Rapid City Area Schools

Middle School Technology Education Program

Approved by the Board of Education
October 21, 2010
RAPID CITY AREA SCHOOLS
300 6TH Street
Rapid City, South Dakota 57701

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"Technology is Human Innovation in Action"

Technology for All Americans Project

Rational for Technology Education Curriculum Project

The need for technological literacy is supported by these organizations: National Academy of Science, National Academy of Engineering, Institute of Medicine, and the National Research Council.

Technological literacy is a person’s ability to use, manage, and understand technology. It involves citizens having knowledge of the nature, behavior, power, and consequences of technology from a broad perspective. Technological literacy means more than the use of computers and other machines. It involves the factors used in the creation and development of technologies and the impact of technology on society, individuals, and the environment.

Today, the majority of people have few direct, hands-on connections to technology, except as users of finished consumer products. They don’t manufacture the devices they use, or try to improve their performance, nor can they repair them when they break. Due to this lack of engagement, most people rarely develop a realistic, intuitive feel for technology.

Due to the fact that people have very little hands on experiences with technology, technology literacy depends essentially on what they learn in the classroom, particularly in the K-12 schools. Technological literacy depends upon active student involvement. How students are engaged within the learning process in the classroom may provide their only hands-on experiences with technology. These experiences, however limited, are enhanced when technology is integrated across the curriculum. This integrated approach promotes student success as well as self-confidence. Within the Technology Education Program, the modular curriculum approach incorporates other areas of study, including math, science and reading. This cross-curricular approach supports NCLB.

Our world is changing rapidly. We possess the knowledge and ability to understand and appreciate the many advances being made. Technology education will guide students to the level of technological literacy needed to function in today’s society.

Technology Defined

The Technology Education Curriculum Development Committee for the Rapid City Area Schools, following an extensive examination of scholarly work related to technology, has adopted the following as its definition of technology:

Technology is the application of resources and systems to solve practical problems and extend human capabilities.
Introduction

The Middle School and High School Technology Education Curriculum Committee was formed in 2006. The Committee is in charge of reviewing and revising the “6-12 Technology Education Curriculum” in alignment with the South Dakota Technological Literacy Standards and the National Technological Literacy Standards. The committee used relevant research from different national organizations including International Technology and Engineering Educators, Technology for All Americans Project, the National Science Foundation and the National Aeronautics and Space Administration.

Philosophy of Technology Education

A primary goal of education is to offer a curriculum that prepares students for their effective roles in society. Because modern society is increasingly influenced by rapidly advancing technologies, it is absolutely necessary for our citizens to understand technology if they are to function as informed voters, productive workers, and wise consumers of technological products and services.

Technology education focuses on developing the technological literacy of students, regardless of their educational and career goals. All students should have access to the technology education program regardless of their sex, race, religion, disability, or national origin.

Technological problem solving is the fundamental curriculum theme. Action-based laboratory activities, as well as classroom instruction, provide students opportunities to apply the technological method by:

- designing and developing technologies
- using a wide variety of technologies
- develop sustainable green technologies
- controlling technologies
- assessing the impacts of technologies

Technology education is the “great integrator” of knowledge, providing a vital link between technology itself and science and mathematics principles. Its inter-disciplinary nature also helps students apply the social sciences and humanities.
Goals of Technology Education

Technology education is for the learner to become technologically literate and be able to:

- Develop positive strategies and citizenship roles for living in a society that is undergoing rapid technological change.
- Effectively assess and apply authentic resources of: time, people, tools and machines, capital, information, materials, and energy.
- Explore a variety of information related, physical related, and biological related systems.
- Utilize the technological method to research, design, develop, produce, utilize, control, and evaluate solutions to technological problems.
- Demonstrate the appropriate, safe, and creative use of technological tools and processes within technological systems.
- Apply science, mathematics, communications, social studies, arts and humanities to solve practical problems and extend human capabilities.
- Assess the impacts of technology and how human capabilities and environments are altered.
- Apply technological knowledge and activities to career, leisure, and consumer decisions.
- Read, write, present, and interpret technical material.

Facility Upgrade

The classroom and laboratory spaces in both high schools have been partially upgraded to a "Technology Center" concept, with some wrap-up projects still needed. This upgrade will complete a shift in "image" that has proven successful in Rapid City’s middle schools. The changes will improve both versatility and utility of the existing facility. Physical plant remodel needs are:

- **Dakota Middle School**
  - Tech Lab: No Change
- **North Middle School**
  - Tech Lab: No Change
- **South Middle School**
  - Tech Lab: No Change
- **Southwest Middle School**
  - Tech Lab: No Change
- **West Middle School**
  - Tech Lab: No Change
Equipment Purchasing

Delivery must take place well in advance of the start of classes to avoid confusion and disruption of student learning. All equipment purchases will be made in accordance to RCAS purchasing and bid-quote practices.

In order to standardize course offerings at the Middle School level, all 5 MIDDLE SCHOOL (Dakota, North, South, Southwest, and West) schools will be purchasing the following equipment.

- Synergy Modules
- Copiers
- Vinyl Cutter
- 3D Printers
- 5 Seats of Pinnacle software
- Text Books

Technology Education Curriculum Implementation Timelines

Implementation of this curriculum shall follow this timeline:

- Jan-August, 2010   Curriculum Writing
- August 10, 2010    Draft complete
- August 24, 2010    Instructional Council meetings
- Sept, 28, 2010     
- Sept, 2010         Open Forums
- May, 2011          Board of Education approval
- Summer, 2011       Purchase orders due (Middle School)
- August, 2011       Staff Development and In-service training
- August, 2011       Implementation (Middle School)
Evaluation Methods for Technology Education Courses

Student work in Technology Education courses is evaluated and graded according to the following components:

**Knowledge** includes: Written summative assessment, written reports, technical vocabulary, project reports, and other authentic assessments related to core academic standards.

**Application** includes: Laboratory activities and projects

**Productivity** includes: Use of time, care of facilities, laboratory safety, cooperation, following work procedures

**Technology Student Portfolio**: (high school) including: an electronic student resume, a personal goal statement with regard to technology study, scores and samples of the student's work, an exit statement relating completed course work to the student's personal goals.

Articulation

The intent of articulation for this technology education curriculum is to more fully align the high school and middle school programs. Representatives from post high school education have been contacted to pursue a more specific degree of articulation with Technology Education program. The cooperative articulation between Rapid City high schools and local post high school instructors will be in this manner.

Black Hills State University  --  Foundations of Technology
Graphic Communications
Manufacturing Systems

SD School of Mines and Technology  --  Principles of Engineering
Electronic and Energy Systems
Manufacturing Systems

Western Dakota Technical Institute  --  Construction Systems
Electronic Systems
Graphic Communications
Manufacturing Systems
Teacher Training and In-service

This curriculum is intended to produce a teaching/learning environment that can readily accommodate change. The teaching professionals can combine their technical understanding with the quality human interaction that is needed by students.

