

BERKELEY HEIGHTS PUBLIC SCHOOLS
BERKELEY HEIGHTS, NEW JERSEY

**COLUMBIA MIDDLE SCHOOL
TECHNOLOGY DEPARTMENT**

TECHNOLOGY EDUCATION
Grades 6, 7, 8

Curriculum Guide

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This curriculum may be modified through varying techniques,
strategies, and materials, as per an individual student's
Individualized Educational Plan (IEP)

Approved by the Berkeley Heights Board of Education
at the regular meeting held on 9/11/08.

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VISION STATEMENT

In today's global society, technological innovations and enhanced communication systems provide access to a wide variety of venues around the world. These provide opportunities to conduct business, solve problems, and access knowledge and information easily. Technology advances have expanded the capabilities of companies, schools, and individuals to communicate and interact around the world.

Technology literacy involves the ability to use, manage, access, and understand technology. It also involves the application of knowledge and abilities to real world situations. An education in basic technological concepts, systems, and theories are an essential part of every child's education.

Technology education has been associated with vocationalism. However, this is changing – in modern technology education classes students are expected to understand and apply the design process. The students analyze and evaluate design options and apply the design process to solve problem. They are expected to use technology as it applies to physical, biological, information, and communication systems. Students are asked to address critical local and global ecological problems to include the possible ramifications of unintended consequences of the technological solutions provided.

Technology is defined as any modification of the natural world designed by human life to extend human capability. Technology education allows students to apply the information that is received in other subjects to real-world situations, thereby increasing the comprehension of the subject matter. Technology educators explain that Technology Education allows students to apply the information that is received in other subjects to real-world situations, increasing the comprehension of that subject matter. The project-based learning environment of the classroom allows students to access and apply information while they are problem-solving and forming solutions.

Learners, today, do not depend on their memories. They must be able to locate, evaluate, and store information on their personal computers and be able to retrieve it. The concept of knowledge has changed from having information in the brain, to “having access to information about a particular topic and knowing how to use it”. David Thornburg focuses on another trend for the future of schools. Thornburg says that schools must prepare “technologically fluent workers” as well as an educational system that prepares students to fill jobs that do not currently exist and/or have not yet been invented.

MISSION STATEMENT

The mission of the Technology Education Program at Columbia Middle School is to provide students with learning opportunities to experience and build their knowledge and skills in the area of technological concepts, systems, and theories. This will be done through:

- ◆ Project-based learning activities.
- ◆ Individual and/or group work.
- ◆ Use of modules on a variety of areas and topics.
- ◆ Identification of current community and/or global based issues to apply technological concepts, systems, and theories toward problem-solving and critical-thinking possible solutions.
- ◆ Use and reinforcement of safe practices and a focus on safety in a laboratory/work setting.

COURSE PROFICIENCIES

COURSE OBJECTIVES

1. To provide students with opportunities and activities that develops problem-solving, decision-making, and critical-thinking skills. (0.2/7; 0.3/1-3, 6-15; 1.6/1,2; 4.1/2,3,6-14; 4.4/1-4; 4.12/1,9; 5.2/2,3,9)
2. To expose students to experiences and educational opportunities that develops self-management and organizational skills. (0.1/1-3,5,7; 0.2/3,9,10; 1.2/1; 5.4/1,3)
3. To establish an environment conducive to students self-improvement. (0.1/2; 0.3/1-3; 1.2/2,3; 3.1/1,6-15; 3.4/16)
4. To provide opportunities for students to establish and attain realistic goals. (0.4/1-11; 3.3/14; 5.2/2)
5. To expose students to activities that will assist students in the development of a positive work attitude and pride in their work. (0.1/1-3,5,7; 0.3/6; 1.2/4; 5.4/1,2,3)
6. To provide opportunities for students to follow oral and written instructions. (0.3/6; 3.1/1,6-15)
7. To provide a safe environment for students to work independently and cooperatively toward educational growth. (0.1/1-3,5,7; 0.4/1-11; 0.5/1,3,4,6-9; 1.2/1-4; 3.2/1,3,5-10; 3.3/1-17; 5.4/1,2,3)
8. To provide activities to assist students in the mastery of the stated objectives and competencies associated with each technology module. (0.2/1-10; 0.4/1-11; 1.2/2-3; 3.2/1,2,5-10; 3.3/11-17; 3.4/1-12,15,16; 3.5/1-10,13-15; 4.1/2,3,6-14; 4.3/4,7,10; 4.4/1-4; 4.5/1; 4.6/1,4,6,10; 4.7/1,5,6,10,19; 4.9/2,5,6,13,14; 4.12/1,9; 5.4/1-3; 5.5/1-3)
9. To develop technology and information processing skills. (0.2/2; 3.5/1-10,13-15; 3.4/1-12,15,16; 4.3/3,7,10; 4.4/1-4; 4.6/1,4,6; 4.7/19; 5.2/2,3,8,9)
10. To promote the multi-disciplinary function of technology throughout education. (0.2/10; 3.3/1-17; 3.4/19; 5.5/2)

