

**Wallingford Public Schools - MIDDLE SCHOOL COURSE OUTLINE**

<b>Course Title:</b> Explorations in Technology	<b>Course Number:</b> N/A
<b>Department:</b> Technology Education	<b>Grade(s):</b> 6, 7 & 8
<b>Level(s):</b> All	<b>Credit:</b>
<p><b>Course Description</b></p> <p>The purpose of this course is to introduce students into the world of technology, resulting in an increased understanding of the different areas of technology, its development and its use. Laboratory experiences revolve around the topics related to the main areas of technology; manufacturing, communications, transportation, and energy.</p> <p>Through hands-on activities, students will develop technological literacy, apply basic skills and increase their self awareness.</p>	
<p><b>Required Instructional Materials</b></p> <ul style="list-style-type: none"> <li>• <i>Technology in Action</i>, Thode, 2002. (Glencoe/McGraw-Hill)</li> <li>• Related teacher manuals</li> <li>• Sufficient hands-on materials</li> <li>• Computers, peripherals, and related technology applications</li> </ul>	<p><b>Completion/Revision Date</b></p> <p align="center">Approved by Board of Education on May 21, 2007</p>

**Mission Statement of the Curriculum Management Team**

The mission of the Career and Technical Education Curriculum Management Team is to ensure that students, as a result of their experiences in K-12, will demonstrate transferable skills, knowledge, and attributes for successful life management, employment, career development, post-secondary educational opportunities, and life long learning.

**Enduring Understandings for the Course**

- Life long learners are able to apply and refine skills as they prepare for their future endeavors.
- Transferable skills and knowledge, and positive attributes help prepare students for employment and educational opportunities.
- The design and manufacturing process turns raw materials into usable products for society.
- Skilled and safe use of materials and equipment will result in quality construction.
- In order to fabricate an object it requires many steps of planning, drawing and revisions before the object can be manufactured.
- Sketches and drawings are created from different views in order to create manufacturing plans of a three dimensional object.

<ul style="list-style-type: none"> <li>Standardized procedures for drawings are essential to communicate with varied tradesmen in a common language.</li> </ul>
<ul style="list-style-type: none"> <li>Computer Aided Drafting allows society to complete technical drawings more efficiently and accurately.</li> </ul>
<ul style="list-style-type: none"> <li>Transportation systems are used to move goods and people.</li> </ul>
<ul style="list-style-type: none"> <li>Safety issues are a major concern that impacts all transportation systems.</li> </ul>
<ul style="list-style-type: none"> <li>Propulsion systems are unique to each mode of transportation.</li> </ul>
<ul style="list-style-type: none"> <li>All transportation systems have an impact on the environment.</li> </ul>
<ul style="list-style-type: none"> <li>Laws of motion and scientific principles impact all modes of transportation.</li> </ul>
<ul style="list-style-type: none"> <li>Robotics play a major role in the automation of American industry.</li> </ul>
<ul style="list-style-type: none"> <li>Robotics are improving the speed, quality, and costs of all manufactured goods.</li> </ul>
<ul style="list-style-type: none"> <li>Robots are programmed to do the special jobs that are too dangerous, detailed, or boring for humans.</li> </ul>
<ul style="list-style-type: none"> <li>Technology advances in audio/video communication has an impact on the way information is gathered, packaged, manipulated, and presented.</li> </ul>
<ul style="list-style-type: none"> <li>A/V productions are produced with different purposes in mind.</li> </ul>
<ul style="list-style-type: none"> <li>A/V production is a multi-stage process.</li> </ul>
<ul style="list-style-type: none"> <li>A/V production competencies are developed through a sequential study of the principles of design and composition.</li> </ul>
<ul style="list-style-type: none"> <li>Technological advances in A/V communications has created multiple and ever-evolving career opportunities.</li> </ul>
<ul style="list-style-type: none"> <li>Alternative energies provide far less damage to the environment than nuclear and fossil fuel sources.</li> </ul>
<ul style="list-style-type: none"> <li>Alternative energies (solar, wind, tidal, geothermal, biomass) are renewable resources because we will not run out of the.</li> </ul>
<ul style="list-style-type: none"> <li>In the 21<sup>st</sup> century, producing energy from non-polluting renewable resources will increase quality of life.</li> </ul>

**LEARNING STRAND**

1.0 Transferable Skills

NOTE: This learning strand should be taught through the integration of the other learning strands. This learning strand is not meant to be taught in isolation as a separate unit.

