VA 22070
Teacher involved	Cindy Etchison
Contact principal	Gioia Caiola Forman (703) 709-7789
Grade level	All

Subjects Integrated

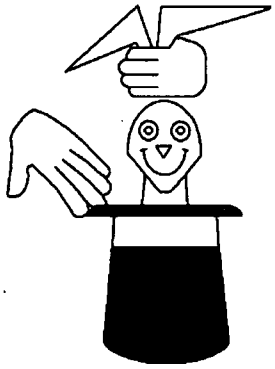
- ☆ **Technology Education**
- Mathematics
- ☆ **Science**
- ☆ **Social Studies**
- Language Arts
- Physical Education
- Reading
- Music
- Art

Resources needed

- Hallways of school for "how it works" posters, waiting areas such as pods, cafeteria lines, or playground
- Poster board, Lego boards, tinker tables, manipulatives
- *How Things Work* by David Macaulay ISBN: 0-395-42857-2

Order from

Houghton Mifflin Company
Wayside Road
Burlington, MA 01803
(800) 225-3362



Technology Activity Abstract

Talents Unlimited

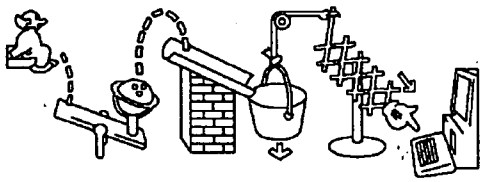
Description	Talents Unlimited is an instructional approach designed to help teachers recognize and nurture the multiple talents of all children. Six areas are emphasized: productive thinking, communication, forecasting, planning, decision making, and academics. The materials are teacher-friendly and process-oriented to increase critical and creative thinking skills.
School involved	J. B. Fisher Model School Richmond City Public Schools 3701 Garden Road Richmond, VA 23235-1299
Teachers invovled	All
Contact principal	Dr. Mary L. Murphy (804) 320-2491
Grade level	K-5

Subjects Integrated

- ☆ **Technology Education**
- ☆ **Mathematics**
- ☆ **Science**
- ☆ **Social Studies**
- ☆ **Language Arts**
- ☆ **Physical Education**
- ☆ **Reading**
- ☆ **Music**
- ☆ **Art**

Resources needed

Talents Unlimited
Charts or posters on critical and creative thinking



Technology Activity Abstract

Technokids Kit

Description

TechnoKids is an interdisciplinary technology program that adapts easily to the classroom and curriculum. The *Activity Guide* contains challenges or design briefs based on popular themes to engage students in science, math, technology, and language arts. The newsletter provides reading material about the real world of technology.

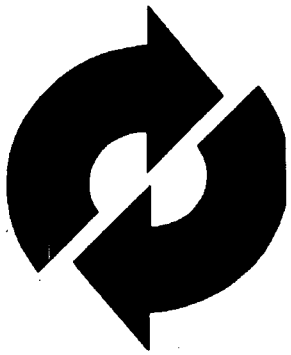
School involved

Ottobine Elementary
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved

Barbara Keller
Margaret Monk
Susan Pollard
Maria Lahman
Linda Zimmerman

Contact principal	Dr. Robert P. Grimesey Jr. (703) 879-9712
Grade level	K, 2-4
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** Music ☆ **Social Studies** Art ☆ **Language Arts** Physical Education
Resources needed	*TechnoKids Affiliation Kit* contains *How To* booklet, *Activity Guide,* newsletters, poster, promotional and recognition items
Order from	Technology Student Association 1914 Association Drive Reston, VA 22091 (703) 860-9000 Fax: (703) 620-4483



Technology Activity Abstract

Using Recycled Paper

Description	Kindergarten students use whole language skills they have mastered by participating in independent, developmental activities in the Writing Center. Each student makes his or her own book or journal by cutting, folding, and binding book pages from recycled computer paper.
School involved	Irisburg Elementary School Rt. 3, Box 120 Axton, VA 24054
Teacher involved	Sue Galtress
Contact principal	Mr. Wayne Moore (703) 650-2183
Grade level	Kindergarten

Subjects Integrated

- ☆ **Technology Education**
- Mathematics
- Science
- Social Studies
- Reading
- Music
- Art
- ☆ **Language Arts**
- ☆ Physical Education

Resources needed

Outdated computer paper can be cut, folded, and stapled on the folded edge to assemble booklets or journals.

Technology Activity Abstract

Virginia's PEN

Description	Virginia's Public Education Network is a telecommunications network that allows teachers and students to exchange information with other computer users and access electronic bulletin boards locally and globally. It provides students opportunities to experience collaborative learning and refine their thinking skills while participating in language arts, science, geography, social studies, and other curriculum-related projects.
School involved	J. B. Fisher Model School 3701 Garden Road Richmond, VA 23235-1299
Teachers involved	Team Three Teachers Daniel Arkin, Consultant Parent Volunteer
Contact principal	Dr. Mary L. Murphy (804) 320-2491

Grade level	4 and 5
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** ☆ **Music** ☆ **Social Studies** ☆ **Art** ☆ **Language Arts** ☆ **Physical Education**
Resources needed	• Computer, modem, communications software, phone line, printer (optional) • User ID/password, phone number for Virginia's PEN node
Contact	George R. Willcox Principal Specialist Technology Education Virginia Department of Education P. O. Box 2120 Richmond, VA 23216-2120 (804) 225-2839 gwillcox@pen.k12.va.us

Technology Activity Abstract

Whole Language Theme: Weather

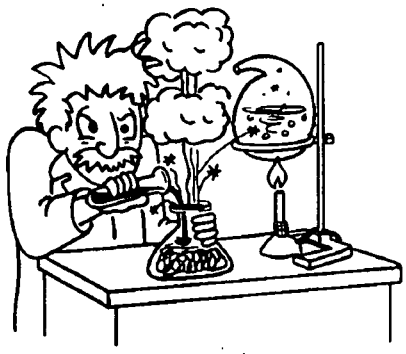
Description

A variety of technology activities are used by teachers in the "whole language" approach. Teachers select a theme such as "weather" and develop a plan that shows the integration of several subjects such as mathematics, science, and technology. Weather observation instruments such as a barometer, rain gauge, weather vane, and thermometer are constructed by the students to engage them in science principles and mathematical calculations. After reading about weather, they retell the story by designing and making illustrations and objects from the literature.

School involved

Salem Elementary School
4501 Jackson Road
Fredericksburg, VA 22401

Teachers involved	Bea Wondree Alana Paramore Kathy Carr Karen Botta
Contact principal	Corky Talley (703) 786-8218
Grade level	Grades where weather is taught
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** ☆ **Reading** ☆ **Science** Music ☆ **Social Studies** Art ☆ **Language Arts** Physical Education
Resources needed	• AIMS materials for building weather instruments • Plastic 2-liter soda bottles • Straws, jars, balloons, paper, glue, scissors, rulers
Order from	AIMS Education Foundation P. O. Box 8120 Fresno, CA 93747 (209) 291-1766



Technology Activity Abstract

Windows on Science

Description

Windows on Science is a laserdisc package available to teachers for preparing and presenting lessons. The program includes a technology application or real world example as part of science lessons.

School involved

McIntosh Elementary School
185 Richneck Road
Newport News, VA 23602

Teachers involved

Patsy Swecker

Contact principal

Mrs. Mary Ann Hutchinson
(804) 886-7767

Subjects Integrated

☆ **Technology Education**
Mathematics
☆ **Science**
Social Studies
Language Arts
Physical Education
☆ **Reading**
Music
Art

Resources needed	• *Windows on Science* • Laserdisc player • Monitor
Order from	Windows on Science Optical Data Corporation 1990 30 Technology Drive Warren, NJ 07059 (800) 524-2481 Fax: (908) 755-0577

Technology Activity Abstract

World in Motion Kit

Description

A World in Motion is a box of materials to be used by teachers and volunteer engineers to encourage a sense of wonder and excitement about hands-on science, mathematics, and engineering. *A World in Motion* promotes volunteerism and education partnerships between companies and schools. The Teacher-Directed Learning Cards are provided for three levels/grades. They are well illustrated and list materials needed for students to follow the sequence. A videotape, posters, and Teacher's Guides are packaged in a single box with the learning cards.