STUDENT PROFICIENCIES

The student will be able to:

1. Identify and understand applications for each technology module.
2. Describe the benefits, challenges, and decisions for each module.
3. Use vocabulary and basic skills specific to each area of technology.
4. Understand the principles, terminology, and safe practical applications of each technology area.
5. Demonstrate by means of experiment, measurement, or testing basic technological principles.
6. Appreciate the career and educational opportunities each field can offer.
7. Understand and use a variety; of technological devices, which include computer software, interactive CD-ROM laser disk, interactive print media, and instructional videos.

METHODS OF EVALUATION

1. Observation of students' work habits and workstation maintenance.
2. Completion of individual and/or group projects.
3. Worksheets, pretests, and post tests.
4. Teacher and student-created projects.
5. Technology log books.

SCOPE AND SEQUENCE
COURSE OUTLINE/STUDENT OBJECTIVES

The student will be able to:

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 9.1 9.2	1,2,3,4 2,3 1,6,7,8,9,10, 11,12,13,14, 15 1,3,5,6,7,8, 9,10 1-17 1-12,15,16 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1, B1,6,10 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	I. Electricity And Electronics (2 weeks) A. Explain the Basic Principles of Electricity/Electronics B. Demonstrate the Basic Mathematics Used in Electronics C. Construct a Simple Circuit D. Correctly Use a Multimeter E. Identify and Explain Electronic Components	X		
1.2 1.4 3.1 3.2 3.3 3.4	1,2,3,4 2,3 1,6-15 1,2,5,6,7,8,9, 10 1-17 1-12,15,16	II. Laser (2 weeks) A. Identify Common Terms Used in the Study of Lasers and Fiber Optics B. Explain and Demonstrate the Laser Concepts 1. Scattering of light 2. Bending of light	X		

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.3 5.4 8.1 9.1 9.2	2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,2,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1 B1,6,10 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	II. Laser (continued) 3. Light coloring/filtering 4. How lenses bend light 5. Fiber optics C. Demonstrate How a Laser Works			
1.2 1.4 1.6 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5	1,2,3,4 2,3 1,2,3 1,6-15 1,3,5,6,7,8,9, 10 1-17 1-12,15,16 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,2,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3	III. Structural Technology (2 weeks) A. Explain Design and Structure Concepts B. Construct Beams, Trusses, and Bridges C. Use Problem Solving Skills in Construction D. Use Mathematical Calculation E. Understand and Use Structural Testing Devices	X		

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
8.1 9.1 9.2	A1 B1,6,10 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	III. Structural Technology (continued)			
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2 9.1 9.2	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9,10 1-17 1-12,15,16 2,3,6,7,8,9 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4 B1,2,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	IV. Robotics I (2 weeks) A. Identify Parts of a Robot B. Explain Technical Terms That Describe a Robot C. Explain How Parts of a Robot Move D. Program the Robot to Execute a Series of Commands E. Write a Program for Others to Use		X	X
1.2 1.4 3.1	1,2,3,4 2,3 1,6-15	V. Tools And Machines (2 weeks) A. Demonstrate All Required Safety Procedures	X		

