

**Southern Regional High School
Manahawkin, New Jersey**

Course of Study

For

**Automotive Technology III
8560**

Submitted By:
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Date: November, 2005

Date Board Approved: February 8, 2006

Southern Regional High School District Course of Study

Department Applied Technology

Course Title: Automotive Technology III

Essential Questions of the Course:

1. What are the 11 systems of the automobile and how are they changing to meet the new demands for fuel economy and environmental protection?
2. What are the changes in the troubleshooting techniques and equipment used?
3. How have safety procedures changed to meet demands of the 21st century?
4. What type of careers are available in the automotive field and how can a student prepare to enter?

Assessments:

1. Students will read and complete worksheets in each of the auto systems areas.
2. Students will use a hands-on approach to compliment each system area studied.
3. Students will take unit tests, a final exam, and practical exams to reinforce the automotive information learned.

Unit of Study

Unit Title: Auto Shop Safety Review

Essential Questions of the Unit:

1. What are the required auto shop safety equipment and procedures?
2. How are these safety requirements applied to our everyday working tasks?
3. How do our requirements relate to safety procedures used in the auto industry?

Assessments:

1. Students will complete sections on safety in the textbook and answer questions by completing the appropriate work sheets.
2. Students must demonstrate correct safety procedures as they work.
3. Students will be asked proper safety procedures on quizzes and tests throughout the year.

Content:

- | | |
|--|--|
| <p>A. General Shop Safety Rules</p> <ol style="list-style-type: none">1. Proper behavior around tools and equipment2. Proper dress for various types of work required to be performed in auto shop. <p>B. Tools & Equipment</p> <ol style="list-style-type: none">1. Hand Tools2. Power Tools3. Air Tools4. Shop Equipment<ol style="list-style-type: none">(a) Jacks and stands(b) Auto lifts(c) Tire changer(d) Tire balancer(e) Brake equipment(f) Bead blaster(g) Automatic transmission fluid changer(h) Air conditioner service machine | <p>C. Materials Handling</p> <ol style="list-style-type: none">1. Fluids2. Dust3. Chemicals <p>D. Fire Safety</p> <ol style="list-style-type: none">1. Prevention2. Suppression3. Drills and procedure for evacuation. |
|--|--|

Skills:

- Student can identify unsafe conditions and be able to take necessary corrective procedures.
- Students should be able to daily demonstrate correct habits and procedures.

Purpose / Rational of the Unit:

To review all safety procedures and equipment learned in previous years in order to reinforce safe working habits in each student.

New Jersey Core Curriculum Content Standards:

8.1 COMPUTER AND INFORMATION LITERACY

B. Application of Productivity Tools – 3, 6

8.2 TECHNOLOGY EDUCATION

A. Nature and Impact of Technology - 1

C. Systems in the Designed World – 2, 3

9.2 CONSUMER, FAMILY, AND LIFE SKILLS

F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

Time Frame of Unit: 2 weeks

Instructional Activities:

- Lecture
- Demonstration
- Video
- Hands-on activities
- Workbooks

Materials and Resources:

- Textbook – Modern Auto Technology
- Shop vehicles
- Shop materials and tools
- Computer programs such as Alldata

Unit of Study

Unit Title: Vehicle Maintenance Review

Essential Questions of the Unit:

1. Why is vehicle maintenance important to maintain proper vehicle operation?
2. How does poor maintenance adversely effect vehicle operation?
3. Where can we find maintenance information and procedures for each vehicle?

Assessments:

- Students must be able to find maintenance information for each vehicle worked on.
- Students will demonstrate proper vehicle maintenance while working on each automobile.
- Students will take quizzes and tests on various maintenance procedures.

Content:

- A. Fluid Service
 - 1. Oil
 - 2. Antifreeze
 - 3. Brake Fluid
 - 4. Power Steering Fluid
 - 5. Transmission Fluid
- B. Chassis Service
- C. Tire and Wheel Service
- D. Engine and Drive Train Service
- E. Auto Body Service and Care
- F. Service Intervals

Skills:

- Use owner's manual, service manual, computer generated auto information.
- Perform the following maintenance procedures:
 - Oil change (engine, transmission, rear differential)
 - Chassis Lube
 - Fluid Checks
 - Tire Check (air pressure, tire wear, balance)
 - Drive Train Check
 - Suspension and Steering System Check
 - Auto Body Care (exterior and interior)

Purpose / Rationale of the Unit:

The student will learn how to properly maintain and care for a motor vehicle.

New Jersey Core Curriculum Content Standards:

8.1 COMPUTER AND INFORMATION LITERACY

- B. Application of Productivity Tools – 3,4,5,6,7,10

8.2 TECHNOLOGY EDUCATION

- A. Nature and Impact of Technology - 1
- B. Design Process and Impact Assessment – 2,3,5
- C. Systems in the Designed World – 1,2,3

9.1 CAREER AND TECHNICAL EDUCATION

- A. Career Awareness and Planning – 1,5

9.2 CONSUMER, FAMILY, AND LIFE SKILLS

- A. Critical Thinking - 3
- B. Self-Management – 2,3
- D. Character Development and Ethics – 1,3,4,5
- E. Consumer and Personal Finance - 5
- F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

Time Frame of Unit: 4 weeks

Instructional Activities:

- Lecture
- Demonstration
- Hands-on activities
- Text and workbook assignments

Materials and Resources:

- Textbook Modern Auto Technology
- Shop vehicles
- Shop materials and tools
- Computer programs “AllData”

Unit of Study

Unit Title: Review of the Major Automotive Systems

Essential Questions of the Unit:

1. What are the main automotive systems?
2. What function do they perform?
3. What are the main components of each system?
4. How does each system interact with the other systems?

Assessments:

- Students will complete a review of each system.
- Students will use shop vehicles, textbook, workbook to study the various components
- Student will complete quizzes and tests on each applicable system.