**ENDURING UNDERSTANDING(S)**

- Life long learners are able to apply and refine skills as they prepare for their future endeavors.
- Transferable skills, content knowledge, and positive attributes help prepare students for employment and educational opportunities.
- There are ethical and legal concerns related to all individual and business actions.
- The 21<sup>st</sup> century worker must be able to work independently and in team settings.

**ESSENTIAL QUESTION(S)**

- What safety precautions do I have to follow?
- How can I assess the situation and implement change?
- What are the characteristics of an organized person? What do I need to do to be more organized?
- What is a leader?
- What is work ethic?
- What responsibility do I have to prevent wrongdoing in the workplace?
- How does what I am doing in the classroom relate to the “real world” and future careers?
- How have/do technological developments affected careers and society?
- What is the best way to communicate my ideas clearly and succinctly?
- How does technology make work more efficient, effective and/or productive?
- How does technology affect society? (cultural, social, economic, and political)

**LEARNING OBJECTIVES** The student will:

- 1.1 Identify and apply the highest standards of safe practices as is required in the world of work.
- 1.2 Describe how technological development affects careers and occupations.
- 1.3 Discuss how technological systems have been used to solve human problems
- 1.4 Explore career opportunities to determine occupational and educational choices.
- 1.5 Develop leadership skills and positive self image.
- 1.6 Define the concept of “work ethic”.
- 1.7 Compare and contrast expectations in the workplace and the classroom as they pertain to efficiency, effectiveness and productivity.
- 1.8 Work cooperatively in small and large group activities.
- 1.9 Develop, test and modify a design idea

**INSTRUCTIONAL SUPPORT MATERIALS**

- See other learning strands for integration

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- See other learning strands for integration