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.2 9.1 9.2	1,3,5,6,7,8,9,10 1-17 1-12,15,16 2,3,6,7,8,9,11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	V. Tools And Machines (continued) B. Read and Use a Ruler C. Demonstrate Proper Use of Hand Tools D. Demonstrate Proper Use of Machinery E. Master Sanding Techniques F. Apply a Wood Finish			
1.2 1.4 1.6 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9	1,2,3,4 2,3 1,2,3 1,6-15 1,3,5,6,7,8,9,10 1-17 1-12,15,16 2,3,6,7,8,9,11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14	VI. Computer Aided Drafting (CAD) (2 weeks) A. Explain the Advantages of CAD Over Traditional Drafting B. Apply Learned Concepts to Fulfill CAD Requirement C. Incorporate Previous Computer Skills into the CAD Module D. Set Up and Use a Roland Plotter		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
4.12 4.14 5.2 5.4 5.5 8.1 8.2 9.1 9.2	1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4,8,11 B1,2,3,8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	VI. Computer Aided Drafting (CAD) (continued)			
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2 9.1	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9,10 1-17 1-12,15,16 2,3,6,7,8,9,11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,4 B8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4	VII. Energy Power And Transportation (2 weeks) A. Explain the Basic Theory of a Four Cycle Engine B. Identify and Discuss Environmental Concerns C. Recognize Solar Power as an Alternative Power Source D. Identify the Parts of an Engine E. Disassemble and Assemble an Engine F. Demonstrate Safe and Proper Use of Module Tools		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
9.2	A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	VII. Energy Power And Transportation (continued)			
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5. 5.4 5.5 8.1 8.2 9.1 9.2	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9, 10 1-17 1-12,15,16 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,4 B1,8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	VIII. Rocketry And Flight (2 weeks) A. Discuss the History of Flight and Aviation B. Explain the Principles and Physics of Flight C. Discuss the Development of the Space Shuttle D. Construct and Fly a Model Rocket and a Rubber Band Powered Airplane		X	X
1.2 1.4 1.6 3.1	1,2,3,4 2,3 1,2,3 1,6-15	IX. Aerodynamics (2 weeks) A. Collect and Measure Atmospheric Data B. Demonstrate How to Safely Operate a Wind Tunnel		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2 9.1 9.2	1,3,5,6,7,8,9 10 1-17 1-12,15,16 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4 B1,8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	IX. Aerodynamics (continued) C. Conduct Experiments to Demonstrate the Motion of an Airfoil in a Wind Tunnel D. Design and Evaluate an Airfoil That Demonstrates Optimal Standards of Drag, Lift, and Velocity E. Understand and Apply Advanced Principles of Aerodynamics to Design an Airfoil That Demonstrates Optimal Aerodynamic Standards			
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9, 10 1-17 1-12,15,16 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10	X. Alternative Energy (2 weeks) A. Use the Alternative Energy Trainer to Conduct Experiments and Demonstrations in Alternative Energy B. Demonstrate the Use of Active Solar Energy C. Use a Solar Oven to Collect, Concentrate, and Convert Sunlight Into Useable Energy D. Understand and Apply the Concept of Wind Turbine to Demonstrate Wind Energy		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2 9.1 9.2	1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4 B1,8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	X. Alternative Energy (continued)			
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9,10 1-17 1-12,15,16 2,3,6,7,8,9,11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4 B1,8,9,10 A1,2,3,4,5 B1,2,3,4,5	XI. Engineering And Stress Analysis (2 weeks) A. Understand and Describe the Concepts of Equilibrium, Stress, Strain, and Deflection B. Demonstrate an Understanding of the Types and Parts of Structures and the Forces That Act Upon Them C. Understand and Describe the Principles of Size, Shape, Strength, and Deflection of Construction Beams D. Test and Evaluate the Stress and Deflection of a Structure Using a Stress Analyzer E. Design, Construct, and Test the Efficiency of a Balsa Wood Structure		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
9.1 9.2	C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	XI. Engineering And Stress Analysis (continued)			
1.2 1. 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2 9.1 9.2	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9, 10 1-17 1-12,15,16 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4 B1,8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	XII. Flight Simulation (2 weeks) A. Identify and Explore the Major Parts of the Airplane and Become Familiar with the Airplane Instrument Panel B. Understand Basic Concepts of and Use the Simulator to Experience Taxiing, Take-off, Straight and Level Flight Landing, and Solo Flying C. Identify the Basic Characteristics of a Jet Engine D. Use the Jet Flight Simulator to Experience Stall, Uncoordinated Flight, and Slip E. Locate, Explain, and Execute Basic Flight Instruments and Maneuvers F. Simulate a Flight Using Flight Controls G. Demonstrate Advanced Flying Skills, Including Advanced Planning and Plotting of a Course, Take-off, Simulated Flying, Communicating, and Landing		X	X
1.2 1.4 3.1	1,2,3,4 2,3 1,6-15	XIII. Plastics (2 weeks) A. Identify and Explore the Properties of Different Plastics		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.2 9.1 9.2	1,3,4,6,7,8,9,10 1-17 1-12,15,16, 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	XIII. Plastics (continued) B. Demonstrate the Use of a Variety of Hand Tools C. Demonstrate the Correct and Safe Use of the Engraving Machine D. Demonstrate the Use of the Injection Molding Machine, Polypropylene, and Dye E. Understand and Apply All Required Safety Procedures			
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9,10 1-17 1-12,15,16 2,3,6,7,8,9, 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19	XIV. Automation And Robotics (2 weeks) A. Understand and Describe the Terms and Industrial Applications of Robotics in Present Day Manufacturing Environments B. Demonstrate an Understanding of the Steps Involved in Initializing, Programming, Editing, and Operating a Robot to Perform Automated Tasks C. Identify Industrial Tasks and Use a Robot Interface to Perform Those Tasks D. Understand and Employ the Commands of Move, Free, Grip, Out, and Jump to Perform Specific Tasks with the Robot		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2 9.1 9.2	3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4 B1,8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3 B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	XIV. Automation And Robotics (continued) E. Write, Execute, and Evaluate Programs for a Robotic Arm for Single and Double Operations F. Identify and Set-up Experiments Using Commands to Perform Specific Operations with a Robot			
1.2 1.4 3.1 3.2 3.3 3.4 4.1 4.3 4.4 4.5 4.6 4.7 4.9 4.12 4.14 5.2 5.4 5.5 8.1 8.2	1,2,3,4 2,3 1,6-15 1,3,5,6,7,8,9,10 1-17 1-12,15,16 2,3,6,7,8,9 11,12,13,14 3,7,10 1,2,3,4 1 1,5,6,10 1,5,6,10,19 3,5,6,13,14 1,9 1 2,3,8,9 1,2,3 1,2,3 A1,3,4 B1,8,9,10 A1,2,3,4,5 B1,2,3,4,5 C1,2,3	XV. Fiber Optics And Lasers (2 weeks) A. Demonstrate the Exchange of Information by Transmitting and Receiving Coded Messages Over a Fiber Optic Link B. Demonstrate the Exchange of Information by Transmitting Voice Messages Using Fiber Optics and Lasers C. Learn the Importance of Using Light to Transmit Human Speech D. Learn About the Exchange of Information Between Computers and Digital Equipment E. Learn About the Three Main Parts of a Laser F. Understand How Light Behaves and the Difference Between Reflection and Refraction		X	X