School involved

Ottobine Elementary
Rt. 1, Box 328
Dayton, VA 22821

Teachers involved

April Cave
Linda Ferguson

Contact principal	Dr. Robert P. Grimesey Jr. (703) 879-9712
Grade level	4 and 5
Subjects Integrated	☆ **Technology Education** ☆ **Mathematics** Reading ☆ **Science** Music Social Studies Art Language Arts Physical Education
Resources needed	*A World of Motion* Kit lists readily available materials for classroom and independent experiments.
Order from	Education Program Coordinator SAE Foundation 400 Commonwealth Drive Warrendale, PA 15096-0001 (412) 776-4844

SECTION 3

SOURCES OF ASSISTANCE

	Page
Books and Resource Guides for Technology Activities	101
Magazines and Articles About Technology Activities	109
Videotapes, Software, and Multimedia	112
Materials, Supplies, and Manipulatives	116
Consultants, Resource Persons, and In-Services	119

BOOKS AND RESOURCE GUIDES FOR TECHNOLOGY ACTIVITIES

An Activities Handbook for Teachers of Young Children (4th ed.)
Order: Houghton Mifflin Company
One Beacon Street
Boston, MA 02108

Adventure Books (with titles in Woodworks, Physics, Small Animals, Plants, Microorganisms)
Order: Small World Technologies
Houghton Mifflin Company
One Beacon Street
Boston, MA 02108
Price: $11.00 - $12.00 each

Aerospace Education (booklet of resources)
Order: Jule Zumwalt
Director of Aerospace Education
USAF CAP-PLR
Mather AFP, CA 85655
Phone: (916) 364-2554

AIMS Resources
Order: AIMS Education Foundation
P. O. Box 8120
Fresno, CA 93747
Phone: (202) 291-1766

Approaching Design and Technology (1990)
Authors: Margaret K. Wright, Geof Royle
ISBN: 0-7195-493-8 Student book
0-7195-4794-6 Teacher's set
Order: Small World Technologies, Inc.
P. O. Box 607
Hillsboro, OR 97123
Price: $22.50
Phone: (800) 542-3555

The Assessment of Hands-On Elementary Science Programs, August 1990
Editor: George Hein
Order: North Dakota Study Group on Evaluation
Center for Teaching and Learning
University of North Dakota
Grand Forks, ND 58202

The Best of Craft, Design and Technology
Author: John Eggleston
ISBN: 0948080-19-1
Order: Trentham Books Limited
Westview House
734 London Road
Oakhill
Stoke-on-Trent ST4 5NF
UK
Price: £ 14.95
Phone: 0782 745567

The Black Resource Guide
ISBN: 0-9608374-8-5
Order: Black Resource Guide, Inc.
501 Oneida Place, N. W.
Washington, DC 20011
Phone: (202) 291-4373

Bubbles (1979)
Author: Bernie Zubrowski
ISBN: 0-316-98881-2
Order: Creative Learning Systems, Inc.
9899 Hibert, Suite C
San Diego, CA 92131
Phone: (619) 566-2880

Children's Dictionary of Occupations
Authors: William E. Hopke,
Barbara M. Parramore
Order: Career Futures, Inc. — CFI
2100 Locust Street
Philadelphia, PA 19103
Phone: (215) 732-9191

A Conceptual Overview of Science Education for High Ability Learners (1992)
Author: College of William and Mary
School of Education
Order: College of William and Mary
School of Education
Center for Gifted Education
Williamsburg, VA 23185

Cooperative Problem Solving with Tongrams (Activities in Binder)
Author: Ann Roper
Order: Creative Publications
5040 West 111th Street
Oak Lawn, IL 60563

Countdown: Mathematics and Model Rocketry
Author: Dr. William E. Schall
Order: Estes Industries
Penrose, CO 81240

Curriculum Evaluation Standards for School Mathematics
ISBN: 0-87353-273-2
Order: National Association of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091

Design and Primary Education (1987)
Author: Design Council's Primary Education Working Party
ISBN: 0-85072-212-8
Order: The Design Council
28 Haymarket
London SW1Y 4SU
UK

Design and Technology 5-12 (ages) (1985)
Authors: Pat Williams
David Jinks
ISBN: 1-85000-049-2
Order: The Falmer Press
Taylor and Francis, Inc.
1900 Frost Road, Suite 101
Bristol, PA 19007
Price: $27.50

Design and Technology in Primary School Classrooms (1990)
Editor: Les Tickle
ISBN: 1-85000-582-6
Order: The Falmer Press
Taylor and Francis, Inc.
1900 Frost Road, Suite 101
Bristol, PA 19007
Price: $27.50

Design Technology: Childrens Engineering (1990)
Author: Susan Dunn, UK Teacher
Rob Larson, Oregon Museum of Science and Industry
ISBN: 1-85000-590-7
Order: The Falmer Press
Taylor and Francis, Inc.
1900 Frost Road, Suite 101
Bristol, PA 19007

Discovery Lab: A Creative Experience
Author: The Center for Entrepreneurial Studies and Development, Inc.
Technology Education Department at West Virginia University
Order: Technology Education Department
West Virginia University
Morgantown, WV 26506-6122
Phone: (304) 293-3803

Do It Yourself Series:
Make Your Own Musical Instruments
Science Can Be Fun
Order: Learner Publications Co.
241 First Ave. No.
Minneapolis, MN 55401
Phone: (800) 328-4929

Elementary School Science for the 90's
Authors: Susan Loucks-Horsley, Roxanne Kapitan, Maura Carlson, Paul Kuerbis, Richard Clark, G. Marge Melle, Thomas Schse, and Emma Walton
Stock #: 611-90119NB
Order: ASCD
1250 N. Pitt Street
Alexandria, VA 22314

Elementary School Technology Education in Virginia's Public Schools (1988)
Order: The Virginia Vocational Curriculum and Resource Center
2200 Mountain Road
Glen Allen, VA 23060
Phone: (804) 261-5075
Fax: (804) 261-5079

Engineering Equals - A Booklet for Staff in Primary School (English books with colorful illustrations)
Foundation Course (8002)
Design & Communication (8004)
Design & Realization (8005)
Technology (8006)
Order: Creative Edge Publishing
80 Pineview Dr.
Amherst, NY 14228-2120
Phone: (800) 626-5052

Fun with Technology Series:
Flight: Take a Closer Look
Lenses: Take a Closer Look
Author: Siegfried Aust
Order: Learner Publications Co.
241 First Avenue North
Minneapolis, MN 55401
Phone: (800) 328-4929

A Guide to Classroom Publishing
Authors: Jane Baskwill
Paulette Whitman
Order: Scholastic Inc.
2931 E. McCarty Street
Jefferson City, MO 65101
Phone: (800) 325-6146

Hands-On Recycling (activities for paper, glass, plastics)
Hands-On Science (1989) (shows how everyday objects teach concepts)
Math Manipulatives for the Overhead (activity pages)
More Story Stretchers (to expand on children's reading)
On the Go (whole language/literature activities)
Some Busy Hospital (shows technology used in hospital)
Things That Fly (color book and poster)
The Unconventional Invention Book (ways to stimulate creativity)
We Learn All About Machines (worksheets and activities)
Young Ben Franklin (illustrates inventions)
Order: Visit local store or request catalog
Teacher's Aid & Educational Supplies
115A S. Carlton Street
Cloverleaf Shopping Mall
Harrisonburg, VA 22801
Phone: (703) 433-6656

How Everyday Things Work
Authors: Chris Cooper and Tony Osman
ISBN: 0-87196-988-2
Order: Creative Learning Systems
9899 Hibert, Suite C
San Diego, CA 92131
Phone: (619) 566-2880

How to Teach Perimeter, Area, and Volume
Author: Vern Beaumont, Roberta Curtis, James Smart
ISBN: 0-87353-232-5
Order: National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091