**SUGGESTED ASSESSMENT METHODS**

- See other learning strands for integration

<p>through experimentation.</p> <p>1.10 Communicate in writing about a topic using different formats applying relevant vocabulary, supporting evidence and clear logic.</p> <p>1.11 Identify and use the appropriate tools and equipment safely.</p> <p>1.12 Apply problem solving skills to critically approach a situation and work through the steps to solve the problem.</p> <p>1.13 Develop organizational skills that assist with data collection, data analysis and synthesis.</p> <p>1.14 Apply research skills to collect information, summarize the findings and to cite the sources used.</p> <p>1.15 Apply computer-based tools such as PowerPoint, Word, and Excel, to organize and present information.</p> <p>1.16 Demonstrate self expression and creativity through different projects.</p> <p>1.17 Develop a positive attitude and become an independent learner in order to prepare for the future.</p>	
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<b><u>LEARNING STRAND</u></b>	
2.0 Grade 6 – Design and Manufacturing	
<b><u>ENDURING UNDERSTANDING(S)</u></b> <ul style="list-style-type: none"> <li>• The design and manufacturing process turns raw materials into usable products for society.</li> <li>• Skilled and safe use of materials and equipment will result in quality construction.</li> </ul>	<b><u>ESSENTIAL QUESTION(S)</u></b> <ul style="list-style-type: none"> <li>• What are the critical components of manufacturing?</li> <li>• What is involved when manufacturing a wood project?</li> <li>• What safety precautions do I have to follow?</li> </ul>
<b><u>LEARNING OBJECTIVES</u></b> The student will: <ul style="list-style-type: none"> <li>2.1 Explain the process of manufacturing using a real life example. <ul style="list-style-type: none"> <li>• Design</li> <li>• Prototype</li> <li>• Choice of materials</li> <li>• Cost analysis</li> <li>• Mass production</li> <li>• Distribution</li> </ul> </li> <li>2.2 Discuss the four process of manufacturing (machining, forming, fastening, and finishing).</li> <li>2.3 Apply the manufacturing pyramid to a new situation (people, information, raw materials, energy, capital, and time).</li> <li>2.4 Demonstrate the appropriate and safe use of woodworking tools and equipment.</li> <li>2.5 Interpret working drawings to construct a project.</li> <li>2.6 Develop a parts list including quantity and size of materials.</li> <li>2.7 Read a ruler to within 1/16" to accurately measure and cut.</li> <li>2.8 Cut materials to specifications accurately and safely.</li> <li>2.9 Select the appropriate equipment for a specific job.</li> <li>2.10 Assemble a project with adhesive (glue) and/or fasteners (dowels, nails, screws, staples).</li> <li>2.11 Explain how to prepare a wood project for finishing.</li> <li>2.12 Explain how to select and apply an appropriate finish.</li> <li>2.13 Explore careers related to manufacturing technologies.</li> </ul>	<b><u>INSTRUCTIONAL SUPPORT MATERIALS</u></b> <ul style="list-style-type: none"> <li>• Miter box, measurement tools, assorted fasteners, pneumatic nailer, adhesives, jig saws, drill press, sanding equipment, finishing equipment</li> <li>• Assorted supplies</li> <li>• Assorted hand tools and machines</li> <li>• Safety equipment including goggles, aprons, and hair nets</li> </ul> <b><u>SUGGESTED INSTRUCTIONAL STRATEGIES</u></b> <ul style="list-style-type: none"> <li>• Review and model safety rules and procedures</li> <li>• Sketch the design of the prototype</li> <li>• Discuss different products that can be made in class such as a small wood box, napkin holder, bird house, coat rack / shelf, pencil box, etc. and select project based on student interest</li> <li>• Demonstrate safe use of tools and equipment</li> <li>• Discuss time management and efficiency as related to manufacturing</li> <li>• Discuss factors that affect the visual appearance of final project such as knots in wood, technique of craftsman, etc.</li> <li>• Model techniques such as pre-sanding, lay out of the fastener holes, pre-drilling, sawing, etc.</li> <li>• Procedural writing – explain the step by step process used to create their project</li> <li>• Writing assignment using relevant vocabulary or the essential questions</li> <li>• Draw a flow chart that represents the manufacturing process and how it applies to their project</li> <li>• Class presentations</li> </ul>

- Model and practice measurement activities
- Discuss the maintenance and care of tools

**SUGGESTED ASSESSMENT METHODS**

- Teacher observations of safe and appropriate use of equipment (tools and machines)
- Rubric for finished project based:  
Choice of materials
  1. Choice of materials
  2. Layout
  3. Fabrication
  4. Assembly
  5. Finish
- Homework
- Tests and quizzes
- Writing assignments:
  1. Exploring careers in manufacturing
  2. Real world connections
- Project-based Portfolio

**LEARNING STRAND**

3.0 Grade 6 – Communications – Mechanical Drawing

**ENDURING UNDERSTANDING(S)**

- In order to fabricate an object it requires many steps of planning, drawing and revisions before the object can be manufactured.
- Sketches and drawings are created from different views in order to create manufacturing plans of a three dimensional object.
- Standardized procedures for drawings are essential to communicate with varied tradesmen in a common language.

**ESSENTIAL QUESTION(S)**

- What are the benefits of proper view placement?
- How does sketching aid in the drawing process?
- How would carelessness affect accuracy?
- How do multi view drawings convey ideas more efficiently than a single view drawing?
- Why is it necessary to use proper dimensioning, line types and layout in drawings?
- How do dimensions help you interpret a drawing?
- What problems would arise from inaccurate or a lack of dimensions?