Facilitating a knowledge-intensive and diverse discipline requires that professional educators are exemplary learners. They also strive to become managers of a broad-based learning environment. Technology teachers access current information; it is crucial to have access to professional conferences dealing with technology transfer and effective teaching methods. Because technology is the integrator of knowledge, technology teachers also need access to in-service training in areas such as mathematics, science, computing, and information systems.

Elementary Technology Education Curriculum

In the elementary years, technology education should be designed to help students learn and achieve the educational goal of the total elementary curriculum. Beginning in kindergarten, technology education can provide the kind of active learning that children need and enjoy. These experiences develop the students’ perceptions and knowledge of technology, psychomotor skills, and provide a basis for informed attitudes about the interrelationships of technology, society, and the environment.

By integrating technology education into the existing elementary curriculum, the information the students receive will help to foster the growth and development of technological literacy at the k-5 level by being an active resource. A primary goal is to develop strategies and activities that utilize technology education to improve teaching and learning in the core content areas at the elementary level.
Middle School Technology Education Curriculum
Technology education is a continuously evolving academic area. Due to this fact we will address the standards to meet the objectives.

Framework
For Technology Education in Rapid City's Middle Schools

- A required 7.5-9 week course for all Grade 6 students
  (Modular delivery system)
- A 9-12 week course for selected Grade 7 students
  (Modular delivery system)
- An 18 week elective course for Grade 8 students
  (Modular delivery system)

Sixth Grade Technology Module Descriptions and Standards Addressed
We are currently addressing Standards for Technological Literacy (STL), South Dakota Educational Technology Standards (SDTES), and Technology Education Middle School (TEMS) standards. Due to the NCLB requirements we are currently in the process of implementing math and reading standards into the module curriculum.

6th 2-DIMENSION
In the 2-Dimension Module, students will sketch and trace two-dimensional blocks and patterns. Students will design, layout and construct a pattern of a storage container. They will also become familiar with T-Squares and 45-degree triangles.

STL Standard 11: Benchmark I
STL Standard 20: Benchmark F, H
SDETS 6.NC.3.1
SDETS 6.NC.4.1
SDETS 6.CP.2.1
TEMS 3.1
TEMS 3.3
6th 3 – DIMENSION
In the 3-Dimension Module, students will sketch and trace three-dimensional blocks and patterns. Students will design a futuristic transportation vehicle using an alternate energy source.

STL Standard 11: Benchmark H
STL Standard 17: Benchmark J
SDETS 6.NC.3.1
SDETS 6.NC.4.1
SDETS 6.CP.2.1
TEMS 4.4
TEMS 3.1
TEMS 3.2

6th CAD
In the Computer Aided Design Module, students use a computer-aided drafting program to explore the fundamentals of 3 dimensional design. Students will learn how to draw, extrude, dimension, color, and assemble different object parts that they draw.

STL Standard 6: Benchmark D
STL Standard 8: Benchmark E, F
STL Standard 9: Benchmark H
SDETS 6.NC.1.1
SDETS 6.CP.2.1
TEMS 4.4
TEMS 3.1

6th FLIGHT
In this module students will learn the fundamental process of flight. They will learn the scientific principles behind flight and learn why planes fly. They will also learn about where paper comes from and how it is manufactured. Students will be interacting with a computer software package and follow steps to design paper airplanes that demonstrate principles of flight.

STL Standard 7: Benchmark F
STL Standard 18: Benchmark G
SDETS 6.NC.1.1
SDETS 6.IL.1.1
TEMS 2.1
TEMS 3.1
6th GRAPHIC COMMUNICATIONS
In this module students learn the fundamentals of drafting and communication of technical information. Students will also learn to use the related tools (drawing board, scale, triangles, and T square) needed to complete various drawings such as orthographic projections. Design and measurement skills are also emphasized.

STL Standard 8: Benchmark E, F
STL Standard 17: Benchmark H, J
SDETS 6.NC.4.1
TEMS 3.1
TEMS 4.4

6th LASER ENGRAVING
In this module students learn the fundamentals of laser processing and computer controls. Students will transform images or drawings on their computer screen into real items made out of a variety of materials, such as, wood, plastic. Students will use the design process to design a key chain and a desk sign.

STL Standard 1: Benchmark F,H
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 6.NC.4.1
SDETS 6.CT.1.1
TEMS 3.1
TEMS 3.2

6th MANUFACTURING
In this module students will learn how a product is made. Students will use a rotator, stripper, and puncher to make a desired product. Students will have a goal (desired product), that needs to be produced with the least amount of machines.

STL Standard 11: Benchmark H, L
STL Standard 12: Benchmark H, J
STL Standard 18: Benchmark F, G
SDETS 6.NC.1.1
SDETS 6.NC.4.1
TEMS 2.1
TEMS 3.1
6th MEASUREMENT
In the measurement module, students will learn basic terminology, and how to read and record linear measurement. This module also details how to read halves, fourths, eight and sixteenths of an inch using a fractional inch ruler. Students will also learn how to reduce fractions to their lowest term.

STL Standard 3: Benchmark f
STL Standard 7: Benchmark E, F
SDETS 6.NC.1.1
SDETS 6.CT.2.2
TEMS 4.4
TEMS 3.1

6th PLASTICS
In the plastics module, students will learn about plastics basics. Students will be introduced to power tool and hand tool safety, and how to use basic filing, sanding and buffing techniques. Students will complete a plastic key chain as a hands-on project.

STL Standard 19: Benchmark H, I, K
SDETS 6.NC.2.1
SDETS 6.NC.3.1
TEMS 3.1
TEMS 3.3
TEMS 4.6

6th PNEUMATICS
In the pneumatics module, students will explore the functions of compressed air elements as they build and operate simple models. Students will discover the operations of pneumatic systems, and work with first, second, and third class levers. Students will also learn about basic concepts of fluid power and the scientific principles behind it.

STL Standard 6: Benchmark D, E
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H, K
SDETS 6.NC.1.1
SDETS 6.NC.2.1
SDETS 6.NC.3.1
TEMS.3.2
TEMS.4.3
6th PROBLEM SOLVING
In the problem solving module, students will experiment with basic principles of physical science within the context of an engaging game. The students will solve interactive science puzzles as they play the game, dealing with several areas of physical science and learning through experimentation and observation. They will also develop and use important thinking skills and strategies along with reading blueprints that provide in-depth information that compares different types of parts that will help get the fastest vehicle.

STL Standard 2: Benchmark H
STL Standard 3: Benchmark D
STL Standard 16: Benchmark E, F
SDETS 6.NC.4.1
TEMS 4.3
TEMS 2.1
TEMS 3.1
TEMS 3.3

6th ROBOTICS
In the robotics module, students will learn about the basic parts of the mars rover while using an interactive web site. Students will also learn about the planet mars and how space rovers work and utilize robotics.