Content:

- A. Body & Frame
- B. Engine
- C. Computer System
- D. Fuel System
- E. Electrical System
- F. Cooling System and Lubrication System
- G. Exhaust and Emission Control System
- H. Drive Train System
- I. Suspension, Steering, and Brake System
- J. Accessory and Safety System

Skills:

- Students will be able to identify the components of the various systems.
- Students will be able to explain what each part contributes to the system.
- Students will be able to troubleshoot, repair or replace some of the parts in each system.

Purpose / Rationale of the Unit:

To give each student an understanding of the modern automobile and how each system works.

New Jersey Core Curriculum Content Standards:

8.1 COMPUTER AND INFORMATION LITERACY

B. Application of Productivity Tools – 3,4,5,6,7,10

8.2 TECHNOLOGY EDUCATION

A. Nature and Impact of Technology - 1

B. Design Process and Impact Assessment – 2,3,5

C. Systems in the Designed World – 1,2,3

9.1 CAREER AND TECHNICAL EDUCATION

A. Career Awareness and Planning – 1,5

9.2 CONSUMER, FAMILY, AND LIFE SKILLS

A. Critical Thinking - 3

B. Self-Management – 2,3

D. Character Development and Ethics – 1,3,4,5

E. Consumer and Personal Finance - 5

F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

Time Frame of Unit: 8 weeks

Instructional Activities:

- Students will work on the various systems throughout the year to understand their functions.
- Students will learn how to remove and install system parts.
- Students will read and answer questions about the systems.
- Quizzes and tests will be used to help reinforce information learned.

Materials and Resources:

- Shop vehicles and parts
- Textbook – Modern Automobile Technology
- Workbooks
- Shop computer and programs
- Auto videos

Unit of Study

Unit Title: Engine Design and Construction

Essential Questions of the Unit:

1. What are the design classifications of the automobile engine?
2. How does a typical automobile operate?
3. What are the components of an automobile engine and how do they fit and work together?

Assessments:

- Inspection and assessment of completed work.
- Test of information learned.
- Completion of measurements and part inspection work sheet.

Content:

- D. Identification of Engine Type
 - 1. Top-End Design
 - 2. Bottom-End Design
 - 3. Fuel System Type
- E. Engine Tear Down and Inspection
 - 1. Top-Eng
 - (a) Valve Train Inspection
 - (b) Hand Inspection
 - (c) Intake System Inspection
 - 2. Bottom-End Inspection
 - (a) Piston and Rings
 - (b) Connecting Rod and Wrist Pin
 - (c) Rod and Main Bearings
 - (d) Crank Shaft
 - (e) Oil Pump
- F. Engine Build-Up
 - 1. Bottom Engine
 - (a) Crankshaft & Main Bearing
 - (b) Piston, ring, connecting rod & bearing, and wristpin
 - (c) Oil Pump and pan
 - 2. Top End
 - (a) Valves and springs
 - (b) Rocker arms and push rods
 - (c) Timing system
 - (d) Intake system
 - 3. Engine Accessories
 - (a) Water pump and thermostat
 - (b) Fuel injectors
 - (c) Pullies, belts, alternator, power steering

Skills:

- A. Parts Inspection and Tool Use
 - 1. Micrometer
 - 2. Plastic gauge
 - 3. Feeler gauge
 - 4. Vernier Caliper
 - 5. Visual inspection
- B. Disassembly Techniques and Tools
 - 1. Ridge Reamer
 - 2. Valve spring remover
 - 3. Cylinder hone
 - 4. Pullers
- C. Assembly procedure
 - 1. Prelube of parts
 - 2. Torque down of parts and torque patterns
 - 3. Port installation techniques
 - 4. Timin procedures

Purpose / Rationale of the Unit:

To have student become familiar with all engine parts and the skill, tools, and techniques of a tear-down and rebuild.

New Jersey Core Curriculum Content Standards:

8.1 COMPUTER AND INFORMATION LITERACY

B. Application of Productivity Tools – 3,4,5,6,7,10

8.2 TECHNOLOGY EDUCATION

A. Nature and Impact of Technology - 1

B. Design Process and Impact Assessment – 2,3,5

C. Systems in the Designed World – 1,2,3

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A. Career Awareness and Planning – 1,5

9.2 CONSUMER, FAMILY, AND LIFE SKILLS

A. Critical Thinking - 3

B. Self-Management – 2,3

D. Character Development and Ethics – 1,3,4,5

E. Consumer and Personal Finance - 5

F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

Time Frame of Unit: 4 weeks

Instructional Activities:

- Lecture
- Shop activities
- Demonstrations of tools and techniques used.

Materials and Resources:

- Shop engines
- Shop tools
- Gas jet materials
- All-Data

Unit of Study

Unit Title: Computer Systems

Essential Questions of the Unit:

1. Why are computer systems needed on today's automobiles?
2. How can the OBD computer be used to solve problems?
3. Why are scanning tools needed by today's mechanics?
4. What are OBD I and OBD II scan systems?

Assessments:

- Students will complete worksheet on the scan tool.
- Students will take practical and written test to demonstrate proficiency on use of OBD I and OBD II computer

Content:

- A. On-Board Diagnostic System
 - 1. OBD I
 - 2. OBD II
- B. Diagnostic Trouble Codes
- C. Scan Tool
 - 1. Stored codes
 - 2. Fault description
 - 3. Datastream information
 - 4. Run test
 - 5. Oxygen sensor monitoring
 - 6. Failure record
 - 7. Test drive scan
- D. Computer System Service
 - 1. Visual inspections
 - 2. Component damage
 - 3. Sensor, activator and circuits
 - 4. Computer service
 - 5. PROM service

Skills:

- Using scan tool to test for trouble codes
- Using trouble codes to pin point defective components
- Component testing
- Component replacement

Purpose / Rationale of the Unit:

To improve trouble-shooting skills and to update and improve student's computer knowledge.

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E. Consumer and Personal Finance - 5

F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

Time Frame of Unit: 4 weeks

Instructional Activities:

- Lecture
- Worksheet
- Demonstration
- Hands-on system testing
- Quizzes and tests

Materials and Resources:

- Shop vehicles
- Scan tool
- Multi meter
- Test light
- All-Data

Unit of Study

Unit Title: Fuel System

Essential Questions of the Unit:

1. How does the modern fuel system work?
2. What are the three major subsystems?
3. What are components of the three subsystems?
4. How do we troubleshoot each of the components?