**LEARNING OBJECTIVES** – The student will:

- 3.1 Demonstrate the proper use of basic drafting tools (t-square, triangle, ruler, drafting board, etc.).
- 3.2 Describe the appropriate situation where the specific tool would be used.
- 3.3 Demonstrate the procedure for orientating a drawing, utilizing proper drafting techniques.
- 3.4 Accurately measure utilizing a ruler plus or minus 1/16”.
- 3.5 Draw a simple drawing.
- 3.6 Utilize orthographic projection to create multi view drawings including:
  - Dividing lines
  - Angles
  - Dimensioning
- 3.7 Explore careers related to mechanical drafting technologies.

**INSTRUCTIONAL SUPPORT MATERIALS**

- LCD projector and screen
- Plexiglas box used for viewing objects from multi-views
- Assorted pictorial drawings
- T-square, triangle, ruler, drafting board, etc.
- Models of basic geometric shapes
- Mechanical drafting machine, wall mounted

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- **Discuss the importance of sketching**
- Discuss the maintenance and care of drafting tools
- Board demonstrations of proper technique
- Explain the representation of line types: solid/object and hidden
- Demonstrate proper dimensioning on multi view drawings
- Locate and draw a dividing line on an objects
- Use dimensions to locate parts on a drawing
- Math integration – reinforce math objectives including the following terms: parallel, perpendicular, angles, degrees, radius, diameter, circumference, arc, chord, pi, surface area, perimeter and volume
- Construct a design and create a surface

	<p>development (such a simple box)</p> <ul style="list-style-type: none"><li>• Develop 2D and 3D drawings</li><li>• Discuss and apply related vocabulary such as orthographic, isometric, line nomenclature, multi-view, dimensioning, etc.</li><li>• Using a variety of shapes have students create multi-view sketches - top, front and right side</li><li>• Use a clear Plexiglas box to help students identify the different views</li><li>• Measuring activities</li><li>• Peer assistance</li></ul> <p><b><u>SUGGESTED ASSESSMENT METHODS</u></b></p> <ul style="list-style-type: none"><li>• Teacher observations of student work and application of skills</li><li>• Participation</li><li>• Measurement assessment</li><li>• Writing assignment to answer essential questions</li><li>• Rubric for drawings<ol style="list-style-type: none"><li>1. neatness</li><li>2. accuracy</li><li>3. measurement</li></ol></li><li>• Self assessments</li><li>• Portfolio</li></ul>





**LEARNING STRAND**

4.0 Grade 7 – Structural Designs

**ENDURING UNDERSTANDING(S)**

- In the design of structures, there is a need to consider factors such as function, materials, safety, cost, stresses, and appearance.
- The strength of a structure is determined by its materials and shape.
- The design and manufacturing process turns raw materials into usable products for society.

**ESSENTIAL QUESTION(S)**

- What forces affect a structure’s ability to withstand stress?
- What are some principles of effective construction?
- What factors influence the strength and durability of a structure?
- How do the needs and resources of society affect the construction of any structure?

**LEARNING OBJECTIVES** – The student will:

- 4.1 Identify the major bridge types (cable, suspension, truss, beam, arch) and the best application of each bridge type.
- 4.2 Identify the major structural construction methods (balloon, platform, I – beam)
- 4.3 Evaluate forces (stress, tension, and compression) that influence structural design.
- 4.4 Discuss structural designs and how factors such as societal needs, available resources and environmental factors influence their design.
- 4.5 Sketch a structural design (bridge or tower).
- 4.6 Create a scaled drawing of a structure.
- 4.7 Assemble structural model to scale from the specified design.
- 4.8 Evaluate structure in relationship to specified design criteria.
- 4.9 Test structure to specified design criteria.
- 4.10 Analyze data for efficiency of different structures.
- 4.11 Explore careers related to design engineering and construction technologies.