NJ Core Curriculum Standards/ Grade	Strands & Indicators	Course Outline/Student Objectives	6	7	8
9.1 9.2	B4 A1,2,3,5 B2,3 C1,2,3,4,5,6 D1,2 F1,2,3	XV. Fiber Optics And Lasers (continued)			

NEW JERSEY CORE CURRICULUM CONTENT STANDARDS
CODE SHEET

Standards:

1. Visual and Performing Arts
2. Comprehensive Health & Physical Ed.
3. Language Arts Literacy
4. Mathematics
5. Science
6. Social Studies
7. World Languages
8. Technological Literacy
9. Career Education and Consumer, Family and Life Skills

Strands:

A, B, C, D

CPI (Cumulative Progress Indicators):

1, 2, 3, 4, 5, etc.

Sample:

From the Visual and Performing Arts Core Curriculum Content Standards –

First Standard, then Grade level, then Strand, and last CPI #s

1.1/4A1,2,4

SUGGESTED MATERIALS

PAXTON ACTION LAB

CAD
Plastics
Robotics
Tools and Machines
Structural
Electricity and Electronics
Energy Power and Transportation
Rocketry and Flight
Laser

LAB-VOLT TECH DESIGN

Fiber Optics and Lasers
Aerodynamics
Alternative Energy
Automation and Robotics
Engineering and Stress Analysis
Flight Simulation

TEACHER GENERATED PROJECTS AND MATERIALS

Module Work Stations
Text Books and Manuals
Teacher Generated Projects
Teacher Generated Materials

DESCRIPTION OF MODULES

1. Rocketry and Flight Technology

This module offers students a logical progression of hands-on activities combined with computer software and instructional video tapes in this area of technology. Students assemble the Delta Dart rubber-band powered airplane and progress to the Wizard model rocket.