Assessments:

- Students will demonstrate hands-on knowledge of the subject area.
- Students will complete worksheets in subject area
- Students will complete quizzes and tests in subject area
- Students will demonstrate work ethic.

Content:**A. Fuel Supply System**

1. Fuel tanks
2. Fuel lines
3. Fuel pump
4. Fuel filters
5. Pickup and sending unit
6. Fuel rail
7. Fuel injector

B. Air Supply System

1. Air intake
2. Duet and valve assembly
3. Air filter
4. Air flow meter
5. Throttle body

C. Fuel Metering System

1. Air flow sensor
2. Throttle position sensor
3. Engine temperature sensor
4. Manifold absolute sensor
5. Oxygen sensor
6. Engine coolant sensor
7. Crankshaft position sensor
8. Inlet air temperature sensor
9. Engine knock sensor
10. A/C compressor sensor
11. Transmission sensor
12. Engine speed sensor

D. Fuel System Testing**Skills:**

- Students will be able to identify fuel system part.
- Students will be able to troubleshoot most fuel system problems.
- Students will be able to test system components.

Purpose / Rationale of the Unit:

To have students identify fuel system problems and how to test using shop equipment. The students will learn the tools and safety procedures to complete the job.

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(For descriptive narrative, see Appendix)

Time Frame of Unit: 4 weeks

Instructional Activities:

- Lecture.
- Tools and test equipment demonstrations as required.
- Hands-on problem solving and testing by students.
- Worksheets to help reinforce materials taught.
- Tests and quizzes as required.

Materials and Resources:

- Shop test equipment for fuel systems
- Scan tool
- Multimeter
- Shop vehicles

Unit of Study

Unit Title: Climate Control System

Essential Questions of the Unit:

1. How does the heating system operate?
2. How does the air conditioning system operate?

Assessments:

- Practical skills assessments.
- Worksheet in unit area
- Quizzes and tests in unit area
- Student work ethic
- Student shop safety skills

Content:

- D. Air Conditioning
 - 1. Principals of Refrigeration
 - a. States of Matter
 - b. Heat transfer
 - 2. Heat Cycle
 - 3. Air Conditioning components
 - a. Compressor
 - b. Condenser
 - c. Expansion Valve
 - d. Evaporator
 - e. Receiver-dryer
 - f. Thermostat
 - g. Refrigerant
- E. Heating System
 - 1. Heater core
 - 2. Blower
 - 3. Manual controls
 - 4. Electronic controls
 - 5. Vacuum controls
 - 6. Air mix door
 - 7. Hot air door
 - 8. Outside air door
 - 9. Heater door
- F. Automatic Temperature Control

Skills:

- A. Cooling System Inspection & Service
 - 1. Types of refrigerant
 - 2. Leak test
 - 3. System evacuating system
 - 4. Charging system
 - 5. Component test.
- B. Heating System
 - 1. System test
 - 2. component operation
 - 3. Leak Test
- C. Safety & Environmental Procedures During Servicing
 - 1. Refrigerant safety precautions
 - 2. Refrigerant reclamation and recycling.

Purpose / Rationale of the Unit:

This unit teaches the students the principals of climate control and the different systems that can cool, heat, or ventilate the automobile.

New Jersey Core Curriculum Content Standards:

8.1 COMPUTER AND INFORMATION LITERACY

B. Application of Productivity Tools – 3,4,5,6,7,10

8.2 TECHNOLOGY EDUCATION

A. Nature and Impact of Technology - 1

B. Design Process and Impact Assessment – 2,3,5

C. Systems in the Designed World – 1,2,3

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A. Career Awareness and Planning – 1,5

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A. Critical Thinking - 3

B. Self-Management – 2,3

D. Character Development and Ethics – 1,3,4,5

E. Consumer and Personal Finance - 5

F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

Time Frame of Unit: 4 weeks

Instructional Activities:

- Lecture.
- Demonstration of servicing procedures.
- Worksheets completed in the climate control area.
- Quizzes and tests
- Observation of students' application using correct servicing procedures.

Materials and Resources:

- Shop vehicles
- Tools and test equipment
- Textbook and worksheets
- All-Date

Unit of Study

Unit Title: Anti-Lock Brakes, Traction Control and Stability Control

Essential Questions of the Unit:

1. How do the computer control systems operate?
2. How have these systems improved driver control of the vehicle?
3. What are the methods used to trouble-shoot and repair the system?

Assessments:

- Students will complete the required worksheets.
- Students will complete the required tests and quizzes.
- Students will demonstrate learned material.
- Students will demonstrate a proper work ethic.
- Students will demonstrate a regard for safe working procedures.

Content:

A. Anti-Lock Brake System

1. Advantage of Having ABS
 - a. Improved straight line stopping.
 - b. Improve braking while turning.
2. ABS Components
 - a. Wheel speed sensors
 - b. Sensor rulers
 - c. ABS control module
 - d. Electro-hydraulic modulator
 - e. Warning lights
3. 3 ABS trouble shooting

B. Traction and stability control

1. Advantages of Both Systems
 - a. Traction
 - b. More control in turns
2. System Components
 - a. Traction sensor
 - b. Steering angle
 - c. Lateral Acceleration sensor
 - d. Yaw sensor
 - e. Throttle position sensor
 - f. Brake pressure sensor
 - g. Other sensors
3. Traction and Stability Control Trouble-shooting

Skills:

- Demonstrate an understanding of the three systems.
- Demonstrate an understanding of the proper care and trouble-shooting techniques.
- Display a knowledge of workplace safety.

Purpose / Rationale of the Unit:

To have students become familiar with the three systems and how they work. Also to have the ability to trouble-shoot each system.