**INSTRUCTIONAL SUPPORT MATERIALS**

- Material tester
- Balsa wood
- Saws, adhesives, rulers, clamps, portable non-stick work surface, tape
- Graph paper and index cards
- Videos and pictures of bridges and towers
- Models of sample projects
- Computer simulation for bridge building: After class bridge building activity, have students create a bridge using **West Point Bridge Building**  
(<http://bridgecontest.usma.edu/download.htm>)

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- Design a “house of cards” structure and test by compression
- Design a paper tower structure to achieve maximum height with specific materials
- Demonstrate the safe and appropriate use of material and equipment
- Discuss project criteria parameters that students must adhere to in designing and constructing their structure
- Design, construct, and test balsa wood structure using appropriate methods
- Video tape students building and testing structures
- Guest speakers on structural design
- Explore current events related to structures

**SUGGESTED ASSESSMENT METHODS**

- Rubric requirements for finished project
  1. Design
  2. Accuracy of model to design
  3. Test
  4. Testing outcomes
- Evaluate structure before, during, and after testing for efficiency
- Written student evaluation on outcome of structural testing, and proposed improvements to original design brief
- Portfolio

**LEARNING STRAND**

5.0 Grade 7 – Computer Aided Drafting (CAD)

**ENDURING UNDERSTANDING(S)**

- Computer Aided Drafting allows society to complete technical drawings more efficiently and accurately.
- In order to fabricate an object it requires many steps of planning, drawing and revisions before the object can be manufactured.
- Transferable skills and knowledge, and positive attributes help prepare students for employment and educational opportunities.

**ESSENTIAL QUESTION(S)**

- What are the benefits of proper view placement?
- How would carelessness affect accuracy?
- How do multi view drawings convey ideas more efficiently than a single view drawing?
- Why is it necessary to use proper dimensioning, line types and layout in drawings?
- How do dimensions help you interpret a drawing?
- What problems would arise from inaccurate or a lack of dimensions?
- How does CAD compare to traditional drawings?

**LEARNING OBJECTIVES** – The student will:

- 5.1 Describe the appropriate situation where a required command would be used.
- 5.2 Demonstrate the procedure for orientating a drawing, utilizing proper drafting techniques.
- 5.3 Accurately measure utilizing the proper measurement command to specified standards.
- 5.4 Create drawings:
  - Multi-view
  - Isometrics
  - Dimensions
- 5.5 Explore careers related to computer aided drafting technologies.

**INSTRUCTIONAL SUPPORT MATERIALS**

- Computer and CAD software
- LCD projector to display models
- Plexiglas box used for viewing objects from multi-views
- Learning Activity Packets
- Models of basic geometric shapes
- Plotters/Printers

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- Computer demonstrations of proper techniques and procedures
- Explain the representation of line types: solid/object and hidden
- Demonstrate proper dimensioning on multi view drawings
- Use dimensions to locate parts on a drawing
- Math integration – reinforce math objectives including the following terms: parallel, perpendicular, angles, degrees, radius, diameter, circumference, surface area, perimeter, volume, fractions, and decimals
- Construct a design and create a surface development (such a simple box)
- Develop orthographic and isometric drawings

- Discuss and apply related vocabulary such as orthographic, isometric, line nomenclature, multi-view, dimensioning, etc.
- Use a clear Plexiglas box to help students identify the different views
- Measuring activities
- Peer assistance

**SUGGESTED ASSESSMENT METHODS**

- Teacher observations of student work and application of skills
- Participation
- Measurement assessment
- Rubric for drawings
  1. neatness
  2. accuracy
  3. measurement
- Self assessments
- Ongoing formative assessments
- Portfolio (printed and electronic)

**LEARNING STRAND**

6.0 Grade 8 – Transportation Systems

**ENDURING UNDERSTANDING(S)**

- Transportation systems are used to move goods and people.
- Safety issues are a major concern that impacts all transportation systems.
- Propulsion systems are unique to each mode of transportation.
- All transportation systems have an impact on the environment.
- Laws of motion and scientific principles impact all modes of transportation.