STL Standard 1: Benchmark F, H
STL Standard 3: Benchmark D, E
STL Standard 6: Benchmark E
SDETS 6.NC.1.1
TEMS.3.1
TEMS.3.2
TEMS.4.5

6th ROCKETS
In the rockets module the students will learn the history of rockets and how they are used today. They will learn what rockets are doing in space. They will also learn how to build a rocket that they will launch.

STL Standard 2: Benchmark F
STL Standard 7: Benchmark F
STL Standard 18: Benchmark G
SDETS 8.NC.1.1
SDETS 8.IL.1.1
TEMS 2.2
TEMS 3.2
TEMS 4.1
6th SIMPLE MACHINES
In the simple machines module, students will experiment and use levers, incline planes, wheels, wedges and pulleys. Students will understand the principles of pulleys and gears to include, direction, speed, power and rotation. Students will also study fluid powers to include, pneumatics, hydraulics, single acting cylinder, double acting cylinder and pressure.

STL Standard 2: Benchmark H
STL Standard 3: Benchmark D
STL Standard 16: Benchmark E, F
SDETS 6.NC.4.1
TEMS.4.2

6th STRUCTURES
In the structures module, students will learn about tunnels, domes, dams bridges and skyscrapers. Students will learn about and experiment with torsion, tension, twisting, forces, compression, stretching and bending. Students will also learn about different types of materials and give examples of strengths, weaknesses and applications for each of these materials.

STL Standard 11: Benchmark H, L
STL Standard 12: Benchmark H, J
STL Standard 18: Benchmark F, G
SDETS 6.NC.3.1
TEMS 2.1
TEMS 2.2
TEMS 2.3

6th WOOD MANUFACTURING
In the wood manufacturing module, students will learn about basic woodworking. Students will be introduced to lumbering, wood products, wood cutting principles along with power and hand tool safety. A variety of power and hand tools will be used in this module to manufacture a wall shelve.

STL Standard 1: Benchmark F, H
STL Standard 8: Benchmark E, F
STL Standard 11: Benchmark H, L
SDETS 6.NC.2.1
SDETS 6.NC.3.1
TEMS.3.3
TEMS.4.1
TEMS.4.7
Seventh Grade Technology Module Descriptions and Standards Addressed

We are currently addressing Standards for Technological Literacy (STL), South Dakota Educational Technology Standards (SDTES), and Technology Education Middle School (TEMS) standards. Due to the NCLB requirements we are currently in the process of implementing math and reading standards into the module curriculum.

7th AUDIO BROADCASTING
In this module students will experience the important medium of radio and produce a radio broadcast. Students learn how to operate common electronic equipment found in most studios, record several announcements and stories, and assemble the recorded pieces into a sample broadcast. Students will also learn about radio waves and how sound is sent from stations to peoples radios in their homes and automobiles miles away.

STL Standard 4: Benchmark G
STL Standard 10: Benchmark F
STL Standard 17: Benchmark H
SDETS 7.NC.3.1
SDETS 7.CT.2.2
SDETS 7.CP.2.1
TEMS.3.1
TEMS.3.3
TEMS.4.4

7th CAD
In the computer aided design module, students use a computer-aided drafting program to explore the fundamentals of 3 dimensional design. Students will learn how to draw, extrude, dimension, color, and assemble different object parts that they draw.

STL Standard 6: Benchmark D
STL Standard 8: Benchmark E, F
STL Standard 9: Benchmark H
SDETS 7.NC.1.1
SDETS 7.NC.3.1
SDETS 7.CP.2.1
TEMS 2.2
TEMS 3.1
TEMS 3.2
**7th DIGITAL PHOTOGRAPHY**

In the digital photography module students learn the basic principles of photographic composition, technique, and design through the use of a color digital camera and computer software. They capture and download images using a digital camera and then use the computer to edit, manipulate, enhance and print their own original photographs.

STL Standard 1: Benchmark F
STL Standard 17: Benchmark J
SDETS 7.NC.3.1
SDETS 7.CT.2.2
SDETS 7.CT.2.3
TEMS.3.1
TEMS.3.3
TEMS.4.4

**7th FLIGHT TECHNOLOGY**

In the flight technology module, students learn the principles of flight. They use computer flight simulator to experience piloting an aircraft. Students are introduced to navigation as they plot a course using angular measurement and mathematical computation.

STL Standard 3: Benchmark D
STL Standard 6: Benchmark D
SDETS 7.NC.3.1
SDETS 7.S.2.1
TEMS.4.2
TEMS.3.2
TEMS.3.3

**7th GRAPHIC COMMUNICATION**

In this module students learn the fundamentals of drafting and communication of technical information. Students will also learn to use the related tools (drawing board, scale, triangles, and T square) needed to complete various drawings such as orthographic projections. Design and measurement skills are also emphasized.

STL Standard 8: Benchmark E, F
STL Standard 17: Benchmark H, J
SDETS 7.NC.4.1
SDETS 7.CT.2.1
SDETS 7.CT.2.3
SDETS 7.CP.1.1
TEMS.3.2
TEMS.4.4
7th METAL FABRICATION
In the metal fabrication module students will make useful and attractive projects that parents can be proud to display in their homes. While constructing the projects students use measuring skills and gain experience bending, rolling and punching metal.

STL Standard 12: Benchmark I
STL Standard 19: Benchmark I, J
SDETS 7.NC.3.1
SDETS 7.NC.4.1
SDETS 7.CT.2.3
SDETS 7.CP.2.1
TEMS.4.6

7th PLASTICS
In this module students learn about the major types of plastics, the processes used to form them into useful consumer products, and the methods used to recycle plastic products into reusable raw materials. Then, they apply their problem-solving and design skills to hand-on activities to create take-home products.

STL Standard 12: Benchmark H, I
STL Standard 19: Benchmark I, J
SDETS 7.NC.3.1
SDETS 7.NC.4.1
SDETS 7.CT.2.3
SDETS 7.CP.2.1
TEMS 4.6
TEMS 4.7
TEMS 4.1

7th POWER TRANSPORTATION
In the power and transportation module, students will be introduced to the fundamentals of the automobile. In addition to learning about automobiles, basic tool skills, and use of fasteners are covered in this module. Students will also learn about a transportation system and how it is made up of subsystems such as structural, propulsion, suspension, guidance, control, and support.