New Jersey Core Curriculum Content Standards:

8.1 COMPUTER AND INFORMATION LITERACY

B. Application of Productivity Tools – 3,4,5,6,7,10

8.2 TECHNOLOGY EDUCATION

A. Nature and Impact of Technology - 1

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A. Critical Thinking - 3

B. Self-Management – 2,3

D. Character Development and Ethics – 1,3,4,5

E. Consumer and Personal Finance - 5

F. Safety – 1,2,3,4,5,6

(For descriptive narrative, see Appendix)

Time Frame of Unit: 4 weeks

Instructional Activities:

- Lecture
- Demonstration
- Video
- Workbook assignments
- Tests and quizzes

Materials and Resources:

- Shop vehicles
- Shop tools and equipment
- Workbooks and text book
- All-Date

New Jersey Core Curriculum Content Standards for Technological Literacy

INTRODUCTION

The Vision

Technology, any modification of the natural world designed by human beings to solve human problems, enhance human life, or extend human capability, was identified by the United States Department of Labor as an essential workplace competency in a 1992 report called the Secretary's Commission on Achieving Necessary Skills (SCANS). SCANS stated that students should be able to select equipment and tools, apply technology to specific tasks, and maintain and troubleshoot equipment. The Department of Education recognized its importance by including technology in the original cross-content workplace readiness standards. In keeping with today's technological society, technological literacy has been further emphasized by its inclusion as a separate standards area which focuses on both computer and information literacy and technology education.

Technology is evolving at an amazing rate, with both frequent advancements of existing technology and the creation of new technologies. All students must understand and be comfortable with the concepts and application of technology, not only in order to function in today's complex society, but also to become informed and productive adults of tomorrow.

Computer and Information Literacy

Computer and information literacy, which supports skills in information-gathering, information-organizing, and problem solving, has become critical for every student whether college- or workplace-bound. Colleges and employers are now demanding that students and employees possess a broad range of computer and information literacy proficiencies. More and more retail purchasing is being done on-line every year, and all but the most menial of positions now require a significant understanding of computer and information literacy. To ensure that students are computer literate, a separate standard that defines rigorous, in-depth learning has been included. The computer and information literacy standard is designed to be integrated and applied in all of the content areas of the Core Curriculum Content Standards.

Technology Education

The technology education standard was developed to ensure the literacy needed by all students to succeed in a highly technological world. Business and industry has clearly stated the need for technological skills in the workplace of the 21st Century.

This standard is based on the *Standards for Technological Literacy (STL): Content for the Study of Technology (ITEA, 2000)*, developed as part of the National Science Foundation (NSF)/National Aeronautics and Space Administration (NASA) funded by the *Technology for All Americans (TfAA)* project.

A study by DeKlerk has found that students form negative attitudes about the technological world if there are no formal technological experiences during the early school years. This finding is a great concern to New Jersey business and industry. Other cognitive research suggests that "design-based learning" is important. Early studies with design and technology curriculum indicate that students who learn important technological concepts develop positive attitudes about technology, math, science and learning in general. For these reasons, an introduction to technology education, including engineering and technological design, is an essential component of a thorough and efficient K-12 education.

Standards and Strands

There are two technological literacy standards, each of which has a number of lettered strands. The standards and strands include:

8.1 Computer and Information Literacy

A. Basic Computer Tools and Skills

- Keyboarding
- Word processing
- Internet usage
- Spreadsheets
- Database concepts and usage
- Publications and presentations

B. Application of Productivity Tools

- Social Aspects
- Information Access and Research
- Problem Solving

8.2 Technology Education

A. Nature and Impact of Technology

B. Design Process and Impact Assessment

C. Systems in the Designed World

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National Business Education Association. (2001). *National standards for business education*. Online: <http://www.nbea.org/curriculum/bes.html>.

STANDARD 8.1 (COMPUTER AND INFORMATION LITERACY) ALL STUDENTS WILL USE COMPUTER APPLICATIONS TO GATHER AND ORGANIZE INFORMATION AND TO SOLVE PROBLEMS.

Descriptive Statement: Using computer applications and technology tools students will conduct research, solve problems, improve learning, achieve goals, and produce products and presentations in conjunction with standards in all content areas, including career education and consumer family, and life skills. They will also develop, locate, summarize, organize, synthesize, and evaluate information for lifelong learning.

Strands and Cumulative Progress Indicators

By the end of Grade 4, students will:

A. Basic Computer Skills and Tools

1. Use basic technology vocabulary.
2. Use basic features of an operating system (e.g., accessing programs, identifying and selecting a printer, finding help).
3. Input and access text and data, using appropriate keyboarding techniques or other input devices.
4. Produce a simple finished document using word processing software.
5. Produce and interpret a simple graph or chart by entering and editing data on a prepared spreadsheet template.
6. Create and present a multimedia presentation using appropriate software.
7. Create and maintain files and folders.
8. Use a graphic organizer.
9. Use basic computer icons.

B. Application of Productivity Tools**Social Aspects**

1. Discuss the common uses of computer applications and identify their advantages and disadvantages.
2. Recognize and practice responsible social and ethical behaviors when using technology, and understand the consequences of inappropriate use including:
 - Internet access
 - Copyrighted materials

- On-line library resources
 - Personal security and safety issues
3. Practice appropriate Internet etiquette.
 4. Recognize the ethical and legal implications of plagiarism of copyrighted materials.

Information Access and Research

5. Recognize the need for accessing and using information.
6. Identify and use web browsers, search engines, and directories to obtain information to solve real world problems.
7. Locate specific information by searching a database.
8. Recognize accuracy and/or bias of information.

Problem Solving and Decision Making

9. Solve problems individually and/or collaboratively using computer applications.
10. Identify basic hardware problems and solve simple problems.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:

A. Basic Computer Skills and Tools

1. Use appropriate technology vocabulary.
2. Use common features of an operating system (e.g., creating and organizing files and folders).
3. Demonstrate effective input of text and data, using touch keyboarding with proper technique.
4. Input and access data and text efficiently and accurately through proficient use of other input devices, such as the mouse.
5. Create documents with advanced text-formatting and graphics using word processing.
6. Create a file containing customized information by merging documents.
7. Construct a simple spreadsheet, enter data, and interpret the information.
8. Design and produce a basic multimedia project.
9. Plan and create a simple database, define fields, input data, and produce a report using sort and query.
10. Use network resources for storing and retrieving data.
11. Choose appropriate electronic graphic organizers to create, construct, or design a document.