How to Launch Your Young Astronaut Chapter
Order: Young Astronaut Council
1211 Connecticut Avenue, NW
Suite 800
Washington, DC 20036
Phone: (202) 682-1985

How Things Work: A Guide to How Human-Made and Living Things Function (1988)
Author: N. Ardley
Order: Simon & Shuster
Englewood Cliffs, NJ 07632

Introduction to National Science and Technology Week (in April)
Order (each year): NSTW Coordinator
National Science Foundation
1800 G Street, N. W. Room 527
Washington, DC 20550

Investigate and Discover Forces and Machines (1991)
Author: Robert Gardner
ISBN: 0-671-69046-9
Order: Julian Messner
Division of Silver Burdett Press, Inc.
Simon & Schuster, Inc.
Prentice Hall Building
Englewood Cliffs, NJ 07632
Price: $9.95

Investigating Electricity (1983)
Author: Peter Warren
ISBN: 0 7195-4019-4
Order: John Murray (Publishers) Ltd.
50 Albemarle Street
London, W1X 4BD
UK

Invent America
Order: 1331 Pennsylvania Avenue NW
Suite 903
Washington, D. C. 20004
Phone: (202) 737-1836
Contact: Local K-Mart store may have information

I Want to Be an Astronaut (1988)
Author: B. Barton
Order: Thomas Y. Crowell
New York, NY

The Kid's Whole Future Catalog (1982)
Author: P. Taylor
Order: Random House
New York, NY

Kindergarten Projects (Activities)
Order: Mr. Armand Taylor
Technology Education
Virginia Beach City Schools
P. O. Box 6038
Virginia Beach, VA 23456

Learning By Doing (A Manual for Teaching and Assessing Higher-Order Thinking in Science and Mathematics)
Report: 17-HOS-80
Order: Educational Testing Service
The National Assessment of Educational Progress
P. O. Box 6710
Princeton, NJ 08541-6710
Phone: (800) 223-0267

Learning How to Learn (1984)
Authors: Joseph D. Novak
D. Bob Gowin
ISBN: 0-521-31926-9
Order: Creative Learning Systems, Inc.
9899 Hibert, Suite C
San Diego, CA 92131
Phone: (619) 566-2880

Let's Make it Work (design and technology for primary schools)
Authors: Gloria Davenport, Peter Sellwood
Order: MacMillan Education Ltd.
Houndmills, Basingstoke
Hampshire RG21 2XS
UK

Linking for Learning: A New Course for Education Summary (November, 1989)
Author: Office of Technology Assessment
Order #: OTA-SET-439
Order: Congress of the United States
Office of Technology Assessment
Washington, D. C. 20510-8025

Living in Space (Preschool Aerospace Curriculum)
Author: Young Astronaut Council Edition
Order: Young Astronaut Council
"Living in Space" Preschool Project
1211 Connecticut Avenue, N. W.
Suite 800
Washington, DC 20036
Phone: (202) 682-1987

Mission to Planet Earth (puzzle coloring book for kids and adults)
Order: NASA

Mission 21 Student Theme Books
Order: Delmar Publishers, Inc.
3 Columbia Circle Dr.
P. O. Box 15015
Albany, NY 12212-5015
Phone: (800) 347-7707 or (518) 464-3500

Odyssey of the Mind Program Handbook
Problems to Challenge Creativity
Make Learning Fun
Author: Samuel Micklus
Order: OM Publications
P. O. Box 547
Glassboro, NJ 08028

175 Science Experiments to Amuse and Amaze Your Friends (1988)
Author: Brenda Walpole
ISBN: 0-394-89991-1
Order: Random House, Inc.
400 Hahn Road
Westminster, MD 21157
Price: $12.00

Outward Dreams: Black Inventors and Their Inventions
Author: Jim Haskins
ISBN: 0-553-29480-6
Order: Bantam Starfire Paperback

Physical Science in Early Childhood (1987)
Authors: Carol Woodard
Robert Davitt
ISBN: 0 398 05286 7
Order: Charles C. Thomas, Publisher
2600 South First Street
Springfield, IL 62794-9265
Price: $32.25

Physics for Every Kid (1991)
Author: Janice Van Cleave
ISBN: 0-471-52505-7
Order: John Wiley & Sons, Inc.
Professional, Reference and Trade Group
605 Third Avenue
New York, NY 10158-0012
Price: $13.95

Portraits of Whole Language Classrooms
Authors: Heidi Mills, Jean A. Clyde
Order: Heinemann-Boynton/Cook
361 Hanover Street
Portsmouth, NH 03801-3959
Phone: (800) 541-2086, ext. 127

Power On! New Tools for Teaching and Learning: Summary (September, 1988)
Author: Office of Technology Assessment
Order #: OTA-SET-380
Order: Congress of the United States
Office of Technology Assessment
Washington, D. C. 20510-8025

A Practical Guide to Alternative Assessment
Authors: Joan L. Herman, Pamela R. Aschbacher, Lynn Winters
Order: ASCD
1250 N. Pitt Street
Alexandria, VA 22314-1403

Problem Solving
Order: Theta
Industrial Technology Products
P. O. Box 70
Mound, MN 55364-0070
Order #: 9845 Problem Solving - Complete Package

Problem-Solving in Primary Science and Technology
Authors: David Rowlands, Carol Holland
Order: Stanley Thornes Ltd.
Old Station Drive
Leckhampton Cheltenham
GL53 ODN England
UK

Projects to Enrich School Mathematics
Author: William E. Schall
Order: National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091
Phone: (703) 620-9840

Projects for Outdoor Mathematics
Author: William E. Schall
Order: National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091
Phone: (703) 620-9840

Projects for Primary Technology
Author: Carol Wisely
ISBN: 0-572-01479-1
Order: W. Foulsham and Co. Ltd.
New York, NY

Recycling: Do It Today for Tomorrow
Order: Amoco Chemical Company
200 East Randolph Drive
MC4106, Department M082
Chicago, IL 60601

Report of the Project 2061 Phase I Technology Panel (1989)
Author: James R. Johnson
Order: American Association for the Advancement of Science
1333 H Street NW
Washington, D. C. 20005

Resources and Projects Book: A Student Guide to Design and Technology
Author: Ollie Kasicki
Order: Delmar Publishers Inc.
3 Columbia Circle Drive
P.O. Box 15015
Albany, NY 12212-5015
Phone: (800) 347-7707 or (518) 464-3500

Safety for Elementary School Technological Activities
Author: Technology Education Council for Children
Order: International Technology Education Association
1914 Association Drive
Reston, VA 22091

The Science Book of Machines (1992)
Author: Neil Ardley
ISBN: 0-385-25361-3
Order: Doubleday Canada Limited
105 Bond Street
Toronto, Ontario
Canada M5B 1Y3
Price: $11.50

Science Works (1984)
Author: Ontario Science Center
ISBN: 0-201-16780-8
Order: Creative Learning Systems, Inc.
9899 Hibert, Suite C
San Diego, CA 92131
Phone: (619) 566-2880

600 Manipulatives and Activities for Math (reproducible pages)
Order: Scholastic Inc.
2931 E. McCarty Street
Jefferson City, MD 65102

Sourcebook for Science, Mathematics, and Technology Education 1990-91
Editors: B. J. Calinger and B. Walthall
Order: American Association for the Advancement of Science
1333 H Street NW
Washington, DC 20005
Publication: #90-345

Sources of Electricity (free student booklet)
Generating Electricity (free student booklet)
Teacher's Guide to a Lesson on . . .
Order: Enterprise for Education
1320-A Santa Monica Mall
Santa Monica, CA 90401

Space and Aviation Series:
At the Controls - Women in Aviation
Distance Flights
Women in Space
Order: Learner Publications Co.
241 First Avenue North
Minneapolis, MN 55401

STEP 5 - 16 Design and Technology
Authors: Staffordshire County, UK
Order: Cambridge University Press
The Edinburgh Building
Cambridge, CB2 2RU
UK