**ESSENTIAL QUESTION(S)**

- How is society affected by the different modes of transportation?
- How do the different modes of transportation impact the environment?
- What would happen to life as we know it if the internal combustion engine was made illegal to use worldwide?
- How has technology transportation safety systems changed the modes of transportation presently and for future implications?
- How do the principles of science affect all modes of transportation?

**LEARNING OBJECTIVES** – The student will:

- 6.1 Understand transportation systems and the environments used to move goods and people and the subsystems common to each.
- 6.2 Describe the transportation subsystems (body/ frame, propulsion, suspension, control, guidance, and support) in a variety of transportation devices.
- 6.3 Experiment with model marine, space, land and air transportation systems.
- 6.4 Compare and contrast advantages and disadvantages of each mode of transportation.
- 6.5 Evaluate the impact of different modes of transportation on the environment.
- 6.6 Explore career opportunities in the transportation field.
- 6.7 Design and fabricate a simulated vehicle for transportation on land, in the sea, or in the air.
- 6.8 Investigate Newton’s three laws of motion.
- 6.9 Explore careers related to transportation systems technologies.

**INSTRUCTIONAL SUPPORT MATERIALS**

- Magnetic levitation:
  - 1. Track
  - 2. Magnets
  - 3. Styrofoam
  - 4. Styrofoam hotwire cutters
  - 5. Motors with propellers
  - 6. Power supply
  - 7. Timer
  - 8. Surform cutting tools
- Rocketry
  - 1. Rocket kits
  - 2. Air compressor
  - 3. Launching system
  - 4. Measuring devices
- Watercraft
  - 1. Hull design tester
  - 2. Timing device
- Wheeled vehicle
  - 1. Track
  - 2. Timing device
  - 3. Vehicle kit

### **SUGGESTED INSTRUCTIONAL STRATEGIES**

- Classroom presentations on each of the different modes of transportation
- Use research and development processes to solve a specific transportation problem
- Written research project on the history of transportation
- Develop data using scientific methods to make predictions on the effectiveness of the transportation vehicles identified above
- Cooperative peer learning to compare and contrast actual project outcomes
- Build and test a simulated transportation vehicle
- NASA videos and internet site  
[www.exploration.grc.nasa.gov/education/rocket/bgmr.html](http://www.exploration.grc.nasa.gov/education/rocket/bgmr.html)
- [www.estesrockets.com](http://www.estesrockets.com)
- [www.nascar.com](http://www.nascar.com)
- [www.boatingbasicsonline.com](http://www.boatingbasicsonline.com)

### **SUGGESTED ASSESSMENT METHODS**

- Authentic assessments
  1. Time
  2. Velocity
  3. Distance
  4. Mathematical calculations
- Participation
- Self and peer evaluation
- Design considerations
- Oral presentations
- Written reports

**LEARNING STRAND**

7.0 Grade 8 – Robotics

**ENDURING UNDERSTANDING(S)**

- Robotics play a major role in the automation of American industry.
- Robotics are improving the speed, quality, and costs of all manufactured products.
- Robots are programmed to do special jobs that are too dangerous, detailed, or boring for humans.

**ESSENTIAL QUESTION(S)**

- Will robotics some day eliminate the majority of human-manned production jobs?
- What skills will be needed for career advancement in the field of robotics technology?
- In what ways would a robotic delivery system make your own life easier?

**LEARNING OBJECTIVES** – The student will:

- 7.1 Describe the different types of robots and and the variety of jobs they perform.
- 7.2 Explore the types, classifications, and applications of industrial robots.
- 7.3 Design robots to perform specific tasks.
- 7.4 Demonstrate how computers control robots by constructing computer-controlled robot models.
- 7.5 Explain the uses of robotic sensors.
- 7.6 Utilize different types of robotic sensors and their applications.
- 7.7 Create a computer program to direct the robot to perform a specific task.
- 7.8 Explore career opportunities in the field of robotics.