STL Standard 10: Benchmark H
STL Standard 16: Benchmark H
SDETS 7.NC.2.1
SDETS 7.NC.3.1
TEMS 4.1
TEMS 4.6
7th ROBOTICS
In this module, students will progress through activities designed to teach programming, behaviors, systems, control, sensors, feedback, and more. Along the way, they address key technology and science concepts.
STL Standard 2: Benchmark H, J
STL Standard 12: Benchmark J
STL Standard 15: Benchmark G
SDETS 7.NC.2.1
SDETS 7.NC.3.1
SDETS 7.S.2.1
TEMS 4.2
TEMS 1.2
TEMS 2.3
TEMS 4.1

7th SIMPLE MACHINES
In the simple machines module, students explore how work, force, energy, and machines make moving objects easier through use of the computer and hands-on activities. They use variables and equations to describe the principles of simple machines. Students use the information they learn about simple machines to design a compound machine that moves an object.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 7.NC.2.1
SDETS 7.NC.4.1
TEMS 4.2

7th WEATHER
The weather module begins from a global perspective by including circulation and weather patterns and moves to local weather system investigation. Students see the relevance of this module daily as their local weather changes. They learn how their local weather is predicted of forecast on the news and how weather patterns of a global nature can influence their everyday lives. Students also keep daily records of weather data such as temperature, pressure, and wind direction.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 7.NC.3.1
SDETS 7.IL.2.1
TEMS 1.2
TEMS 2.2
TEMS 2.3
7th WOOD FABRICATION
In the wood manufacturing module, students will learn about the various manufacturing processes required to turn raw materials into usable products. They will manufacture a box out of five different wood materials. A variety of power and hand tools will be used along with power and hand tool safety.

STL Standard 12: Benchmark I
STL Standard 20: Benchmark F
SDETS 7.NC.3.1
SDETS 7.NC.4.1
SDETS 7.CT.2.3
SDETS 7.CP.2.1
TEMS 4.6
TEMS 4.7
TEMS 4.1

7th PROBLEM SOLVING
In the problem solving module, students will gain experience using on how logic gates and circuits work using an interactive computer program. They will also learn about inputs, controllers, outputs and check valves along with learning how widgets can be used to solve problems. They will be constructing a super second calculator, number guesser, probability tester, random color generator and a data mixer.

STL Standard 2: Benchmark D, E
STL Standard 12: Benchmark A, F
SDETS 7.NC.2.1
SDETS 7.NC.4.1
TEMS 3.1
TEMS 3.2
Eighth Grade Technology Module Descriptions and Standards Addressed

We are currently addressing Standards for Technological Literacy (STL), South Dakota Educational Technology Standards (SDTES), and Technology Education Middle School (TEMS) standards. Due to the NCLB requirements we are currently in the process of implementing math and reading standards into the module curriculum.

8th 3D DESIGN
In the 3D design module, students use a computer-aided drafting program to explore the fundamentals of 3 dimensional design. Students will learn how to draw, extrude, dimension, color, and assemble different object parts that they draw.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.3.1
SDETS 8.NC.4.1
SDETS 8.CT.2.3
TEMS 2.2
TEMS 3.1
TEMS 3.2

8th ALTERNATIVE ENERGY
In this module students explore the basic concepts of energy, as well as the law of conservation of energy. Information is presented about renewable and nonrenewable energy sources and how these resource types are important for meeting global energy demands.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.2.1
SDETS 8.NC.3.1
SDETS 8.NC.4.1
TEMS 4.2
**8th ARCHITECTURE**

In the architecture module, students will use an architectural software program to design a floor plan. The floor plans are based on standards for architectural drawings. During the design process students will be able to see their floor plan in a 3 dimensional perspective.

STL Standard 1: Benchmark F  
STL Standard 10: Benchmark H  
STL Standard 12: Benchmark H  
SDETS 8.NC.2.1  
SDETS 8.NC.3.1  
SDETS 8.CT.2.1  
TEMS.4.6

**8th CAREERS**

In this module students will explore careers through the use of the Occupational Outlook Handbook and a computer program. As students work through various activities, they begin to build a portfolio of information that is relevant to the specific careers that interest them. Students will gain insight into the many opportunities that await them when they enter the world of work.

STL Standard 1: Benchmark F  
STL Standard 10: Benchmark H  
STL Standard 12: Benchmark H  
SDETS 8.NC.3.1  
SDETS 8.CP.2.1  
SDETS 8.IL.1.1  
TEMS.4.4

**8th COMPUTER GRAPHICS and ANIMATION**

In computer graphics and animation, students learn how the use of computers can enhance products created by professional artists and animators. With the use of a computer and related software, students produce an animated sequence using bendable cartoon figures. Students use a digital camera to capture a picture and create an animated project. Students also explore 3-D animation and create an animated 3-D movie.

STL Standard 1: Benchmark F  
STL Standard 10: Benchmark H  
STL Standard 12: Benchmark H  
SDETS 8.NC.3.1  
SDETS 8.NC.4.1  
TEMS.3.1  
TEMS.3.2  
TEMS.4.7
8th CNC MILL
In the CNC mill module, students are introduced to CNC manufacturing by using a computer numeric controlled tabletop mill. Students learn how to program the mill by using pre-drawn picture art.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.4.1
SDETS 8.CT.2.3
TEMS 4.1
TEMS 4.3

8th DIGITAL VIDEO
In the digital video module students will learn the basic principles of digital video and audio composition, technique, and design through the use of a digital camcorder and computer software. They will generate ideas for effective video communications, write a script, design a video layout, complete the filming process and then capture and download images using the computer to edit, manipulate, enhance and create their own digital videos.

STL Standard 1: Benchmark F
STL Standard 9: Benchmark G
STL Standard 17: Benchmark J
SDETS: 8.NC.4.1
SDETS: 8.CT.2.1
SDETS: 8.CT.2.3
TEMS.3.1
TEMS.3.3
TEMS.4.4

8th ECO-ARCHITECTURE
In the eco-architecture module, students explore what is needed for complete off-the-grid living. They learn how the architecture (or “biotecture”) of a home can provide a family with sustainable living that is comfortable and Earth friendly.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.2.1
SDETS 8.NC.3.1
SDETS 8.CT.2.1
TEMS.4.6
8th ELECTRICITY
This module will introduce the student to electricity, how to stay safe while working with electricity, and how to construct and fault-find electrical circuits. Students will discover how to use professional test equipment, like that used by electricians.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.2.1
SDETS 8.CT.3.1

8th ENERGY, POWER and MECHANICS
When students complete energy, power and mechanics, they have a basic understanding of energy sources, the principles of power technology, and the concept of mechanical advantage and machines. Students see how fluids can be used with other simple machines. Using educational instruments, students learn the fundamentals of gears, fluid mechanics, and three classes of levers. Students also use a solar hot dog cooker and experience the concept of wind power.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 7.NC.2.1
SDETS 7.NC.4.1
TEMS.4.2

8th ENGINEERING BRIDGES
In the engineering bridges module, students solve an engineering problem as a team. The students' task will be to build a balsa bridge that spans a space and holds the most weight before breaking. Students must follow certain rules while building their bridges. Students learn the relationships between design, structure, and strength of the bridge. Students will also learn valuable engineering concepts and principles.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.3.1
SDETS 8.NC.4.1
TEMS.3.1
TEMS.3.2
TEMS.4.7
8th GREEN MACHINE
According to the Best Foot Forward group, the average American’s carbon footprint shows that 34% of the emissions produced are accounted for by personal travel. In the green machines module, the effects of personal travel on the environment are explored. While it would be unrealistic to imagine eliminating travel from our society, we can make smart buying choices regarding cars and fuel. Car types, car companies, fuel types, and alternative methods of travel are identified and examined. Finally, students are introduced to the concept of climate change and how the transportation of food and goods has contributed to this problem.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.3.1
SDETS 8.NC.4.1
TEMS.3.1
TEMS.3.2
TEMS.4.7

8th HOME MAKEOVER
Students in the home makeover module will put math skills to use as they plan an addition to a home. Students learn the basics involved in financing a home, designing roofs, building trusses, purchasing Sheetrock and floor covering, and calculating the amount of roofing, interior paint, and siding needed for the home’s exterior.