Summary: Shortchanging Girls
Order: AAUW
Sales Office
P. O. Box 251
Annapolis Junction, MD 20701
Phone: (800) 225-9998, ext. 238
Price: $5.00

Teacher-Made Aids for Elementary School Mathematics, Volume 2
Order: National Council of Teachers of Mathematics
1906 Association Drive
Reston, VA 22091
Phone: (703) 620-9840

Teaching Children Through Construction Activities (1987)
Author: W. R. Miller; Garder Boyd
Order: Giffon Press
P. O. Box 411
Urbana, IL 61801

Teaching Science to Children: An Integrated Approach (1986)
Author: A. E. Friedl
Order: Random House
New York, NY

TechnoKids (activities for K-5 children)
Order: Mrs. Rosanne White, Executive Director
Technology Student Association
1914 Association Drive
Reston, VA 22091
Phone: (703) 860-9000

Technology (textbook with laserdiscs)
Authors: Brad and Terry Thode
ISBN: 0-8273-5098-8 text
0-8273-5604-8 interactive software
0-8273-5464-9 laserdiscs
Order: Delmar Publishers Inc.
3 Columbia Circle
P. O. Box 15015
Albany, New York 12214-5511
Phone: (800) 347-7707

Technology and Science: The Social Impacts of Technology
Author: Kenneth Smith
Order: Board of Education for Charles County
La Plata, MD 20646-0170

Technology Education for Children Council (TECC) Monographs
Constitution & Bylaws #1
Directory of Resource People #2
Schools for Children #3
Problem Solving and Technology #4
Developmental Growth of Elementary Schools Students #5
Implications of Piagetian Theory for Early Childhood IA #6
Education of the Handicapped and Its Implications for Elementary TE #7
Technology Education in the Elementary School #8
Establishing an Elementary Technology Education Program #9
*Safety for Elementary School*Technological Activities #10
Technology: The Gifted Student in the Elementary School #11
Reading-Technology Connection in the Elementary Curriculum #12
Architecture: Building My World #13
Language Development in the Elementary School Technology Context #14
Technology Education for the Elementary School #15
Classroom Activities Packet 1 & 2
Order: International Technology Education Association
c/o TECC Publications
1914 Association Drive
Reston, VA 22091

Technology for Children Project
Author: F. J. Dreves
Order: New Jersey Department of Education
Trenton State College
Hillwood Lakes
Trenton, NJ 08650-4700
Phone: (609) 771-2529

Technology 2000
Cities 2000
Your World 2000
Health 2000
Author: Peter Evans
Series Editor: Isaac Asimov
ISBN: 08160-11559
Order: Facts on File Publications
460 Park Avenue So.
New York, NY 10016

The Technology of Teaching
Author: B. F. Skinner
Order: Appleton-Century-Crofts
Educational Division
Meredith Corporation
440 Park Avenue South
New York, NY 10016

Technology You Can Build
Authors: Bert Diamond
ISBN: 0-87-192-215-0
Order: Delmar Publishers, Inc.
3 Columbia Circle Dr.
P. O. Box 15015
Albany, NY 12212-5015
Phone: (800) 347-7707 or (518) 464-3500

There Are No Electrons
Author: Kenn Arndahl
Order: Science News Books
1719 N. Street NW
Washington, DC 20036

They're Not Dumb, They're Different — Stalking the Second Tier
Author: Shelia Tobias
Order: Research Corporation
6840 East Broadway Boulevard
Tuscon, AZ 85710-2815

Usborne New Technology Series:
Lasers: What They Can Do and How They Work
Computer Graphics Information Revolution: Cable & Satellite TV, Databases, Teletext & Other Communication Technology
Fun with Electronics: Safe, Practical Things to Do with a Microcomputer
Order: Creative Learning Systems
9889 Hibert, Suite E
San Diego, CA 92131
Phone: (619) 566-2880

Walk Around the Block
Box City: A Built Environment Education Curriculum
ISBN: 0-9632033-0-4
Order: Center for Understanding the Built Environment
5328 W. 67th Street
Prairie Village, KS 66208-1408

The Way Things Work (1988)
Author: David Macaulay
ISBN: 0-395-42857-2
Order: Houghton Mifflin Company
Wayside Road
Burlington, MA 01803
(800) 225-3362
Price: $29.95

We Learn All About Series:
We Learn All About Transportation
We Learn All About Machines
Author: Sharon MacDonald
Order: Good Apple Publications
1204 Buchanan Street
P. O. Box 299
Carthage, IL 62321-0299
Phone: (800) 435-7234

Woodworking for Young Children
Authors: Patsy Skeen, Anita Payne Garner, Sally Cartwright
Order: National Association for the Education of Young Children
1834 Connecticut Avenue, NW
Washington, DC 20009
Phone: (800) 424-2460

Working in Space: Directory of Energy Education Materials (books, kits, samplers, film)
Mr. Wizard's Supermarket Science
Order: National Science Teachers Association
1742 Connecticut Ave., NW
Washington, D. C. 20009
Phone: (202) 328-5800

The World of Tomorrow (aerospace activities guide for teachers) (1978)
Author: Cub Scout-NASA Project (Edmond T. Hesser, Project Director and Robert L. Untch, Project Advisor)
Stock #: 033-000-00745-1
Order: Superintendent of Documents
U. S. Government Printing Office
Washington, DC 20402

Young Astronaut Council Publications:
Living in Space
Traveling in Space
Physics of Fun
Toys that Teach
Order: Publications List
Young Astronaut Council
1211 Connecticut Avenue N. W.
Washington, DC 20036
Phone: (202) 682-1987

The Young Child as Scientist
Authors: Christine Chaille, Lory Britain
Order: Harper Collins Publisher
10 East 53rd Street
New York, NY 10022

The Young Peoples Guide to Home Building
Author: National Association of Home Builders
Order #: 970.13
Order: National Association of Home Builders
1625 L Street, N. W.
Washington, DC 20036

MAGAZINES AND ARTICLES ABOUT TECHNOLOGY ACTIVITIES

The Big Paper (technology publication)
Order: The Design Council
28 Haymarket
London, England SW1Y 4SU

"Characteristics of Preschoolers Interested in Microcomputers." J. E. Johnson. *The Journal of Educational Research*, Vol. 78, May/June 1985, pp. 299-305.

"Developing Studies in Technology." Brian Jacobi. *The Technology Teacher*, April 1992, pp. 3-6.

"Design & Technology: Good Practice and a New Paradigm." Ron Todd and Pat Hutchinson. *TIES Magazine*, January/February 1991, pp. 5-11.

Designing (technology publication)
Order: The Design Council
28 Haymarket
London SW1Y 4SU
UK

"Educating Children for Lifelong Learning and a Learning Society." L. M. Berman. *Childhood Education*, November/December 1984, pp. 99-106.

Hands On! (newsletter)
Order: TERC
TERC Communications
2067 Massachusetts Avenue
Cambridge, MA 02140
(617) 547-0430

"Information Technology: Telecomputing." Joseph M. McCade. *The Technology Teacher*, November 1988, pp. 12-14.

The Journal of the Design and Technology Association (published 3 times a year — winter, spring, summer)
Order: Trentham Books Limited
Westview House
734 London Road
Oakhill
Stoke-on-Trent ST4 5NP
Phone: 0782 745567
Price: £ 20.00

"Kinder-Tech." Linda H. Sittig. *The Technology Teacher*, April 1992, pp. 7-8.

Mac's Place Magazine
Order: Macintosh Software/Hardware
8461 154th Ave. NE
Redmond, WA 98052

"Organizing for Results: The Basis of Authentic Restructuring and Reform." William G. Spady. *Educational Leadership*, 46(2), October 1988, pp. 4-8.

"Our Material World - Resources in Technology." Martha B. Jackson. *The Technology Teacher*, December 1992, pp. 15-21.