**INSTRUCTIONAL SUPPORT MATERIALS**

- NXT Robotics Engineering 1 Curriculum by LEGO Education
- NXT Robotics Engineering 1 GS Package
- NXT Resource Kit
- NXT Ultrasonic Sensor
- NXT Sound Sensor
- NXT Rechargeable Batteries
- NXT Battery Charger
- NXT Interactive Servo Motor
- NXT Connector Cables (assorted sizes)
- NXT Intelligent Brick
- Computers
- DVD Player
- NXT Bluetooth Dongle (wireless computer connection)
- Advances in Industrial Robots DVD
- Robots: An Important Place in World History DVD
- Robotics: Designed to Meet Almost Any Need DVD
- Timing devices

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- Research the different types of robots utilized in all facets of life
- Discuss and review technical vocabulary
- Identify the specific task(s)/brief that the robot will perform
- Discuss robotic movement(s) as it pertains to a specific task(s)/brief



	<ul style="list-style-type: none"><li>• Demonstrate use of LEGO robotics for a specific task/brief</li><li>• Demonstrate sensor types and their applications</li><li>• Create a robot to perform a specific design task(s)/brief</li><li>• <a href="http://www.youthlearn.org">www.youthlearn.org</a></li><li>• <a href="http://www.usfirst.org">www.usfirst.org</a></li><li>• <a href="http://www.robots.net">www.robots.net</a></li><li>• <a href="http://www.LEGOeducation.com">www.LEGOeducation.com</a></li></ul> <p><b><u>SUGGESTED ASSESSMENT METHODS</u></b></p> <ul style="list-style-type: none"><li>• Student participation</li><li>• Teacher observation of safe and appropriate use of equipment</li><li>• Rubric to assess robotic operations related to the specified task</li><li>• Student research presentations on robotic applications in multiple career fields</li><li>• Student self-assessment on the outcomes of their intended robotic task(s)</li><li>• Tests and quizzes</li></ul>
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**LEARNING STRAND**

8.0 Grade 8 - Audio/Video Communication

**ENDURING UNDERSTANDING(S)**

- Technology advances in audio/video communication has an impact on the way information is gathered, packaged, manipulated, and presented.
- A/V productions are produced with different purposes in mind.
- A/V production is a multi-stage process.
- Technological advances in A/V communications has created multiple and ever-evolving career opportunities.

**ESSENTIAL QUESTION(S)**

- How are audio sounds and video images created and edited?
- How can the choice of equipment affect the intended A/V production outcome?
- How is information organized to present information efficiently and effectively?
- What steps are necessary to complete an A/V production?
- How will A/V technological advancements impact society in the next decade?

**LEARNING OBJECTIVES** – The student will:

- 8.1 Discover the fundamental principles of A/V production and broadcasting.
- 8.2 Demonstrate the proper use of various types of audio and video equipment.
- 8.3 Create a 30-second audio commercial.
- 8.4 Create a 60-second video presentation.
- 8.5 Analyze how a video program is designed, produced, and delivered.
- 8.6 Demonstrate editing techniques that improve audio and video footage.
- 8.7 Utilize appropriate duplicating equipment to produce audio/video reproductions.
- 8.8 Research copyright, licensing, and broadcast laws.
- 8.9 Use the Occupational Outlook Handbook to explore careers in the A/V production industry.

**INSTRUCTIONAL SUPPORT MATERIALS**

- Hearlihy Audio Video Curriculum
- Headphones
- Occupational Outlook Handbook
- Dual cassette player
- Color Television
- VCR/DVD/CD player
- Microphones
- Digital video camera
- Stereo mixing board
- Camera tripod
- Stereo amplifier
- Speakers
- Mini DV tapes

**SUGGESTED INSTRUCTIONAL STRATEGIES**

- Cooperative learning experience to produce an audio commercial and a video presentation
- Oral presentations of student(s) work or activities to teacher or class
- Research career opportunities in A/V Production
- Peer editing of scripts and broadcast
- Problem-based instruction
- Design brief including script writing, producing, and editing a video program
- Design a TV commercial using a storyboard format
- Present previous student's video production as examples
- Demonstrate the proper use of audio and video equipment used in A/V production