STL Standard 10: Benchmark H
SDETS 8.NC.2.1
SDETS 8.NC.3.1
TEMS 3.2
TEMS 4.1

8th LASER ENGRAVING
In this module students learn the fundamentals of laser processing and computer controls. Students will transform images or drawings on their computer screen into real items made out of a variety of materials, such as, wood, plastic, fabric, paper, glass, stone and ceramics.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.4.1
SDETS 8.CT.2.3
TEMS 3.1
TEMS 3.2
TEMS 4.1
8th LIGHT and LASER
In the lights and lasers module, students explore various aspects of light and lasers. Students perform activities that provide examples of how technology can be used. They used geometric concepts to divide and reflect a laser beam into desired paths. Non-laser light is explored and manipulated through experiments that use lenses, prisms, filters, and intensity meters. The data from these experiments is analyzed and interpreted to provide a clearer picture of the nature of light.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.2.1
SDETS 8.NC.3.1
TEMS 2.2
TEMS 2.3
TEMS 4.6

8th MACHING METALS
In this module the students will learn how to select cutting tools for machining metals. They will also learn how set-up a small metal lathe and machine (or cut the metal) to design specifications. Design specifications will be checked using micrometers and dial indicators.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.3.1
SDETS 8.NC.4.1
TEMS.4.5
TEMS.4.6

8th MANUFACTURING (pen)
In the pen manufacturing module, students will use a mini lathe to manufacture a pen or mechanical pencil. They will learn proper lathe setup, tooling techniques, sanding, finishing, and assembly of the take home project.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.3.1
SDETS 8.NC.4.1
TEMS 4.1
TEMS 4.6
TEMS 4.7


8th **MEASUREMENT**
In the measurement module, students will learn basic terminology, how to read and record linear measurement. This module also details how to read halves, fourths, eight and sixteenths of an inch using a fractional inch ruler. Students will also learn how to reduce fractions to their lowest term. Advanced measuring devices such as a micrometer and dial caliper will be used to measure items to one thousandths of an inch.

STL Standard 2: Benchmark H
STL Standard 3: Benchmark D
STL Standard 16: Benchmark E, F
SDETS 6.NC.4.1
TEMS 3.1
TEMS 4.7

8th **METAL PRODUCTION**
In the metal production module, students will be introduced to the concepts of beginning metalworking. Students will be introduced to sheet metal design, layout, cutting, bending, and spot welding techniques to produce a take-home product.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.3.1
SDETS 8.NC.4.1
TEMS 3.1
TEMS 4.1

8th **NAVIGATION AND GPS**
This module provides an introduction to navigation and GPS. Students will explore different ways to navigate, including the use of a GPS receiver. Students will also learn how to read grid systems, a compass, different types of map and a GPS receiver.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.2.1
SDETS 8.CT.3.1
TEMS 4.4
8th PACKAGE DESIGN
In package design, students design and construct a package for a specified product. They explore spatial relationships as well as transformations and use rotations, reflections, and translations to create tessellations used as graphics for packages. Students select the package’s shape based on appearance and practicality and design packages to conserve as much material and space as possible. Students also explore how transformations can be used in art.

STL Standard 8: Benchmark E, F
STL Standard 17: Benchmark H, J
SDETS 7.NC.4.1
SDETS 7.CT.2.1
SDETS 7.CT.2.3
SDETS 7.CP.1.1
TEMS.3.2
TEMS.4.4

8th PLASTICS AND POLYMERS
In the plastics and polymers module, students explore several types of polymers, including plastics. Students explore the basic concepts of atoms, molecules, and compounds. This enables students to better understand the properties of the plastics and polymers they create and manipulate. Students create, mold recycle, and form various polymers. These activities provide a better understanding of the usefulness and limitations of the materials.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.4.1
SDETS 8.CT.3.1
TEMS.1.2
TEMS.2.1
8th PRACTICAL SKILLS
In the practical skills module, students learn to identify common tools and their uses. They will be introduced to the history of measuring systems, and follow directions to assemble prefabricated furniture. One important skill would be to recognize situations when it would be best to call in a professional to help them solve the problem.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.2.1
SDETS 8.NC.3.1
TEMS.4.1
TEMS.4.7

8th RESEARCH and DESIGN
In the research and design module, students design, manufacture, and race a model CO2 powered dragster car. Students design their car to meet certain specifications and limitations so that it qualifies as a legal car on race day. They learn the concepts and terms in the design process as well as gain an understanding of lift and drag on an object.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.4.1
SDETS 8.IL.1.1
TEMS 1.1
TEMS 1.2
TEMS 4.4

8th ROBOTICS
In the robotics module, students learn about the fascinating role that robots play in their lives. More and more, this technology is helping to improve the way we live and manufacture items. Students learn how to operate, program, and use robots in different environments. Initially, each student learns to manipulate the robot and program it to conduct repeatable tasks.

STL Standard 1: Benchmark F
STL Standard 10: Benchmark H
STL Standard 12: Benchmark H
SDETS 8.NC.2.1
SDETS 8.NC.3.1
SDETS 8.CT.2.3
TEMS 2.2
TEMS 2.3
TEMS 4.6
**8th ROCKETRY AND SPACE**
This In the rocketry and space module students learn about the development of rocketry and the United States space program and its history. The principles of rocket design, propulsion, and certain scientific principles that are fundamental to successful rocket flight are important concepts in this module. Students construct and launch a model rocket as a means of bringing application to the scientific concepts presented.

STL Standard 2: Benchmark F  
STL Standard 7: Benchmark F  
STL Standard 18: Benchmark G  
SDETS 8.NC.1.1  
SDETS 8.IL.1.1  
TEMS 2.2  
TEMS 3.2  
TEMS 4.1

**8th ROCKET SCIENCE**
In rocket science the students will learn Newton’s laws of motion. They will apply these laws by designing, building and flying a pop bottle rocket. The bottle rocket will be propelled by pneumatic pressure. The pressure will be supplied by a bicycle pump.