12. Create, organize and manipulate shortcuts.

B. Application of Productivity Tools

Social Aspects

1. Demonstrate an understanding of how changes in technology impact the workplace and society.
2. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.
3. Explain the purpose of an Acceptable Use Policy and the consequences of inappropriate use of technology.
4. Describe and practice safe Internet usage.
5. Describe and practice "etiquette" when using the Internet and electronic mail.

Information Access and Research

6. Choose appropriate tools and information resources to support research and solve real world problems, including but not limited to:
 - On-line resources and databases
 - Search engines and subject directories
7. Evaluate the accuracy, relevance, and appropriateness of print and non-print electronic information sources.

Problem Solving and Decision Making

8. Use computer applications to modify information independently and/or collaboratively to solve problems.
9. Identify basic hardware problems and demonstrate the ability to solve common problems.
10. Determine when technology tools are appropriate to solve a problem and make a decision.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students will:

A. Basic Computer Skills and Tools

1. Create a multi-page document with citations using word processing software in conjunction with other tools that demonstrates the ability to format, edit, and print.
2. Create documents including a resume and a business letter using professional format.
3. Construct a spreadsheet, enter data, use mathematical or logical functions to manipulate and process data, generate charts and graphs, and interpret the results.

4. Given a database, define fields, input data from multiple records, produce a report using sort and query, and interpret the data.
5. Produce a multimedia project using text, graphics, moving images, and sound.
6. Produce and edit page layouts in different formats using desktop publishing and graphics software.
7. Develop a document or file for inclusion into a website or web page.
8. Discuss and/or demonstrate the capability of emerging technologies and software in the creation of documents or files.
9. Merge information from one document to another.

B. Application of Productivity Tools

Social Aspects

1. Describe the potential and implications of contemporary and emerging computer applications for personal, social, lifelong learning, and workplace needs.
2. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.
3. Make informed choices among technology systems, resources, and services in a variety of contexts.
4. Use appropriate language when communicating with diverse audiences using computer and information literacy.

Information Access and Research

5. Select and use specialized databases for advanced research to solve real world problems.
6. Identify new technologies and other organizational tools to use in personal, home, and/or work environments for information retrieval, entry, and presentation.
7. Evaluate information sources for accuracy, relevance, and appropriateness.
8. Compose, send, and organize e-mail messages with and without attachments.

Problem-Solving and Decision Making

9. Create and manipulate information, independently and/or collaboratively, to solve problems and design and develop products.
10. Identify, diagnose, and suggest solutions for non-functioning technology systems.
11. Identify a problem in a content area and formulate a strategy to solve the problem using brainstorming, flowcharting, and appropriate resources.

12. Integrate new information into an existing knowledge base and communicate the results in a project or presentation.

STANDARD 8.2 (TECHNOLOGY EDUCATION) ALL STUDENTS WILL DEVELOP AN UNDERSTANDING OF THE NATURE AND IMPACT OF TECHNOLOGY, ENGINEERING, TECHNOLOGICAL DESIGN, AND THE DESIGNED WORLD AS THEY RELATE TO THE INDIVIDUAL, SOCIETY, AND THE ENVIRONMENT.

Descriptive Statement: The following indicators are based on the Standards for Technological Literacy (STL, 2000) and support the National Academy of Engineering's (2002) call for students to gain technological literacy. Students will be expected to understand the various facets of technology and the design process. They will analyze and evaluate design options and then apply the design process to solve problems. A systems perspective is employed to emphasize the interconnectedness of all knowledge and the impact of technology and technological change. Students will be expected to use technology as it applies to physical systems, biological systems, and information and communication systems. The intent at the elementary and middle school levels is that all students develop technological literacy and are prepared for the option of further study in the field of technology education. At the elementary level, the foundation for technology education is found in the science standards, particularly standards 5.2 and 5.4.

Strands and Cumulative Progress Indicators

By the end of Grade 4, students will:

A. Nature and Impact of Technology

Refer to Science Standards 5.2 and 5.4.

B. Design Process and Impact Assessment

Refer to Science Standards 5.2 and 5.4.

C. Systems in the Designed World

Refer to Science Standards 5.2 and 5.4.

Building upon knowledge and skills gained in the preceding grades, by the end of Grade 8, students will:

A. Nature and Impact of Technology

1. Describe the nature of technology and the consequences of technological activity.
2. Describe how components of a technological product, system, or environment interact.
3. Describe how one technological innovation can be applied to solve another human problem that enhances human life or extends human capability.
4. Describe how technological activity has an affect on economic development, political actions, and cultural change.

5. Explain the cultural and societal effects resulting from the dramatic increases of knowledge and information available today.

B. Design Process and Impact Assessment

1. Demonstrate and explain how the design process is not linear.
2. Use hands on activities to analyze products and systems to determine how the design process was applied to create the solution.
3. Identify a technological problem and use the design process to create an appropriate solution.
4. Describe how variations in resources can affect solutions to a technological problem.
5. Select and safely use appropriate tools and materials in analyzing, designing, modeling or making a technological product, system or environment.

C. Systems in the Designed World

1. Explain technological advances in medical, agricultural, energy and power, information and communication, transportation, manufacturing, and construction technologies.
2. Explain reasons why human-designed systems, products, and environments need to be monitored, maintained, and improved to ensure safety, quality, cost efficiency, and sustainability.
3. Explain the functions and interdependence of subsystems such as waste disposal, water purification, electrical, structural, safety, climatic control, and communication.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students electing courses in technology education will:

A. Nature and Impact of Technology

1. Use appropriate data to discuss the full costs, benefits and trade-offs, and risks related to the use of technologies.
2. Explain how technological development is affected by competition through a variety of management activities associated with planning, organizing, and controlling the enterprise.
3. Provide various examples of how technological developments have shaped human history.