**SUGGESTED ASSESSMENT METHODS**

- Pre-test/Post-test
- Projects
- Oral presentations
- Writing assignments
- Participation
- Peer evaluation
- Self evaluation
- Rubrics for design, production, and presentation

**LEARNING STRAND**

9.0 Grade 8 – Alternative Energies

**ENDURING UNDERSTANDING(S)**

- Alternative energy provides far less damage to the environment than nuclear and fossil fuel sources.
- Alternative energies (solar, wind, tidal, geothermal, biomass) are renewable resources.
- In the 21<sup>st</sup> century, producing energy from non-polluting renewable resources will increase quality of life.

**ESSENTIAL QUESTION(S)**

- What is energy?
- What is the greenhouse effect?
- What are the consequences of the continuing use of fossil fuel sources?
- What role will renewable and non-renewable energy sources play in the economy in the year 2050?
- How will the 21<sup>st</sup> century address the issue of environmental protection?
- What can you immediately do to contribute to the greening of America?

**LEARNING OBJECTIVES** – The student will:

- 9.1 Identify the basic forms, types, and characteristics of energy.
- 9.2 Describe how fossil fuels such as coal, oil, and natural gas are used as energy sources?
- 9.3 Recognize the importance of fossil fuel conservation and the need to develop alternative energy sources.
- 9.4 Differentiate between renewable and non-renewable energy sources.
- 9.5 Demonstrate the ability to read a volt or ammeter.
- 9.6 Design simulated models utilizing alternative energy sources.
- 9.7 Explore a variety of alternative energy sources that can be used to provide power for providing transportation, heating, and lighting buildings and supporting industry.
- 9.8 Use the Occupational Outlook Handbook to explore career opportunities in the field of alternative energy.

**INSTRUCTIONAL SUPPORT MATERIALS**

- Volt or ammeter
- DVD's:
  1. Energy: Nature's Power Source (mechanical, thermal, light)
  2. Energy: Nature's Power Source (chemical, electrical, nuclear)
  3. The Power of Wind III
  4. Geothermal Energy: A Renewable Option
  5. Fossil Fuels
  6. Science In Action: Solar Energy
- Secondary Energy Information Workbooks
- Occupational Outlook Handbook
- Understanding Energy CD-ROM
- Activity Kits:
  1. Solar
  2. Wind
  3. Biomass
  4. Tidal
  5. Geothermal
- Computer

### **SUGGESTED INSTRUCTIONAL STRATEGIES**

- Class presentations on assigned energy sources
- Differentiate between alternative and conventional energy sources using simulated models
- Student fabrication of individual energy kits
- Demonstrate the safe and appropriate use of materials and equipment.
- Utilize appropriate equipment to measure the alternative energy forms
- Guest speakers and/or field trips related to various energy sources
- Explore current events as it relates to energy
- Writing assignment using relevant vocabulary words or the essential questions
- Use A/V material to enhance energy presentations
- Department of Energy websites:  
[www.eere.energy.gov](http://www.eere.energy.gov)  
[www.1eere.energy.gov/biomass/](http://www.1eere.energy.gov/biomass/)  
[www.1eere.energy.gov/hydrogenandfuelcells/](http://www.1eere.energy.gov/hydrogenandfuelcells/)  
[www.1eere.energy.gov/solar/](http://www.1eere.energy.gov/solar/)  
[www.1eere.energy.gov/geothermal](http://www.1eere.energy.gov/geothermal)  
[www.1eere.energy.gov/windandhydro/](http://www.1eere.energy.gov/windandhydro/)

### **SUGGESTED ASSESSMENT METHODS**

- Student self evaluation rubric
- Student activity work sheets
- Test and quizzes
- Research and writing assignments
- Teacher observation of student work and participation
- Peer evaluation
- Evaluate student simulated energy activities