Grade: 6 Subject: Technology and Engineering Education  
Course: Exploring Technology  
Unit: Technology, Manufacturing, Automation  
Time frame for Completion: 22 classes

Enduring Understandings / Big Ideas: Over time, technological change has had a profound influence on individuals, society, careers, and the environment. These changes are neither good nor bad and can have far-reaching positive and negative impacts.

Essential Questions: Why is it important to be able to identify and explain technology used everyday in our world? Why is technology largely responsible for the great changes in our world, society, and the way we live? Why is it important to learn about manufacturing systems and technology in a global economy?

<table>
<thead>
<tr>
<th>Learning Competencies - What the students will know and be able to do upon completion of the unit</th>
<th>Supportive Learning Activities</th>
<th>Assessments</th>
<th>Resources</th>
<th>PDE Academic Standards</th>
</tr>
</thead>
</table>
| Students will be able to define and explain technology | Teaching Strategies - Large Group Demos  
Small Group Instruction  
Individualized Instruction  
Multimedia Presentation  
Journal Writing  
Hands-On Activities  
Cooperative Learning | Formative: Check for understanding questions will be utilized during large group instruction.  
Students will be asked open-ended questions during small group and individualized instruction to check for understanding.  
Students will demonstrate proper use of tools and design concepts while completing design challenges.  
Wida Access Placement Test (W-APT) | Teacher Resources – Engineering by Design Curriculum  
Tech Lab Tools, Equipment, and Materials  
Laptop Computer  
Multimedia Projection  
Concrete and Kids Curriculum | See Addendum for details  
Science and Technology and Engineering  
3.2.6.A 1  
3.2.6.A 2  
3.2.6.A 4  
3.2.6.A 5  
3.4.6. A 1  
3.4.6.A 2  
3.4.6.A 3  
3.4.6 B 1  
3.4.6 B 4  
3.4.6 C 1  
3.4.6 C 2  
3.4.6 C 3  
3.4.6 D 3  
3.4.6 E 7 |
| Students will list examples of how technology has impacted society, individuals, and the environment. | Learning Activities – Large Group Instruction  
Students will participate in presentations and discussions covering Technology, Manufacturing, and Automation | | | |
| Students will differentiate between intended and unintended impacts of technology. | Manufacturing Activities Push-Pull Manufacturing  
Students will participate in a simulated manufacturing activity to learn, evaluate, and differentiate between manufacturing systems. | | | |
| Students will Defend the benefits and drawbacks of using robots in manufacturing. | | | | |
| Students will work cooperatively to manufacture a product. | | | | |
| Students will identify the changing nature of careers as a result of technological change. | | | | |
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| Manufacturing / Production | technical report for final evaluation.  
| Concrete Casting          | Students will complete a post-test for final evaluation.  
|                            | Student teams will be evaluated on their presentations using a grading rubric. |
| **Design Challenge**      |                                                                 |
| Students will work in teams to design, build, and test a concrete beam that meets specifications.  
| **Presentation**          |                                                                 |
| Students will plan an informal presentation and present their team’s design solution to the class.  
| [All activities are structured to work within each student’s “zone of proximal development” in English Language Acquisition]  

**Supplemental Resources:**  
- Alternative Assessment  
- ESL staff  
- Bilingual dictionaries  

**ELL:**  
http://www.cal.org/siop: Fifty Strategies for Teaching; English Language Learners, 2nd edition; Adrienne Herrell, Michael Jordan; (Merrill/Prentice Hall, 2003)

**Common Core Standards:**  
- **English Language Arts**  
  - ELA.1.2.6.F  
  - ELA.1.2.6.G  
  - ELA.1.2.6.J  
  - ELA.1.4.6.A  
  - ELA.1.4.6.F  
  - ELA.1.4.6.U  
  - ELA.1.4.6.V  
  - ELA.1.4.6.W  
  - ELA.1.4.6.X  
  - ELA.1.5.6.A  
  - ELA.1.5.6.C  
  - ELA.1.5.6.E  
  - ELA.1.5.6.F  
  - ELA.1.5.6.G  

- **Mathematics**  
  - CC.2.1.6.D.1  
  - CC.2.2.6.B.2  
  - CC.2.3.6.A.1  

- **Reading in Science and Technical Subjects**  
  - RST.3.5.6-8.C.  
  - RST.3.5.6-8.D.  
  - RST.3.5.6-8.I.  