2. Introductory Laser

Designed to teach students about laser technology, this is an introductory ten day module. Each laser activity is approximately 50 minutes long and has the following format:

- A. Statement of objectives
- B. Listing and assembling
- C. Background information/readings
- D. Lab activity/inquiry
- E. Lab review questions

3. Structural Technology

The study of beams, trusses, and bridges is an integral part of construction technology in today's modern infrastructure. This module covers the building and testing of a variety of beam sections and trusses, which lead to the final challenge of constructing a model bridge.

4. Introductory Electricity and Electronics

The Electricity and Electronics Module provides opportunities for students to explore electricity and electronics. Through the use of pictorial diagrams and a variety of interesting experiments, students explore circuits, transistors, resistors, switches, and lights.

5. Energy, Power, and Transportation Technology

A Briggs and Stratton engine is used as the basis for this module to allow students to understand the working of a four cycle gasoline engine, as well as learn hands-on tool skills. The Technology Module includes all tools and necessary accessories to disassemble and assemble the two horsepower engine.

Students learn about engine basics, cooling systems, and exhaust systems along with a single disk program produced by General Motors to explain the operation of their "Sunraycer" solar powered vehicle.

DESCRIPTION OF MODULES (continued)

5. Energy, Power, and Transportation Technology (continued)

The module also includes a short video to assist students in the disassembly and assembly of the engine.

6. Computer Aided Drafting

CAD is an increasingly important part of communicating ideas in a technical society. The ROBOCAD Program guides students through each activity. It loads drawings and pre-sets the parameters required for each specific lesson. An independent drafting system is also built in so students can further explore drafting and design possibilities.

7. Plastics

The Plastics Module allows students the opportunity to manufacture several projects from a variety of plastic materials and learn about their properties. The projects include an engraved REY FOB, acrylic design, and a student selected injection molded project.

8. Aerodynamic

In this module, students learn how temperature, pressure, and humidity affect the four aerodynamic forces – weight, lift, drag, and gravity. They also study Bernoulli's principle, angle of attack, helicopters, mass flow, lever law, stability and control, viscosity, airfoil theory, and supersonics. Students use a wind tunnel to test a variety of airfoils in the activities they perform.

9. Alternative Energy

This module teaches students the terminology and concepts underlying alternative energy research and development. Among the many concepts students explore are renewable and nonrenewable energy sources, energy conservation systems, wind, and solar energy forms. By analyzing and evaluating the environmental benefits and challenges posed by alternative energy sources, students gain a new understanding of the environmental issues in modern society.

10. Automation and Robotics

In this module, students examine the automatic operation of equipment used in a process. They also learn about the robots used to perform this automatic operation by becoming familiar with the basic parts of a robot and by analyzing how robots make the manufacturing process easier and safer. Students also learn about career options available in the fields of automation and robotics.

DESCRIPTION OF MODULES (continued)

11. Flight Simulation

In this module, students learn about aviation and the fundamentals of flying an airplane. They practice flying in a flight simulator designed to help student pilots learn to fly a plane. Students become familiar with the internal and external parts of an airplane, including the instrument panel, and they practice many different maneuvers in the flight simulator. They learn about the four forces that act on an airplane, jet engines, pilot licensing, and more. Students also learn about the career options available in the aviation industry.

12. Engineering and Stress Analysis

In this module, students learn the concepts of equilibrium, stress, strain, and deflection, Hooke's Law, tension and compression, elongation and shortening, shear and torsion, beam bending and deflection, fatigue and buckling, the Finite Element Method (FEM) as applied to the construction of buildings and bridges. They demonstrate an understanding of the principles of size, shape, strength, and deflection of construction beams under load.

13. Robotics

Robotics provided the opportunity for students to get a better understanding of industrial process and applications. Using a sophisticated five axis robotic arm, students can emulate a number of industrial applications. This module also highlights problem-solving exercises, as well as allowing students to engage in hands-on manipulation and programming.

14. Tools and Machines

Tools and machines may be the most basic of all the technology equipment we see today and perhaps the most important. Without them we could not produce today's sophisticated products and equipment. This hands-on module will allow students to identify and use common hand and power tools through the production of a pen set project.

15. Fiber Optics and Lasers

Fiber optics and lasers introduces students to the principle of fiber optics and laser technology. Students use the module equipment to perform a variety of experiments and demonstrate basic fiber optic and laser communication.