B. Design Process and Impact Assessment

1. Analyze a given technological product, system, or environment to understand how the engineering design process and design specification limitations influenced the final solution.
2. Evaluate the function, value, and appearance of technological products, systems, and environments from the perspective of the user and the producer.
3. Develop methods for creating possible solutions, modeling and testing solutions, and modifying proposed design in the solution of a technological problem using hands-on activities.

4. Use a computer assisted design (CAD) system in the development of an appropriate design solution.
5. Diagnose a malfunctioning product and system using appropriate critical thinking methods.
6. Create a technological product, system, or environment using given design specifications and constraints by applying design and engineering principles.

C. Systems in the Designed World

1. Explain the life cycle of a product from initial design to reuse, recycling, remanufacture, or final disposal, and its relationship to people, society, and the environment, including conservation and sustainability principles.
2. Analyze the factors that influence design of products, systems, and environments.
3. Compare and contrast the effectiveness of various products, systems, and environments associated with technological activities in energy, transportation, manufacturing, and information and communication.

New Jersey Core Curriculum Content Standards
for
Career Education and Consumer, Family, and Life Skills

INTRODUCTION

The Vision

Rapid societal changes, including innovations in technology, information exchange, and communications, have increased the demand for internationally competitive workers and for an educational system designed to meet that demand. Today's students will be employed through much of the twenty-first century and will, therefore, need increasingly advanced levels of knowledge and skills. To obtain and retain high-wage employment that provides job satisfaction, they will also need to continue to learn throughout their lives. The career education and consumer, family, and life skills standards identify key career development and life skills that students must accomplish in order to achieve continuing success in various life roles related to continuing education, career development, and personal growth.

Members of the business and industry communities have identified vital career and technical education skills. In 1992, the Secretary's Commission on Achieving Necessary Skills (SCANS) identified productive use of resources, interpersonal skills, information, systems, and technology as essential workplace competencies. The SCANS foundation skills include basic skills, personal qualities, and the ability to identify and solve real problems, reason effectively, and apply critical thinking skills.

To compete in this global, information-based economy, students must be able to identify and solve real problems, use appropriate tools, reason effectively, and apply critical thinking skills. The career and technical education and consumer, family, and life skills standards identify key career education and consumer, family, and life skills which can also enhance personal behavior and professional conduct in life and careers. In addition to the SCANS report, the National Career Development Guidelines and National Standards for School Counseling Programs were used as resources. Educators may find these national standards as well as the national standards documents in other areas very useful resources.

Career and Technical Education

The career and technical arts standards at the elementary and middle school levels are designed to prepare students for further study at the high school level in career and technical education, formerly known as practical arts. These courses typically include business education, family and consumer sciences, and other courses related to career education and consumer, family, and life skills. In early elementary grades, career and technical education is designed to be integrated with other core content. At the middle and junior high school levels, the standard may be integrated or taught through rotational programs as students work on interdisciplinary projects that develop employability and academic skills. At the high school level, career and technical education programs establish necessary pathways for entering the world of work as well as continuing education, such as college, post-secondary vocational-technical education, specialized certification and/or registered apprenticeships. They also support lifelong learning. These essential elements include preparation for post-secondary pursuits as well as providing an essential foundation in everyday living skills. In essence, career and technical education is the application of life, academic, and occupational skills demonstrated by student-centered experiences in courses related to the sixteen States' Career Clusters supported by state vocational technical directors

from across the country. Career and technical education provides a variety of learning experiences to meet the needs of students having multiple learning styles.

Students interested in more intensive study at the high school level in one of the career clusters may participate in a vocational-technical education program as defined in N.J.A.C. 6A:19, Vocational Technical Education Programs and Standards. The career clusters include: agriculture, food, and natural resources; architecture and construction; arts, audio/video technology and communications; business, management, and administration; education and training; finance; government and public administration; health science; hospitality and tourism; human services; information technology; law, public safety and security; manufacturing; marketing, sales and service; science, technology, engineering, and mathematics; and transportation, distribution, and logistics. A number of vocational student organizations have been created to enhance and support career development. They include:

- DECA/DEX/Distributive Education Clubs of America/Delta Epsilon Chi (marketing education);
- FBLA-PLB/Future Business Leaders of America-Hi Beta Lambda (business/technology education);
- FCCLA/ Family, Career, and Community Leaders of American (family and consumer sciences);
- FFA (agri-business education);
- HOSA /Health Occupations Students of America (trade and industrial education);
- TSA/Technology Student Association(technology education); and
- SKILLSUSA/VICA Vocational Trade and Industrial Student Organization.

Career and technical education programs enable students to:

- Describe and integrate basic skills, thinking skills, and personal qualities, as defined by the SCANS Report;
- Address self-knowledge, career planning, and employability skills utilizing technology, information, and other resources;
- Enhance academic achievement and motivation for learning;
- Explore career education and planning;
- Acquire necessary employability and interpersonal workplace skills; and
- Pursue specific courses and programs designed to lead to employment or post-secondary_options in occupations included within the sixteen States' Career Clusters.

Consumer, Family, and Life Skills

All students need to develop consumer, family, and life skills necessary to be a functioning member of society. All students will develop original thoughts and ideas, think creatively, develop habits of inquiry, and take intellectual and performance risks. They will recognize problems, devise a variety of ways to solve these problems, analyze the potential advantages and disadvantages of each alternative, and evaluate the effectiveness of the method ultimately selected. Students will work collaboratively with a variety of groups and demonstrate trustworthiness, responsibility, respect, fairness, caring, and citizenship. Students will apply the principles of resource management and skills that promote personal and professional well-being. They will also be expected to understand the components of financial education and make economic choices.