Pinnacle
Order: United Telecommunications, Inc.
P. O. Box 11315
Kansas City, MO 64112

Primary Data: A Journal of the Design and Technology Association
Order: Smallpiece House
27 Newbald Terrace East
Leamington Spa
Warwickshire, CV32 4ES England
Price: £ 30 (Free subscription with membership in DATA)

PS4KIDS (This is a new magazine from the editors of *Popular Science*. The promotional prototype contains articles and colorful pictures about technology as well as science. For the study of technology, this issue contained "How it Works," "The Compact Disk Player", and "Invention Convention." A vocabulary list is included for the science and technology terms and their definitions.)

Order: PS4KIDS Subscription Department
2 Park Avenue
New York, NY 10016
Price: $2.50 each
$7.97 for 1-year subscription

"Pupil's Attitudes and Concepts of Technology." E. Allen Bame, William E. Dugger Jr. *The Technology Teacher,* May/June 1990, pp. 10-11.

Puppetools Newsletter
Order: The Puppetools Newsletter
Box 32000
Richmond, VA 23261
(804) 321-3467

"Science Education Reform — What's Wrong with the Process?" Sheila Tobias. *Change Magazine,* May/June 1992, pp. 13-19.

School Scene
Order: Technology Student Association
1914 Association Drive
Reston, VA 22091
(703) 860-9000

"Synthesis of Research on Strategies for Motivating Students to Learn." J. Brophy. *Educational Leadership,* 45(2), 1987, pp. 40-45.

"Teaching Children About Simple Machines." James J. Kirkwood. *The Technology Teacher,* October 1992, pp. 11-13.

"Teaching in the Year 2000: The K ey Words Are Hands-On and Enthusiastic." S. P. Speech. *The Science Teacher* 53 (6), 54, 58, 1986.

Technology Education for Children Council (TECC) Newsletter (with membership in TECC)
Order: ITEA
1914 Association Dr.
Reston, VA 22091

The Technology Teacher
Order: ITEA
1914 Association Drive
Reston, VA 22091-1502
(703) 860-2100
Fax: (703) 860-0353
Membership: $50.00 for teacher, $100.00 for elementary school

"Technology 2000 A Profile of Technology Education at Dranesville Elementary." Gioia Caiola Forman and Cindy Etchison. *The Technology Teacher,* October 1991, pp. 13-27.

TIES Magazine (contains colorful articles for teachers about technology, innovation, and entrepreneurship for students) (Free subscription)
Order: TIES Magazine
Trenton State College
Department of Technological Studies
CN 4700
Trenton, NJ 08650-4700
(609) 771-3333

The Torch (newsletter for DC area math and science teachers)
Order: The Torch
George Washington University
School of Engineering and
Applied Science
Staughton Hall, Room 103
Washington, DC 20052

Triangle Coalition Network News (newsletter from the Triangle Coalition for Science and Technology)
Order: Triangle Coalition Network News
5112 Berwyn Road, 3rd Floor
College Park, MD 20740
(301) 220-0870

"When Girls Lose, America Loses." Vanessa G. Hardee. *In Other Words,* May 1992, p. 2.
Order: University of Virginia's Women's Center
P. O. Box 9011
Charlottesville, VA 22906-9011

"Your Help is Needed in Elementary Schools." Lewis D. Kieft. *The Technology Teacher,* November 1988, pp. 27-31.

Virginia Spacelink (newsletter about space-related activities for students and teachers)

Order: Virginia Space Grant Consortium
Old Dominion University
Peninsula Center
2713-D Magruder Blvd.
Hampton, VA 23666

T.H.E. Journal (free magazine about technology horizons in education)

Order: Request free subscription by calling (714) 730-4011

Virginia Scientists (newsletter with science/technology/education events)

Order: Virginia Academy of Science
Department of Biology
University of Richmond
Richmond, VA 23173

VIDEOTAPES, SOFTWARE, AND MEDIA

AT&T Learning Network (telecommunications network)
Order: AT&T Learning Network
P. O. Box 6391
Parsippany, NJ 07054
Phone: (800) 367-7225, ext. 4158

Autosketch Software for Computer-Aided Design
Order: Mr. Ron Williams
Ronald A Williams, Ltd.
P.O. Box K34
Richmond, VA 23288
Phone: (804) 282-8239 Fax: (804) 282-4087
or
Autodesk, Inc.
2320 Marinship Way
Sausalito, CA 94965

Bridge Builder Software
Order: Pre-Engineering Software
1266 Kimbro Drive
Baton Rouge, LA 70808
Phone: (504) 769-3728

Business Kids Network (video, kit, newsletter, national computer network) (Provides children with ways to create, develop, launch, organize, manage, and market a new business)
Order: Business Kids
1300 I Street NW
Suite 1080 E
Washington, DC 20005
Phone: (800) 282-KIDS (5437)
Price: $49.95

Career Awareness (video)
Order: Glencoe/McMilliam/McGraw-Hill Publishing Company SBN: 0-02-675639-0
Price: $48.99

Career Search (Apple and IBM software)
Author: AVA
Number: AIG 28CD
Order: American Vocational Association
1410 King Street
Alexandria, VA 22314
Phone: (800) 826-9972 ext. 317

The Clip Creator
Order: AABACA Company
5570 Shady Oak Road
Minnetonka, MN 55343
Price: $89.75 (approximate)

Computers for Kids (videotape in JMU library)
Order: Arvid Van Dyke
James Madison University
Harrisonburg, VA 22807
Phone: (703) 568-2786

Creative Learning Software
The Toy Shop, The Car Builder, Glidepath, Flight Simulator II, The Print Shop, The Newsroom, Creative Contraptions, Project Space Station
Order: Creative Learning Systems, Inc.
9889-E Hibert Street
San Diego, CA 92131
Phone: (619) 566-2880

Decision Making (VHS Video)
Order: Educational Video Network, Inc.
Educational Filmstrips
1401-19th Street
Huntsville, Texas 77340
Phone: (409) 295-5767
Price: $49.95

Elementary Aerospace Technology
Order: Elementary Industrial Technology Center
Los Angeles Unified School District
2935 East 7th Street
Los Angeles, CA 90023
Phone: 213-262-1886

The Explorers: A Century of Discover (videodisc)
Order: National Geographic Society
Educational Services
Department 5397
Washington, D. C. 20036
Order #: 53341
Phone: (800) 368-2728
Price: $35.20

First Hand Science, 1991
Order: Ontario Science Centre
70 Don Mills Road
Don Mills, Ontario
M3C 1T3

Graphic Communications (video)
Order: Glencoe/McMillan/McGraw-Hill Publishing Company
ISBN: 0-02-675626-9
Price: $48.99

How to Conduct a Meeting (3 VHS Videos)
Order: Educational Video Network, Inc.
Educational Filmstrips
1401-19th Street
Huntsville, TX 77340
Phone: (409) 295-5767
Price: $159.95

Iris On-Line Network
Order: P. O. Box 29424
Richmond, VA 23242-0424
Phone: (202) 298-0969 Fax: (703) 841-9798
Price: $198.00

Kid Pix School Edition
Order: Creative Learning Systems
9889-E Hibert Street
San Diego, CA 92131
Phone: (619) 566-2880

KidsDesk (Mac or IBM software) (Children launch their own programs from 6 desktop designs with interactive accessories
Number: MCEMK01R3 Mac
PCEMK01R8 IBM
Grades: K-5
Price: $39.95

Launching a Dream (Video) (Free tape of 2 elementary schools that simulated a NASA launch)Send blank VHS cassette to
Dr. Bondurant, Chief
NASA Educational Services
MS7-4, NASA Lewis
Cleveland, OH 44135

Learning Link (telecommunication for teachers)
Order: WHRO-TV/FM
5200 Hampton Blvd.
Norfolk, VA 23508

Looking to the Future: Catalog of Videos, Software, Guides, Activities, Charts
Order: Educational Affairs Liaison
Office of Space Science A
Code SPS
NASA
Washington, DC 20546

Lotus 1-2-3 for Kids (videotape)
Contact: Dr. Arvid Van Dyke
James Madison University
Harrisonburg, VA 22807
Phone: (703) 568-6822