- **Writing in Science and Technical Subjects**  
  - WST.3.6.6-8.B.  
  - WST.3.6.6-8.C.  
  - WST.3.6.6-8.E.
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**Unit:** Technology, Manufacturing, Automation  
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<th>WST.3.6.6-8.I.I.</th>
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</table>

**Student Interpersonal Skills**  
16.1.8.B  
16.1.8.C  
16.1.8.D  
16.2.8.C  
16.2.8.D  
16.3.8.A  
16.3.8.C

**Every Teacher Teaches ESL**  
**ELP Standard 1:** English Language Learners communicate in English for social and instructional purposes within the school setting.  
**ELP Standard 2:** English Language Learners communicate information, ideas, and concepts necessary for academic success in the content area of Language Arts.
Addendum

Science and Technology and Engineering

3.2.6.A 1 - Distinguish the differences in properties of solids, liquids, and gases.
3.2.6.A 2 - Compare and contrast pure substances with mixtures.
3.2.6.A 4 - Differentiate between physical changes and chemical changes.
3.2.6.A 5 - Identify characteristic properties of matter that can be used to separate one substance from the other.

3.4.6.A 1 - Identify how creative thinking and economic and cultural influences shape technological development.
3.4.6.A 2 - Explain how knowledge from other fields of study (STEM) integrate to create new technologies.
3.4.6.B 1 - Describe how economic, political, and cultural issues are influenced by the development and use of technology.
3.4.6.B 4 - Demonstrate how new technologies are developed based on people’s needs, wants, values, and/or interests.
3.4.6.C 1 - Recognize that requirements for a design include such factors as the desired elements and features of a product or system or the limits that are placed on the design.
3.4.6.C 2 - Show how models are used to communicate and test design ideas and processes.
3.4.6.C 3 - Explain why some technological problems are best solved through experimentation.
3.4.6.D 3 - Design and use instruments to evaluate data.

Mathematics

2.1.6.A - Model and compare values of whole numbers, mixed numbers, fractions, and decimals.
2.1.6.B - Represent whole numbers, fractions, mixed numbers, decimals, and percents in equivalent forms.
2.2.6.B - Add, subtract, multiply, and divide whole numbers, decimals, fractions, and mixed numbers.
2.3.6.B - Use appropriate units to measure perimeter, area, and volume; use a protractor to measure angles between 0 and 180 degrees.
2.3.6.D - Perform basic conversions within the metric and within the customary systems.

Reading, Writing, Speaking

1.2.6.E - Read, understand, and respond to essential content of text and documents in all academic areas.
1.6.6.A - Listen critically and respond to others in small and large group situations.
1.6.6.B - Demonstrate awareness of audience using appropriate volume and clarity in formal speaking presentations.
1.9.6.A - Use media and technology resources for self-directed learning, group collaboration, and learning throughout the curriculum.

Career Education and Work

13.1.5.C - Relate the impact of change to both traditional and nontraditional careers.
13.2.5.A - Apply appropriate speaking and listening techniques used in conversation.
13.2.5.E - Apply to daily activities, the essential workplace skills, such as, but not limited to:
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- Commitment
- Communication
- Dependability
- Health/safety
- Personal initiative
- Scheduling/time management
- Team building
- Technical literacy
- Technology

13.3.5 B - Explain the importance of working cooperatively with others at both home and school to complete a task.
13.3.5 C - Identify effective group interaction strategies, such as, but not limited to:
- Building consensus
- Communicating effectively
- Establishing ground rules
- Listening to others

Common Core Standards

English Language Arts
CC.1.2.6.F - Determine the meaning of words and phrases as they are used in grade level reading and content, including interpretation of figurative language in context.
CC.1.2.6.G - Integrate information presented in different media or formats (e.g. visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
CC.1.2.6.J - Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.
CC.1.4.6.A - Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information clearly.
CC.1.4.6.F - Demonstrate a grade appropriate command of the conventions of standard English grammar, usage, capitalization, punctuation, and spelling.
CC.1.4.6.U - Use technology, including the Internet, to produce and publish writing as well as to interact and collaborate with others; demonstrate sufficient command of keyboarding skills to type a minimum of three pages in a single sitting.
CC.1.4.6.V - Conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate.
CC.1.4.6.W - Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of other while avoiding plagiarism and providing basic bibliographic information for sources.
CC.1.4.6.X - Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes and audiences.
CC.1.5.6.A - Engage effectively in a range of collaborative discussions, on grade level topics, texts, and issues, building on others’ ideas and expressing their own clearly.
CC.1.5.6.C - Interpret information presented in diverse media and formats (e.g. visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
CC.1.5.6.E - Adapt speech to a variety of contexts and tasks.
CC.1.5.6.F - Include multimedia components and visual displays in presentations to clarify information.
CC.1.5.6.G - Demonstrate command of the conventions of standard English when speaking based on grade 6 level and content.