Standards and Strands

There are two career education and consumer, family, and life skills standards, each of which has a number of lettered strands. The standards and strands include:

9.1 Career and Technical Education

- A. Career Awareness and Planning
- B. Employability Skills

9.2 Consumer, Family, and Life Skills

- A. Critical Thinking
- B. Self-Management
- C. Interpersonal Communication
- D. Character Development and Ethics
- E. Consumer and Personal Finance
- F. Safety

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STANDARD 9.1: (CAREER AND TECHNICAL EDUCATION) ALL STUDENTS WILL DEVELOP CAREER AWARENESS AND PLANNING, EMPLOYABILITY SKILLS, AND FOUNDATIONAL KNOWLEDGE NECESSARY FOR SUCCESS IN THE WORKPLACE.

Descriptive Statement: All students will explore career opportunities and make informed choices based on aptitudes and interests. Students will identify and pursue career goals, apply communications skills in work-relevant situations, demonstrate the ability to combine ideas or information in new ways, make connections between unrelated ideas, organize and present information, and allocate financial and other resources efficiently and effectively. Students will identify and use various print and non-print resources in the home, school, and community to seek and plan for employment. They will be able to use the job application process, including resumes, forms, and interviews.

Career and technical education, formerly called practical arts, is the application of life, academic, and occupational skills demonstrated by student-centered experiences in courses related to the sixteen States' Career Clusters. The intent at the elementary and middle school levels is to prepare all students for the option of further study in career and technical education at the high school level. These courses typically include business education, family and consumer sciences, and other courses related to careers and life skills. Career and technical education programs establish necessary pathways for secondary vocational-technical education programs, entering the world of work, continuing education (such as college, post secondary vocational-technical education, specialized certification and/or registered apprenticeships), and lifelong learning.

Those students electing courses in career and technical education should demonstrate both teamwork and problem-solving skills through a structured learning experience. This could consist of an experiential, supervised educational activity designed to provide students with exposure to the requirements and responsibilities of specific job titles or job groupings, and to assist them in gaining employment skills and making career and educational choices. The experience may be either paid or unpaid, depending on the type of activities in which the student is involved. Examples include, but are not limited to: apprenticeships, community service, cooperative education, internships, job shadowing, school-based experiences, vocational student organizations, paid employment, and volunteer activities. Structured learning experiences must meet all state and federal child labor laws and regulations.

Strands and Cumulative Progress Indicators

By the end of Grade 4, students will:

A. Career Awareness and Planning

1. Describe various life roles and work-related activities in the home, community, and school.
2. Identify abilities and skills associated with various careers.
3. Identify reasons people work and how work habits impact the quality of one's work.

B. Employability Skills

1. Describe and demonstrate the importance of personal and interpersonal skills.
2. Identify positive work habits and attitudes necessary for home, community, and school.
3. Identify reasons for working as part of a team.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:

A. Career Awareness and Planning

1. Demonstrate the ability to distinguish between job, occupation, and career.
2. Outline the steps in the career planning process.
3. Apply research skills to career exploration.
4. Analyze personal interests, abilities, and skills through various measures including self assessments.
5. Explore careers using hands-on real life experiences within the sixteen States' Career Clusters.
6. Develop an individual career plan and include in a portfolio.
7. Plan and conduct a cooperative project that addresses one of the problems faced by the school and/or community.

B. Employability Skills

1. Research local and state employment opportunities.
2. Develop an employment package that includes a job application, letter of interest, and resume.
3. Demonstrate job-seeking skills.
4. Describe and demonstrate appropriate work habits and interpersonal skills needed to obtain and retain employment.
5. Compare and contrast possible choices based on identified/perceived strengths, goals, and interests.
6. Identify and develop skills that are transferable from one occupation to another.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students will:

A. Career Awareness/Preparation

1. Re-evaluate personal interests, abilities, and skills through various measures including self assessments.
2. Evaluate academic and career skills needed in various career clusters.

3. Analyze factors that can impact an individual's career.
4. Review and update their career plan and include the plan in a portfolio.
5. Research current advances in technology that apply to a selected occupational career cluster.

B. Employability Skills

1. Assess personal qualities that are needed to obtain and retain a job related to career clusters.
2. Communicate and comprehend written and verbal thoughts, ideas, directions, and information relative to educational and occupational settings.
3. Select and utilize appropriate technology in the design and implementation of teacher-approved projects relevant to occupations and/or higher educational settings.
4. Evaluate the following academic and career skills as they relate to home, school, community, and employment:
 - Communication
 - Punctuality
 - Time management
 - Organization
 - Decision making
 - Goal setting
 - Resources allocation
 - Fair and equitable competition
 - Safety
 - Employment application skills
 - Teamwork
5. Demonstrate teamwork and leadership skills that include student participation in real world applications of career and technical education skills.

All students electing further study in career and technical education will also:

1. Participate in a structured learning experience that demonstrates interpersonal communication, teamwork, and leadership skills.
2. Participate in simulated industry assessments, when and where appropriate.
3. Prepare industry-specific technical reports/projects that incorporate graphic aids, when and where appropriate.

4. Demonstrate occupational health and safety skills related to industry-specific activities.

STANDARD 9.2 (CONSUMER, FAMILY, AND LIFE SKILLS) ALL STUDENTS WILL DEMONSTRATE CRITICAL LIFE SKILLS IN ORDER TO BE FUNCTIONAL MEMBERS OF SOCIETY.

Descriptive Statement: All students need to develop consumer, family, and life skills necessary to be functioning members of society. All students will develop original thoughts and ideas, think creatively, develop habits of inquiry, and take intellectual and performance risks. They will recognize problems, devise a variety of ways to solve these problems, analyze the potential advantages and disadvantages of each alternative, and evaluate the effectiveness of the method ultimately selected. Students will understand the components of financial education and make economic choices. Students will demonstrate self-awareness and the ability to respond constructively to criticism and potential conflict. In addition, students will work collaboratively with a variety of groups and demonstrate the essential components of character development and ethics, including trustworthiness, responsibility, respect, fairness, caring, and citizenship. Students apply principles of resource management and skills that promote personal and professional well-being. Wellness, nutrition, child development, and human relationships are an important part of consumer, family, and life skills. However, wellness, nutrition, and human relationship cumulative progress indicators are not listed here as it would duplicate those in Comprehensive Health and Physical Education Standards.