STL Standard 11: Benchmark I  
STL Standard 19: Benchmark F  
STL Standard 19: Benchmark H  
SDETS 8.NC.4.1  
SDETS 8.IL.1.1  
TEMS.3.1  
TEMS.3.2

**8th SIGN DEVELOPMENT**
In this module students will be a designer for a sign company. They will use the design process to design a room sign for their room. They will learn how to safely operate a handheld router to fabricate their sign. They will also learn the basic operations of a 3-D engraver to electronically design and manufacture a house sign for their home.

STL Standard 11: Benchmark I  
STL Standard 19: Benchmark F  
STL Standard 19: Benchmark H  
SDETS 8.NC.4.1  
SDETS 8.IL.1.1  
TEMS 2.2  
TEMS 3.2  
TEMS 4.1
**8th SMALL ENGINES**

In this module students are introduced to the history, theory, and applications of engines. Students will learn shop and equipment safety, basic operating principles, parts, and tools - all through practical hands-on experiences with a common four-stroke motor.

STL Standard 1: Benchmark F  
STL Standard 10: Benchmark H  
STL Standard 12: Benchmark H  
SDETS 8.NC.3.1  
SDETS 8.NC.4.1  
TEMS.4.2

**8th WOOD PRODUCTION**

This module covers many of the concepts of beginning woodworking. Students will be introduced to softwoods, hardwoods, plywood, board foot, wood joints, glues, wood finishes, and power tool safety. The students will build a trinket box out of poplar. Students follow step-by-step directions, which include measuring, cutting with a band saw, gluing and clamping, installing hinges, and staining.

STL Standard 1: Benchmark F  
STL Standard 10: Benchmark H  
STL Standard 12: Benchmark H  
SDETS 8.NC.3.1  
SDETS 8.NC.4.1  
TEMS 4.6  
TEMS 4.7  
TEMS 4.1
Standards for Technological Literacy

Technological Literacy is for all Americans. Our professional organization, International Technology Education Association (ITEA) has developed 20 National Standards for Technological Literacy. The first 13 standards and related benchmarks apply to all disciplines. We incorporate standards 1-13 and related benchmarks into lab presentations and classroom activities. Standards 14 – 20 are application-based. We incorporate these standards in our modular learning environment. We do not prepare specific activities for the first 13 standards, but incorporate them into our lab presentations and classroom activities.

The Nature of Technology

Standard 1: Students will develop an understanding of the characteristics and scope of technology.

Benchmarks: Grades K-8

A. Natural world and human-made world are different
B. All people use tools and techniques to help them do things
C. Things found in nature differ from things that are human-made in how they are produced and used
D. Tools, materials and skills are used to make things and carry out tasks
E. Creative thinking and economic and cultural influences shape technological development
F. New products and systems can be developed to solve problems or to help do things that could not be done without technology
G. The development of technology is a human activity and is the result of individual or collective needs and the ability to be creative
H. Technology is closely linked to creativity, which has resulted in innovation.
I. Corporations can often create demand for a product by bringing it onto the market and advertising it

Standard 2: Students will develop an understanding of the core concepts of technology.

Benchmarks: Grades K-8

A. Some systems are found in nature, and some are made by humans
B. Systems have parts of components that work together to accomplish a goal
C. Tools are simple objects that help human’s complete tasks
D. Different tools are used in making things
E. People plan in order to get things done
F. A subsystem is a system that operates as a part of another system
G. When parts of a system are missing, it may not work as planned
H. Resources are the things needed to get a job done, such as tools and machines, materials, information, energy, people, capital, and time
I. Tools are used to design, make, use, and assess technology
J. Materials have many different properties
K. Tools and machines extend human capabilities, such as holding, lifting, carrying, fastening, separating, and computing
L. Requirements are the limits to designing or making a product or system
M. Technological systems include input, processes, output, and, at times, feedback
N. Systems thinking involves considering how every part relates to others
O. An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback
P. Technological systems can be connected to one another
Q. Malfunctions of any part of a system may affect the function and quality of the system
R. Requirements are the parameters placed on the development of a product or system
S. Trade-off is a decision process recognizing the need for careful compromises among competing factors
T. Different technologies involve different sets of processes
U. Maintenance is the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its capability
V. Controls are mechanics or particular steps that people perform using information about the system that causes systems to change

**Standard 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.**

**Benchmarks: Grades K-8**

A. The study or technology uses many of the same ideas and skills as other subjects
B. Technologies are often combined
C. Various relationships exist between technology and other fields of study
D. Technological systems often interact with one another
E. A product, system, or environment developed for one setting maybe applied to another setting
F. Knowledge gained from other fields of study has a direct effect on the development of technological products and systems
Technology and Society

Standard 4: Students will develop an understanding of the cultural, social, economic, and political effects of technology.

Benchmarks: Grades K-8

A. The use of tools and machines can be helpful or harmful
B. When using technology, results can be good or bad
C. The use of technology can have unintended consequences
D. The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use
E. Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences
F. The development and use of technology poses ethical issues
G. Economic, political, and cultural issues are influenced by the development and use of technology

Standard 5: Students will develop an understanding of the effects of technology on the environment.

Benchmarks: Grades K-8

A. Some materials can be reused and/or recycled
B. Waste must be appropriately recycled or disposed of to prevent unnecessary harm to the environment
C. The use of technology affects the environment in good and bad ways
D. The management of waste produced by technology systems is an important societal issue
E. Technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems
F. Decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another
G. Humans can devise technologies to conserve water, soil, and energy through such techniques as reusing, reducing, and recycling
H. When new technologies are developed to reduce the use of resources, considerations of tradeoffs are important
Standard 6: Students will develop an understanding of the role of society in the development and use of technology.

Benchmarks: Grades K-8

A. Products are made to meet individual needs and wants
B. Because people's needs and wants change, new technologies are developed, and old ones are improved to meet those changes
C. Individual, family, community, and economic concerns may expand or limit the development of technologies
D. Throughout history, new technologies have resulted from the demands, values, and interests or individuals, businesses, industries, and societies
E. The use of inventions and innovations has led to changes in society and the creation of new needs and wants
F. Social and cultural priorities and values are reflected in technological devices
G. Meeting societal expectations is the driving force behind the acceptance and use of products and systems

Standard 7: Students will develop an understanding of the influence of technology on history.

Benchmarks: Grades K-8

A. The way people live and work has changed throughout history because of technology
B. People have made tools to provide food, to make clothing, and to protect themselves
C. Many inventions and innovations have involved by using slow and methodical processes of tests and refinements
D. The specialization of function has been at the heart of many technological improvements
E. The design and structures for service or convenience have involved from the development of techniques for measurement, controlling systems, and understanding of spatial relationships
F. In the past, an invention or innovation was not usually developed with the knowledge of science
Design

Standard 8: Students will develop an understanding of the attributes of design.