Love Those Trains (videodisc)
Order: National Geographic Society
Educational Services
Department 5397
Washington, DC 20036
Order: #53382
Price: $35.20

Microsoft Flight Simulator (version 4.0)
Order: Creative Learning Systems
9889-E Hibert Street
San Diego, CA 92131
Phone: (619) 566-2880

Miniature Miracle: The Computer Chip (videodisc)
Order: #53291
National Geographic Society
Educational Services
Department 5397
Washington, D. C. 20036
Price: $35.20

Mission 21: Launching Technology Across the Curriculum (promotional/marketing video)
Order: Delmar Publishers Inc.
3 Columbia Circle
P. O. Box 15015
Albany, NY 12212-5015
Phone: (800) 998-7498 or (518) 464-3500

NASA videotapes and publications
NASA Spacelink (electronic information system)
Order: Langley Research Center
Public Services Office
Mail Stop 154
Hampton, VA 23665-5225
Phone: (804) 864-3312

NASA CORE Resources for Educators
Order: Lorain County Voc. School
15181 Rt. 5850
Oberlin, OH 44074
Phone: (216) 774-1051

Printshop (software)
Order: Modern School Supply
P.O. Box 958
Hartford, CT 06143

SciBoard (electronic bulletin board)
Order: University of Louisville
School of Education
Louisville, KY 40292
Phone: (502) 588-6667

Science-By-Van (traveling science program with presenters, exhibits, and workshops)
Order: Science-By-Van
Science Museum of Virginia
2500 W. Broad Street
Richmond, VA 23220

The Scientific Method (videotape)
Order: Barr Films
12801 Schabarum Ave.
P. O. Box 7878
Irwindale, CA 91706-7878
Phone: (800) 234-7878 or (818) 338-7878

Simple Machines Series (Inclined planes, lever, pulleys, wheels)
Order: Coronet/MTI Film and Video
108 Wilmot Road
Deerfield, IL 60015
Phone: (800) 621-2131

Stickybear Town Builder (Mac or IBM) (Kids build own towns, learn compass reading, directions, map reading and solve mysteries
Grades: 1-3
Publisher: Optimum Resource, Inc.
Number: PCX8512R8
Price: $49.95

Storybook Weaver (Mac or IBM software) (Children can author and illustrate a story or story-book using simple word processor and graphics)
Grades: K-3
Publisher: MECC
Number: MCMECO5R3 for Mac
PCMECO5R8 for IBM
Price: $49.95

Tales of Discovery - Revealing the Science of Everyday Experiences (videotape, activity guide, and transparency masters)
Order: Educational Services
Virginia Power
P. O. Box 26666
Richmond, VA 23261

Technology is Elementary (Video for teachers and parents)
Order: ITEA
1914 Association Drive
Reston, VA 22091
Phone: (703) 860-2100

Telecommunications (video)
Order: Glencoe/McMilliam/McGraw-Hill Publishing Company
ISBN: 0-02-675624-2
Price: $48.99

Things That Go Bump in the Night!
Order: Creative Learning Systems, Inc.
16510 Via Esprillo
San Diego, CA 92127
Phone: (800) 458-2880

Videodisc for Teachers (unique video programs)
Order: NASA Teacher Resource Center
The Virginia Air and Space Center
600 Settlers Landing Road
Hampton, VA 23669-4033

Virginia's Public Education Network (Virginia's PEN)
Contact: George R. Willcox
Principal Specialist
Technology Education - 21st Floor
Virginia Department of Education
P. O. Box 2120
Richmond, VA 23216-2120
Phone: (804) 225-2839

Windows on Science (laserdisc)
Order: Optical Data Corporation 1990
30 Technology Drive
Warren, NJ 07059

Word Perfect for Kids (videotape in JMU library)
Order: Dr. Arvid Van Dyke
James Madison University
Harrisonburg, VA 22807
Phone: 703-568-2787

Writing to Write (IBM software)
Order: Contact local IBM representative

Young Entrepreneurs (video)
Order: Glencoe/McMillan/McGraw-Hill Publishing Company
ISBN: 0-02-675638-2
Price: $48.99

MATERIALS, SUPPLIES, AND MANIPULATIVES

Childcraft Catalog (toys, kits, manipulatives, furniture, simulation materials)
Order: Childcraft Catalog
912 Brandon Ave. #3
Norfolk, VA 23517
Phone: (804) 623-5745

Creative Learning Systems (kits, books, software)
Order: Creative Learning Systems
9889-E Hibert Street
San Diego, CA 92131
Phone: (619) 566-2880

Creative Publications Catalog (kits, manipulatives, fun activities, calculators, creative books)
Order: Creative Publications Order Department
5040 West 111th Street
Oak Lawn, IL 60453
Phone: (800) 624-0822

Creative Teaching Press Catalog (cardboard storage box for supplies)
Order: Creative Teaching Press
P. O. Box 6017
Cypress, CA 90630-0017
Phone: (800) 444-4287

Dale Seymour Publications (catalog of educational materials)
Order: Dale Seymour Publications
P. O. Box 10888
Palo Alto, CA 94303-0879
Phone: (800) 872-1100

Delta Education Hands-On Science Catalog
Order: Delta Education Hands-On Science Catalog
P. O. Box M
Nashua, NH 03061
Phone: (800) 258-1302

Discover Dynamics (kits for building small vehicles and experiments)
Order: Salter Science
Bretton Way, Bretton
Peterborough PE38YA
UK

Electricity Kit (35 Project booklets with electrical parts)
How Things Work Kit (science in everyday objects) Bulletin Board, Posters (for survival signs and symbols, careers, heat, light and sound, simple machines, computer keyboarding, earth care, etc.)
Forty Famous Women (cards to read and research)
Famous Inventors - Black Americans and Their Inventions (cards)
Order: Visit local store or request catalog
Teacher's Aide & Educational Supplies
115A S. Carlton Street
Cloverleaf Shopping Mall
Harrisonburg, VA 22801
Phone: (703) 433-6656

Erector Sets (construction sets)
Order: Science News Books
1719 N Street, NW
Washington, DC 20036
Phone: (800) 544-4565

Fomeboards (easy to use material for display and models)
Order: Fomeboards
407-A Pomona Drive
Greensboro, NC 27407
Phone: (800) 362-6267

Good Apple Publications (teacher's resource catalog)
Order: Good Apple Publications
1204 Buchanan Street
P. O. Box 299
Carthage, IL 62321-0299
Phone: (800) 435-7234

Goodheart-Willcox Co., Inc. Catalog (textbooks and other resource manuals)
Order: Goodheart-Willcox Co., Inc.
123 Taft Drive
South Holland, IL 60473
Phone: (800) 323-0440

Graves Humphreys Kits (electrical demonstration kits, hand tools, future science kits, microscopes, robotic arm, project kits)

Order: Graves Humphreys
5320 Peters Creek Road
Roanoke, VA 24033
Phone: (800) 336-5998

Kelvin Electronics Catalog

Order: Kelvin Electronics Catalog
10 Hub Drive
Melville, NY 11747
Phone: (800) 645-9212

LASY Plastic Building Kits

Order: Mr. John S. Taylor, President
AMTEK COMPANY
778 Holly Drive
Arnold, MD 21012
Phone: (800) 926-8359

Learning Things, Inc. Educational Materials Catalog (kits, books, math & technology manipulatives, simple tools, educational aids)

Order: Learning Things, Inc.
68 A Broadway
P. O. Box 436
Arlington, MA 02174
Phone: (617) 646-0093

LEGO dacta

Order: Mr. Ronald Revere
Learning Development Representative
Lego dacta
401 Montpelier Drive
Stafford, VA 22554
Phone: (800) 527-8339 (office)
(800) 344-5341 (voice mail)
(703) 752-8339 (home)

LINX System (kit and simple tools for design and constructing)

Order: The Science Source
P. O. Box 727
Waldoboro, ME 04572
Phone: (207) 832-6344

The Magnetic Way (magnetic maps, big books, activity boards, supermarket kit)