Mathematics
CC.2.1.6.D.1 - Understand ratio concepts and use ratio reasoning to solve problems.
CC.2.2.6.B.2 - Understand the process of solving a one-variable equation or inequality and apply to real-world and mathematical problems.
CC.2.3.6.A.1 - Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.

Reading in Science and Technical Subjects
CC.3.5.6-8.C. - Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
CC.3.5.6-8.D. - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
CC.3.5.6-8.I. - Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

Writing in Science and Technical Subjects
CC.3.6.6-8.B. * - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
CC.3.6.6-8.C. - Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
CC.3.6.6-8.E. - Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
CC.3.6.6-8.F. - Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.

CC.3.6.6-8.G. - Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

CC.3.6.6-8.J.I. - Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

* = Funding needed to purchase equipment, materials, tools, supplies to implement curriculum
**Zone of Proximal Development:** That area between what the student is capable of at the moment and the point you want the student to reach next (Vygotsky, 1978)

**Stages of Second Language Acquisition:** (Hill, J., Flynn, K., 2006)

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
<th>Approximate Time Frame</th>
<th>Teacher Prompts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preproduction</td>
<td>The student</td>
<td>0-6 months</td>
<td>• Show me…</td>
</tr>
<tr>
<td>PDE: Entering</td>
<td>• Has minimal comprehension</td>
<td></td>
<td>• Circle the…</td>
</tr>
<tr>
<td></td>
<td>• Does not verbalize</td>
<td></td>
<td>• Where is…?</td>
</tr>
<tr>
<td></td>
<td>• Nods “yes” and “no”</td>
<td></td>
<td>• Who has…?</td>
</tr>
<tr>
<td></td>
<td>• Draws and points</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Early Production</td>
<td>The student</td>
<td>6 months to 1 year</td>
<td>• Yes/no questions</td>
</tr>
<tr>
<td>PDE: Beginning</td>
<td>• Has limited comprehension</td>
<td></td>
<td>• Either/or questions</td>
</tr>
<tr>
<td></td>
<td>• Produces one- or two-word responses</td>
<td></td>
<td>• One-or two-word answers</td>
</tr>
<tr>
<td></td>
<td>• Participates using key words and familiar phrases</td>
<td></td>
<td>• Lists</td>
</tr>
<tr>
<td></td>
<td>• Uses present-tense verbs</td>
<td></td>
<td>• Labels</td>
</tr>
<tr>
<td>Speech Emergence</td>
<td>The student</td>
<td>1-3 years</td>
<td>• Why…?</td>
</tr>
<tr>
<td>PDE: Developing</td>
<td>• Has good comprehension</td>
<td></td>
<td>• How…?</td>
</tr>
<tr>
<td></td>
<td>• Can produce simple sentences</td>
<td></td>
<td>• Explain…</td>
</tr>
<tr>
<td></td>
<td>• Makes grammar and pronunciation errors</td>
<td></td>
<td>• Phrase or short-sentence answers</td>
</tr>
<tr>
<td></td>
<td>• Frequently misunderstands jokes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate Fluency</td>
<td>The Student</td>
<td>3-5 years</td>
<td>• What would happen if…?</td>
</tr>
<tr>
<td>PDE: Expanding</td>
<td>• Has excellent comprehension</td>
<td></td>
<td>• Why do you think…?</td>
</tr>
<tr>
<td></td>
<td>• Makes few grammatical errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Fluency:</td>
<td>The student has a near native level of speech.</td>
<td>5-7 years</td>
<td>• Decide if…</td>
</tr>
<tr>
<td>PDE: Bridging</td>
<td></td>
<td></td>
<td>• Retell…</td>
</tr>
</tbody>
</table>