Benchmarks: Grades K-8

A. Everyone can design solutions to a problem
B. Design is a creative process
C. The design process is a purposeful method of planning practical solutions to problems
D. Requirements for a design include such factors as a desired elements and features of a product or a system or the limits that are placed on the design
E. Design is a creative planning process the leads to useful products and systems
F. There is no perfect design
G. Requirements for a design are made up of criteria and constraints

Standard 9: Students will develop an understanding of engineering design.

Benchmarks: Grades K-8

A. The engineering design process includes identifying a problem, looking for ideas, developing solutions, and sharing solutions with others
B. Expressing ideas to others verbally and through sketches and models is an important part of the design process
C. The engineering design process involves defining a problem, generating ideas, selecting a solution, testing the solution(s), making the item, evaluating it, and presenting the results
D. When designing an object, it is important to be creative and consider all ideas
E. Models are used to communicate and test design ideas and processes
F. Design involves a set of steps, which can be performed in different sequences and repeated as needed
G. Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum
H. Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions
Standard 10: Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Benchmarks: Grades K-8

A. Asking questions and making observations helps a person to figure out how things work
B. All products and systems are subject to failure. Many products and systems, however, can be fixed
C. Troubleshooting is a way of finding out why something does not work so that it can be fixed
D. Invention and innovation are creative ways to turn ideas into real things
E. The process of experimentation, which is common in science, can also be used to solve technological problems
F. Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system
G. Invention is a process of turning ideas and imagination into devices and systems
   Innovation is the process of modifying an existing product or system to improve it
H. Some technological problems are best solved through experimentation
Abilities of a Technological World

Standard 11: Students will develop abilities to apply the design process.

Benchmarks: Grades K-8

A. Brainstorm people's needs and wants and pick some problems that can be solved through the design process
B. Build or construct an object using the design process
C. Investigate how things are made and how they can be improved
D. Identify and collect information about everyday problems that can be solved by technology, and generate ideas and requirements for solving a problem
E. The process of designing involves presenting some possible solutions in visual form and then selecting in visual form and then selecting the best solution(s) from many
F. Test and evaluate the solutions for the design problem
G. Improve the design solutions
H. Apply a design process to solve problems in and beyond the laboratory-classroom
I. Specify criteria and constraints for the design
J. Make two-dimensional and three-dimensional representations of the designed solution
K. Test and evaluate the design in relation to pre-established requirements, such as criteria and constraints, and refine as needed
L. Make a product or system and document the solution

Standard 12: Students will develop abilities to use and maintain technological products and systems.

Benchmarks: Grades K-8

A. Discover how things work
B. Use hand tools correctly and safely and be able to name them correctly
C. Recognize and use everyday symbols
D. Follow step-by-step directions to assemble a product
E. Select and safely use tools, products, and systems for specific tasks
F. Use computers to access and organize information
G. Use common symbols, such as numbers and words, to communicate key ideas
H. Use information provided in manuals, protocols, or by experienced people to see and understand how things work
I. Use tools, materials, and machines safely to diagnose, adjust, and repair systems
J. Use computers and calculators in various applications
K. Operate and maintain systems in order to achieve a given purpose
Standard 13: Students will develop abilities to assess the impact of products and systems.

Benchmarks: Grades K-8

A. Collect information about everyday products and systems by asking questions
B. Determine if the human use of a product or systems creates positive or negative results
C. Compare, contrast, and classify collected information in order to identify patterns
D. Investigate and assess the influence of a specific technology on the individual, family, community, and environment
E. Examine the trade-offs of using a product or system and decide when it could be used
F. Design and use instruments to gather data
G. Use data to analyze and interpret trends in order to identify the positive or negative effects to a technology
H. Identify trends and monitor potential consequences of technological development
I. Interpret and evaluate the accuracy of the information obtained and determine if it is useful
The Designed World

Standard 14: Students will develop an understanding of and be able to select and use medical technologies.

Benchmarks: Grades K-8

A. Vaccinations protect people from getting certain diseases
B. Medicine helps people who are sick to get better
C. There are many products designed specifically to help people take care of themselves
D. Vaccines are designed to prevent diseases from developing and spreading; medicines are designed to relieve symptoms and stop diseases from developing
E. Technological advances have made it possible to create new devices, to repair or replace certain parts of the body, and to provide a means for mobility
F. Many tools and devices have been designed to help provide clues about health and to provide a safe environment
G. Advances and innovations in medical technologies are used to improve healthcare
H. Sanitation processes used in the disposal of medical products help to protect people from harmful organisms and disease, and shape the ethics of medical safety
I. The vaccines developed for use in immunization require specialized technologies to support environments in which a sufficient amount of vaccines are produced
J. Genetic engineering involves modifying the structure of DNA to produce novel genetic make-ups

Standard 15: Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.

Benchmarks: Grades K-8

A. The use of technologies in agriculture makes it possible for food to be available year round and to conserve resources
B. There are many different tools necessary to control and make up the part of an ecosystem
C. Artificial ecosystems are human-made environments that are designed to function as a unit and are comprised of humans, plants, and animals
D. Most agricultural waste can be recycled
E. Many processes used in agricultural require different procedures, products, or systems
F. Technological advances in agriculture directly affect the time and number of people required to produce food for a large population
G. A wide range of specialized equipment and practices is used to improve the production of food, fiber, fuel, and other products and in the care of animals
H. Biotechnology applies the principles of biology to create commercial products of processes
I. Artificial ecosystems are human made complexes that replicate some aspects of the natural environment
J. The development of refrigeration, freezing, dehydration, preservation, and irradiation provide long-term storage of food and reduce the health risks caused by tainted food

Standard 16: Students will develop an understanding of and be able to select and use energy and power technologies.

Benchmarks: Grades K-8

A. Energy comes in many forms
B. Energy should not be wasted
C. Energy comes in different forms
D. Tools, machines, products, and systems use energy in order to do work
E. Energy is the capacity to do work
F. Energy can be used to do work, using many processes
G. Power is the rate at which energy is converted from one form to another or transferred from one place to another, or the rate at which work is done
H. Power systems are used to drive and provide propulsion to other technological products and systems
I. Much of the energy used in our environment is not used efficiently
Areas of Study  (Standard 16)

Fluid Power
- Pneumatics
- Hydraulics
- Single acting cylinder
- Double acting cylinder
- Pressure

Electrical/Electronic Systems
- Simple Circuit
  - Serial
  - Parallel
- Inputs
  - 12 volt
  - 120 volt
- Type
  - Alternating Current
  - Direct Current
- Controllers
  - Switches
- Outputs
- Logic Gates
  - IF
  - AND
  - OR NOT
- Check Valves

Control/Management
- Inputs
- Controllers
  - Switches
  - Valves
- Outputs
- Logic Gates
  - IF
  - AND
  - OR NOT
- Check Valves

Energy/Alternative
- Wind
  - Source
  - Applications
- Water
  - Source
  - Applications
- Solar
  - Source
  - Applications
- Nuclear
  - Source
  - Applications
- Tidal
  - Source
  - Applications
- Hydro
  - Source
  - Applications
Standard 17: Students will develop an understanding of and be able to select and use information and communication technologies.