Order: The Magnetic Way Catalog
Creative Edge, Inc.
80 Pineview Drive
Amherst, NY 14228-2120
Phone: (800) 626-5052

Mission 21 Activity Resource Kit

Order: E & L Instruments
70 Fulton Terrace
New Haven, CT 06512
Phone: (800) 368-0880

Model Rocketry Catalog (kits for model rockets and other flying objects)

Order: Estes Industries, Inc.
Penrose, CO 81240
Phone: (303) 784-6345

Modern School Supplies, Inc. Catalog (software, kits and manipulatives)

Order: Modern School Supplies, Inc.
P. O. Box 958
Hartford, CT 06143
Phone: (800) 243-2329

Mortensen (A Model and A Method for Math)

Order: V. J. Mortensen Co.
P. O. Box 98
Hayden Lake, ID 83835
Phone: (208) 667-1580

Motorized Capsela (204 Robot Discovery Toy)

Order: Creative Learning Systems, Inc.
16510 Via Esprillo
San Diego, CA 92127
Phone: (800) 458-2880

Pitsco Catalog (kits, models, software, supplies)

Order: Pitsco
1004 E. Adams
P. O. Box 1328
Pittsburg, KS 66762
Phone: (800) 835-0686

Playmobile (realistic people and equipment with community context)

Sold in retail stores; write for catalog and nearest store:

Playmobile USA Inc.
11 E. Nicholas Court
Dayton, NJ 08810
Phone: (908) 274-0101

Ramagon (kits for design and constructioN)
Order: Small World Technologies, Inc.
P. O. Box 607
Hillsboro, OR 97123
Phone: (800) 542-3555

Rigby Books Catalog
Order: Rigby
P. O. Box 797
Crystal Lake, IL 60039-0797
Phone: (800) 822-8661

Sargent-Welch Co. Catalog (supplies, kits)
Order: Sargent-Welch Co.
7400 North Linder Avenue
P. O. Box 1026
Skokie, IL 60076-1026
Phone: (312) 677-0560

Scholastic Science Place Kits (with the following technology topics): What We Use (materials); How People Move Things; Energy; How People Get Food
Order: Scholastic Science Place Program Guide
2931 East McCarty Street
Jefferson City, MO 65101
Phone: (800) 325-6149

Technology Education Supply Co. (TESCO) (equipment, supplies, kits, wooden sheets, simple electricity kits, books, etc.)
Order: Technology Education Supply Co. (TESCO)
Educational Markets Division
5724 W. 36th Street
Minneapolis, MN 55416
Phone: (612) 920-7393

Theta Industrial Technology Products Catalog
Order: Theta Industrial Technology Products
P. O. Box 70
Mound, MN 55364-0070

Transtech (equipment, kits, LEGO, Robotics, Fishertechnik, and hundreds of other packages and books)
Order: Transtech
Creative Learning Systems, Inc.
16510 Via Esprillo
San Diego, CA 92127

Unilab Equipment:
Beaver Construction Kit (tools and easy-to-assemble materials)
First Gear (easy-to-use kit for models that work)
Activator Series (for making models that work)
Constructo (erector set)
Technology Workcenter (cart with wheels)
PneuMatics (fittings for air control)
Polymek materials and tools for models
Gears and mechanisms for models
Alternative Energy Kits
Electric Kits
Order: Mr. Gary Beer, General Manager
UNILAB, INC.
1604 Walker Lake Road
Mansfield, OH 44906
Phone: (419) 747-1040
or
Mr. Rober Wyatt, President
Diversified Educational Systems, Inc.
P.O. Box 388
Berryville, VA 22611
Phone: (703) 955-2782

Walsh Products, Inc. (Screen printing supplies)
Order: Welsh Products, Inc.
1201 E. 5th Street
P. O. Box 845
Benicia, CA 94510
Phone: (707) 745-3252

Whitewings: The Future of Flight (models of advanced aircraft designs)
Order: Science New Books
1719 N Street, NW
Washington, DC 20036
Phone: (800) 544-4565

CONSULTANTS, RESOURCE PERSONS, AND IN-SERVICE PROGRAMS

Consultants and Resource Persons

Pauline Botrill (design and art teacher from UK)
5607 Newington Road
Bethesda, MD 20816
(301) 229-3072

Audrey H. Brainard, Elementary Science Consultant (advocates student involvement with manipulative materials and learning through an inquiry approach)
RR 2 Box 299J
Heathsville, VA 22473
(804) 580-5519

Dr. Lillian Brinkley, Past President NAESP and Principal
Willard Model Elementary School
Norfolk City Schools
1511 Willow Wood Drive
Norfolk, VA 23503
(804) 441-2891

Dr. Sharon A. Brusic (writer of Mission 21 materials and in-service leader)
Kate Collins Middle School
1625 Ivy Street
Waynesboro, VA 22980
(703) 939-4373

Diane Buckley (former elementary teacher, now teacher educator)
Primary Centre for Design and Technology Education

University of Wolverhampton
Walsall Campus, Gorway Road
Walsall WSI 3BD UK
Phone: 0902 323267 Fax: 0902 323175

Debbie Busch, Education Coordinator
The Discovery Lab
109 Engineering Research Building
P. O. Box 6101
West Virginia University
Morgantown, WV 26506-6101
(304) 293-3612 Fax: (304) 293-3472

Dr. Julie H. Cothron and Staff (conduct in-service using science, mathematics, and technology activities)
Mathematics and Science Center
2401 Hartman Street
Richmond, VA 23223
(804) 343-6525

Marie Dodson and Melanie Smith (plan programs for CHROME clubs, which engage minority children in science and technology)
CHROME
P. O. Box 1394
Norfolk, VA 23501
(804) 683-2931

Dr. William E. Dugger Jr. (writer of Mission 21 materials and in-service leader)
Co-Director, Mission 21 Project
Technology Education
Virginia Tech
Blacksburg, VA 24061
(703) 231-6480

Edison Electric Institute
701 Pennsylvania Avenue, NW
Washington, DC 20004-2696
(202) 508-5000

Cindy Etchison (lead technology teacher at elementary school with technology integration, leads in-service workshops)
12010 Cheviot Dr.
Herndon, VA 22070
(803) 435-6738

Gioia Caiola Forman (principal of elementary school with technology integration)
Dranesville Elementary School
1515 Powells Tavern Place
Herndon, VA 22070
(703) 709-7789

Dr. Robert P. Grimesey Jr.
Ottobine Elementary
Rt. 1, Box 328
Dayton, VA 22821
(703) 879-9712

Mary Ann Hutchinson, Principal
McIntosh Elementary School
185 Richneck Road
Newport News, VA 23602
(804) 886-7767

International Technology Education Association (ITEA) (Books, journals for teachers, audiovisuals, workshops, conferences, etc.)
1914 Association Drive
Reston, VA 22091

Jim Ker, (Director of Kit Services, which loans science/technology kits to schools in Hamilton, Ontario
Board of Education—City of Hamilton
100 Main Street W
Hamilton, Ontario L8N 3L1
(416) 527-5092 Fax: (416) 521-2536

Dr. James LaPorte (writer of Mission 21 materials and in-service leader)
Co-Director, Mission 21 Project
Technology Education
Virginia Tech
Blacksburg, VA 24061
(703) 231-6480

David Magnone, TSA Specialist
Virginia Technology Student Association
P.O. Box 2120
Riochmond, VA 23216-2120
(804) 225-4051

Dr. James McCracken (college professor who teaches technology to elementary education majors)
Technology Education Department
Bemedji State University
Bemedji, MN 56601
(218) 755-2950

NASA Teacher Resource Center
The Virginia Air and Space Center
600 Settlers Landing Road
Hampton, VA 23669-4033
Catherine Ney (Mission 21 teacher who conducts in-service for elementary teachers)

Margaret Beeks Elementary School
Montgomery County Schools
709 Airport Road
Blacksburg, VA 24060
(703) 552-4541

Ronald Revere (salesperson who also does in-service workshops)
Learning Development Representative
Lego dacta
401 Montpelier Drive
Stafford, VA 22554
(800) 527-8339 office; (703) 752-8339 home;
(800) 344-5341 voice mail