Strands and Cumulative Progress Indicators

By the end of Grade 4, students will:

A. Critical Thinking

1. Recognize and define a problem.
2. Plan and follow steps to make choices and decisions.
3. Identify and access print and non-print resources that can be used to help solve problems.
4. Demonstrate brainstorming skills.

B. Self-Management

1. Demonstrate an understanding of the relationship between personal behavior and self-image.
2. Recognize and build upon personal strengths.
3. Accept criticism and respond constructively.
4. Recognize personal likes and dislikes.
5. Demonstrate steps to deal with stress and conflict.

C. Interpersonal Communication

1. Develop positive social skills to interact with others.

2. Select and use language appropriate to the situation.
3. Develop skills for accepting self and others through awareness of different cultures, lifestyles, and attitudes.
4. Practice steps for effective conflict resolution.
5. Work cooperatively with others to accomplish a task.

D. Character Development and Ethics

1. Demonstrate character traits that are important in day-to-day activities in the home, school, and community such as trust, responsibility, respect, fairness, caring, and citizenship.
2. Conduct a cooperative activity or project that addresses a character trait.
3. Identify ethical behaviors in the home, school, and community.
4. Explain a person's responsibility to obey the laws and rules.

E. Consumer and Personal Finance

1. Demonstrate a basic understanding of the value of money.
2. Identify various sources of money for personal spending.
3. Explore the relationship among wants, needs, and resources.
4. Understand that prices of goods and services can be compared to make decisions about purchases.
5. Explain how people can improve their ability to earn income by gaining new knowledge, skills, and experiences.
6. Describe how to earn and save money in order to purchase a desired item.

F. Safety

1. Identify common hazards associated with home, school, and community.
2. Explain how common hazards can be eliminated in the home, school, and community.
3. Describe and demonstrate the safe use of tools and equipment used at home and at school.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 8, students will:

A. Critical Thinking

1. Communicate, analyze data, apply technology, and problem solve.
2. Describe how personal beliefs and attitudes affect decision-making.
3. Identify and assess problems that interfere with attaining goals.

4. Recognize bias, vested interest, stereotyping, and the manipulation and misuse of information.
5. Practice goal setting and decision-making in areas relative to life skills.

B. Self-Management

1. Develop and implement a personal growth plan that includes short- and long-term goals to enhance development.
2. Demonstrate responsibility for personal actions and contributions to group activities.
3. Explain the need for, and advantages of, lifelong learning.

C. Interpersonal Communication

1. Demonstrate respect and flexibility in interpersonal and group situations.
2. Organize thoughts to reflect logical thinking and speaking.
3. Work cooperatively with others to solve a problem.
4. Demonstrate appropriate social skills within group activities.
5. Practice the skills necessary to avoid physical and verbal confrontation in individual and group settings.
6. Participate as a member of a team and contribute to group effort.

D. Character Development and Ethics

1. Explain and demonstrate how character and behavior affects and influences the actions of others in the home, school, and community.
2. Describe and demonstrate appropriate character traits, social skills, and positive attitudes needed for the home, school, community, and workplace.
3. List problems and their causes, effects, and solutions that are faced in the home, school, and/or community.
4. Describe how personal ethics influence decision making.

E. Consumer and Personal Finance Skills

1. Identify and demonstrate personal finance skills in checkbook maintenance and investing.
2. Construct a simple personal savings/spending plan.
3. Understand that people make financial choices that have costs, benefits, and consequences.
4. Explain the difference in cost between cash and credit purchases.
5. Compare prices of similar items from different sellers.

F. Safety

1. Demonstrate appropriate safety procedures for hands-on experiences.
2. Demonstrate the use of recommended safety and protective devices.
3. Describe appropriate response procedures for emergency situations.

Building upon knowledge and skills gained in preceding grades, by the end of Grade 12, students will:

A. Critical Thinking

1. Apply communications and data analysis to the problem-solving and decision making processes in a variety of life situations.
2. Describe and apply constructive responses to criticism.
3. Apply the use of symbols, pictures, graphs, objects, and other visual information to a selected project in academic and/or occupational settings.
4. Recognize bias, vested interest, stereotyping, and the manipulation and misuse of information while formulating solutions to problems that interfere with attaining goals.
5. Apply knowledge and skills needed to use various means of transportation within a community.

B. Self-Management

1. Revise and update the personal growth plan to address multiple life roles.
2. Apply project planning and management skills in academic and/or occupational settings.
3. Compare and contrast methods for maximizing personal productivity.

C. Interpersonal Communication

1. Model interpersonal and effective conflict resolution skills.
2. Communicate effectively in a variety of settings with a diverse group of people.

D. Character Development and Ethics

1. Analyze how character influences work performance.
2. Identify and research privileges and duties of citizens in a democratic society.
3. Discuss consequences and sanctions when on-the-job rules and laws are not followed.
4. Compare and contrast a professional code of ethics or code of conduct from various work fields and discuss similarities and differences.
5. Apply a professional code of ethics to a workplace problem or issue.

E. Consumer and Personal Finance

1. Analyze factors that influence gross and net income.
2. Design, implement, and critique a personal financial plan.
3. Discuss how to obtain and maintain credit.
4. Prepare and use skills for budget preparation, making predictions about income and expenditures, income tax preparation, and adjusting spending or expectations based on analysis.
5. Use comparative shopping techniques for the acquisition of goods and services.
6. Analyze the impact of advertising, peer pressure, and living arrangements on personal purchasing decisions.
7. Evaluate the actions a consumer might take in response to excess debt and personal financial status.
8. Analyze the interrelationships between the economic system and consumer actions in a chosen career cluster.

F. Safety

1. Engage in an informed discussion about rules and laws designed to promote safety and health.
2. Describe and demonstrate basic first aid and safety procedures.
3. Analyze the occurrence of workplace hazards.
4. Practice the safe use of tools and equipment.
5. Implement safety procedures in the classroom and workplace, where appropriate.
6. Discuss motor vehicle safety, including but not limited to, New Jersey motor vehicle laws and regulations, methods of defensive driving, and the importance of personal responsibility on public roads/streets.