Benchmarks: Grades K-8

A. Information is data that has been organized
B. Technology enables people to communicate by sending and receiving information over a distance
C. People use symbols when they communicate by technology
D. The processing of information throughout the use of technology can be used to help humans make decisions and solve problems
E. Information can be acquired and sent through a variety of technological sources, including print and electronic media
F. Communication technology is the transfer of messages among people through and/or machines over distances through the use of technology
G. Letters, characters, icons, and signs are symbols that represent ideas, quantities, elements, and operations
H. Information and communication systems allow information to be human transferred from human to human, human to machine, and machine to human
I. Communication systems are made up of a source, encoder, transmitter, receiver, decoder, and destination
J. The design of a message is influenced by such factors as the intended audience, medium, purpose, and nature of the message
K. The use of symbols, measurements, and drawings promotes clear communication by providing a common language to express ideas
Areas of Study  (Standard 17)

Geographic Information Systems

- Global Positioning Systems
  - Concept
  - Applications
  - Operations

- Image Processing
  - Digital Mapping
  - Data Sets
  - Types

- Mapping
  - Scale
  - Interpret
  - Type

- Surveying
  - Elevations
  - Equipment

Graphic Design

Mechanical

- 2 Dimensional
  - 3 Dimensional
  - Pattern Development

- CADD
  - 2 Dimensional
  - 3 Dimensional
  - Modeling

Multimedia

- Video/TV Production
  - Editing
  - Recording/Mixing
  - Format
    - Script Presentation

- Radio Production
  - Editing
  - Recording/Mixing
  - Format
  - Script Presentation

- Tele-communications
  - Satellite
  - Land Line
  - Microwave

- Computer Applications
  - Desktop Publishing
  - Word Processing
  - Spread Sheet
  - Data Base
  - Presentation
  - Animation
  - WEB Design
  - Digital Imaging
Standard 18: Students will develop an understanding of and be able to select and use transportation technologies.

Benchmarks: Grades K-8

A. A transportation system has many parts that work together to help people travel
B. Vehicles move people or goods from one place to another in water, air, or space and on land
C. Transportation vehicles need to be cared for to prolong their use
D. The use of transportation allows people and goods to be moved from place to place
E. A transportation system may lose efficiency or fail if one part is missing or malfunctioning or if a subsystem is not working
F. Transporting people and goods involves a combination of individuals and vehicles
G. Transportation vehicles are made up of subsystems, such as structural, propulsion, suspension, guidance, control, and support; they must function together for a system to work effectively
H. Governmental regulation often influences the design and operation of transportation systems
I. Processes, such as receiving, holding, storing, loading, moving, unloading, delivering, evaluating, marketing, managing, communicating, and using conventions are necessary for the entire transportation system to operate efficiently
Areas of Study (Standard 18)

Land

- Vehicular
  - Structural
  - Propulsion
  - Suspension
  - Control
  - Support

- Aerodynamics
  - Speed
  - Friction
  - Fuel efficiency
  - Design

Water

- Buoyancy
  - V hull
  - Flat hull
  - Tri hull

- Propulsion
  - Wind
  - Mechanical

Air/Space

- Air subsystems
  - Structural
  - Propulsion
  - Suspension
  - Control
  - Support

- Guidance
  - Lift
  - Drag
  - Thrust
  - Gravity

- Principles
  - Bernoulli’s
  - Newton’s 3rd Law
Standard 19: Students will develop an understanding of and be able to select and use manufacturing technologies.

Benchmarks: Grades K-8

A. Manufacturing systems produce products in quantity
B. Manufactured products are designed
C. Processing systems convert natural materials into products
D. Manufacturing processes include designing products, gathering resources, and using tools to separate, form, and combine materials in order to produce products
E. Manufacturing enterprises exist because of a consumption of goods
F. Manufacturing systems use mechanical processes that change the form of materials through the processes of separating, forming, combing, and conditioning them
G. Manufactured goods may be classified as durable and non-durable
H. The manufacturing process includes the designing, development, making, and servicing of products and systems
I. Chemical technologies are used to modify or alter chemical substances.
J. Materials must first be located before they can be extracted from the earth through such processes as harvesting, drilling, and mining
K. Marketing a product involves informing the public about it as well as assisting in selling and distributing it
Areas of Study  (Standard 19)

Product Development

- Design
  - Structural
  - Aesthetics
  - 3D CAD

- Marketing
  - Target group
  - Advertisement

- Resources
  - Time
  - People
  - Information
  - Materials
  - Energy
  - Tools/Machines
  - Capital

Production

- Finishing
  - Staining
  - Painting
  - Waxing

Fabrication

- Casting/Molding
  - Injection

- Forming
  - Vacuum
  - Scroll

- Separating
  - Shearing
  - Thermo
  - Mechanical

- Conditioning
  - Chemical
  - Thermo

- Assembly
  - Fasteners
  - Order

- Select Operations
  - Drilling
  - Cutting
  - Shearing

- Sequence Operations
  - Flow Chart

- Select Equipment
  - Tools
  - Machines

- Design Tooling
  - Jigs
  - Fixtures

- Quality Control
  - Check off list

- Testing the System
  - Trial Run
  - Adjust System
Standard 20: Students will develop an understanding of and be able to select and use construction technologies.

Benchmarks: Grades K-8

A. People live, work, and go to school in buildings, which are of different types: houses, apartments, office buildings, and schools
B. The type of structure determines how the parts are put together
C. Modern communities are usually planned according to guidelines
D. Structures need to be maintained
E. Many systems are used in buildings
F. The selection of designs for structures is based on factors such as building laws and codes, style, convenience, cost, climate, and function
G. Structures rest on a foundation
H. Some structures are temporary, while others are permanent
I. Buildings generally contain a variety of subsystems
Areas of Study  (Standard 20)
Basic Construction Principles

- Materials
  - Types
  - Properties

- Loads
  - Natural
  - Man Made

- Force
  - Sequencing
  - Stretching
  - Bending
  - Shoring
  - Twisting

- Shapes
  - Squares
  - Triangles
  - Domes

Types of Construction

- Residential
  - Single Dwelling
  - Multiple Dwelling

- Commercial
  - Business
  - Institution
  - Industrial
  - Entertainment

- Civil
  - Bridges
  - Tunnels
  - Dams
  - Towers

- Infrastructure
  - Utilities
  - Transportation

Construction Systems

- Input
  - Information
  - People
  - Materials

- Process
  - Planning
  - Funding
  - Design
  - Contracting

- Output
  - New or Improved Structures

- Feedback
  - Change Orders
  - Maintenance
  - Future Expansion