Doug Smith, Coordinator, Technology Education
Fairfax County Public Schools
7423 Camp Alger Avenue
Falls Church, VA 22042
(703) 698-0400

Dr. Kendall N. Starkweather (Executive Director of ITEA and broad-based consultant)
International Technology Education Association
1914 Association Drive
Reston, VA 22091
(703) 860-2100

Sandy Stephens (retired teacher)
9025 Ft. Craig Drive
Burke, VA 22015
(703) 323-5979

Armand Taylor
Technology Education
Virginia Beach City Schools
P. O. Box 6038
Virginia Beach, VA 23456
(804) 427-4839

Officers and Leaders in TECC (Technology Education Council for Children)
International Technology Education Association
1914 Association Drive
Reston, VA 22091
(703) 860-0353

Terri Thode
Hemingway Elementary School
P. O. Box 298
Ketchum, ID 83340
(208) 726-3348

Dr. Ronald Todd (Editor of *TIES Magazine* with extensive international experience)
3Trenton State College Department of TechnologicalStudies
CN 4700
Trenton, NJ 08650-4700
(609)771-3333

Dr. Arvid Van Dyke, Professional Development Specialist
Technology Education
James Madison University
Harrisonburg, VA 22807

Jerry Weddle, Coordinator
Roanoke County Schools
P. O. Box 13145
526 College Avenue
Salem, VA 24153
(703) 387-6403

Rosanne White (Executive Director of TSA and enthusiastic leader and planner)
Technology Student Association
1914 Association Drive
Reston, VA 22091
(703) 860-9000

George R. Willcox, Principal Specialist
Technology Education, 21st Floor
Virginia Department of Education
P. O. Box 2120
Richmond, VA 23216-2120
(804) 225-2839

Young Astronaut Council (a club program in science and space technology)
T. Wendell Butler, Executive Director
Young Astronaut Program
1211 Connecticut Avenue, NW
Suite 800
Washington, DC 20036
(800) 426-4234 or (202) 682-1985

Dr. Karen Zuga (college professor active in elementary school programs and curriculum)
Technology Education Department
The Ohio State University
190 W. 19th Avenue
Columbus, OH 43210-1184

In-Service Workshops for Elementary Teachers

Autosketch Software Inservice Workshop
For more information, contact:
Mr. John Grannis
Ronald A. Williams, Ltd.
P. O. Box K-34
Richmond, VA 23288

ITEA Pre-Conference Workshops (One-day workshops on Saturday or Sunday prior to International Technology Education Conference in April.
Contact each year:
ITEA
1914 Association Drive
Reston, VA 22091
(703) 860-2100

Mission 21 (offers workshops or school assistance to elementary teachers)
Contact:
Sharon Brusic
Kate Collins Middle School
1625 Ivy Street
Waynesboro, VA 22980
(703) 939-4373
or
Dr. William E. Dugger Jr.
Technology Education
144 Smyth Hall
Virginia Tech
Blacksburg, VA 24061-0432
(703) 231-6480

National Education Workshops for Elementary School Teachers - NEWEST (Two-week summer workshops at one of NASA's research centers. Teachers work with NASA experts and learn about space and aeronautics activities, curriculum, and classroom materials.)
Request application package and deadline dates from:
National Science Teachers Association
Space, Science and Technology Programs
1742 Connecticut Avenue, N. W.
Washington, DC 20009

Project AIMS Summer Workshops (One-week workshops provide elementary teachers with "hands on" experiences with the integrated science/mathematics investigators which use technology activities. Teachers discuss classroom implementation and management. Request reservation form and schedule each year from:

AIMS Education Foundation
P. O. Box 8120
Fresno, CA 93747
(209) 255-4094 Fax: (209) 255-6396

Project Update - NSF Design and Technology/ Engineering (An NSF grant to Drexel University that is preparing instructional materials for grades K-5. After materials are developed and pilot-tested, the *TIES Magazine* editors will facilitate dissemination and in-service training. Request information about materials and training from:

Project Update
c/o TIES Magazine
Trenton State College
Department of Technological Studies
CN 4700
Trenton, NJ 08650-4700
(609) 771-3333

Space School (A two-week course designed to connect elementary teachers to space science and education resources through hands-on activities and take-home classroom materials.) Request registration information from:

Dr. Dianne Q. Robinson, Director
Interdisciplinary Science Center
Hampton University
Hampton, VA 23668
(804) 727-5869

Space Technology for Elementary Teachers (Explores space in the elementary curriculum through technology education by providing problem-solving space activities and hands-on experiences.) Doub Polette, Author. Request information from:

ITEA
1914 Association Drive
Reston, VA 22091
(703 860-2100

University Departments with Technology Education Programs

Virginia Tech
Dr. William E. Dugger Jr.
144 Smyth Hall
Blacksburg, VA 24061

Old Dominion University
Dr. John Ritz
46000 Hampton Blvd.
Norfolk, VA 23529

Norfolk State University
Dr. Jack Witty
2401 Corprew Avenue
Norfolk, VA 23504

Virginia State University
Mr. Posey Young
Petersburg, VA 23803

James Madison University
Dr. Arvid Van Dyke
School of Integrated Science and Technology
Harrisonburg, VA 22807
(703) 568-2786

In accordance with the requirements of the Office of Gender Equity for Career Development, Virginia Department of Education, the Carl Perkins Act, and other federal and state laws and regulations, this document has been reviewed to ensure that it does not reflect stereotypes based on sex, race, or national origin.

The Virginia Department of Education does not unlawfully discriminate on the basis of sex, race, color, religion, handicapping conditions, or national origin in employment or in its educational programs and activities.

The activity which is the subject of this report was supported in whole or in part by the U.S. Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the U.S. Department of Education, and no official endorsement by the U.S. Department of Education should be inferred.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
Educational Resources Information Center (ERIC)

ERIC

CE 073 770

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: TECHNOLOGY EDUCATION IN THE ELEMENTARY SCHOOL	
Author(s): VIRGINIA DEPT. OF EDUCATION & JAMES MADISON UNIVERSITY	
Corporate Source: VIRGINIA DEPT. OF EDUCATION	Publication Date: 1994

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic/optical media, and sold through the ERIC Document Reproduction Service (EDRS) or other ERIC vendors. Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following two options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all **Level 1** documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Level 1

The sample sticker shown below will be affixed to all **Level 2** documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Level 2

☑ Check here
For Level 1 Release:
Permitting reproduction in microfiche (4" x 6" film) or other ERIC archival media (e.g., electronic or optical) *and* paper copy.

☐ Check here
For Level 2 Release:
Permitting reproduction in microfiche (4" x 6" film) or other ERIC archival media (e.g., electronic or optical), but *not* in paper copy.

Documents will be processed as indicated provided reproduction quality permits. If permission to reproduce is granted, but neither box is checked, documents will be processed at **Level 1**.

"I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic/optical media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries."

Sign here→ please

Signature: Margaret Watson	Printed Name/Position/Title: MARGARET WATSON	
Organization/Address: VVCRC 2200 MOUNTAIN ROAD GLEN ALLEN, VA. 23060	Telephone: 804-261-5075	FAX: 804-261-5079
	E-Mail Address: vvcrc@vvcrc.tec.va.us	Date: 4/10/97

(over)

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, *or*, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:

VIRGINIA VOCATIONAL CURRICULUM AND RESOURCE CENTER

Address:

2200 MOUNTAIN ROAD
GLEN ALLEN, VA. 23060-2208

Price:

$10.46

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:

Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:

Acquisitions Coordinator
ERIC Clearinghouse on Adult, Career, and Vocational Education
Center on Education and Training for Employment
1900 Kenny Road
Columbus, OH 43210-1090

However, if solicited by the ERIC Facility, or if making an unsolicited contribution to ERIC, return this form (and the document being contributed) to:

MARY GRATTAN
c/o VVCRC
2200 MOUNTAIN ROAD
GLEN ALLEN, VA. 23060-2208