## Lesson Plan

<table>
<thead>
<tr>
<th>Course Title:</th>
<th>Concepts of Engineering and Technology</th>
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<tbody>
<tr>
<td>Session Title:</td>
<td>Introduction to Engineering Fundamentals and Civilization - Part 3 Technology and Society</td>
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### Performance Objective:
After completing Part 1, 2, and 3 of this lesson, students will be able to identify how the developments of engineering and technology influenced society and the development of civilization to the teacher’s satisfaction and by completing the quiz.

### Specific Objectives:
- Differentiate between science, technology, and engineering
- Identify how developments in science influence developments in technology and vice versa
- List some of the most important technologies in each time period
- Differentiate between the scientific process and the engineering design process
- Describe how technology influences their life and the world around them
- Identify the ethical considerations of technology and undesired consequences

## Preparation

### TEKS Correlations:
This lesson, as published, correlates to the following TEKS. Any changes/alterations to the activities may result in the elimination of any or all of the TEKS listed.

### Concepts of Engineering and Technology:
- **130.362 (c)(1)(A)(B)(C)(D)**
  - ...investigate and report on the history of engineering science;
  - ...identify the inputs, processes, and outputs associated with technological systems;
  - ...describe the difference between open and closed systems;
  - ...describe how technological systems interact to achieve common goals;

### Interdisciplinary Correlations:

#### Physics:
  - ...know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;
  - ...know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;
  - ...know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but may be
subject to change as new areas of science and new technologies are developed; 
...distinguish between scientific hypotheses and scientific theories;

- **112.39 (c)(3)(D)**
  ...explain the impacts of the scientific contributions of a variety of historical and 
contemporary scientists on scientific thought and society;

**English:**

- **110.42(b)(6)(A)(B)**
  …expand vocabulary through wide reading, listening, and discussing;
  …rely on context to determine meanings of words and phrases such as figurative 
language, idioms, multiple meaning words, and technical vocabulary;

- **110.42(b)(7)(A)(l)(J)**
  …establish a purpose for reading such as to discover, interpret, and enjoy;
  …use study strategies such as skimming and scanning, note taking, outlining, and using 
study-guide questions to better understand texts;
  …read silently with comprehension for a sustained period of time;

### Teacher Preparation:

Introduction to Engineering Fundamentals and Civilization is a 3-part lesson. Teachers should 
review Part 1 Definitions; Part 2 History; and Part 3 Technology and all supporting documents 
such as PowerPoint presentations and notes; Definitions handout; Matching Activity handout; 
and Quiz to be prepared to deliver all 3 parts of this lesson.

### References:

Cengage Learning.
Wikipedia
Other references as noted

### Instructional Aids:

1. PowerPoint presentation - Part 3
2. PowerPoint notes – Part 3
3. Quiz
4. Quiz Key

### Materials Needed:

1. Pen or pencil

### Equipment Needed:
1. TV
2. Computer
3. Overhead projector

**Learner Preparation:** None required.

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**Introduction**

**Introduction (LSI Quadrant I):**

**SAY:** As we get closer to present time, the pace of technology development is increasing.

**ASK:** Looking at the industrial age (before computers and the internet), what do you think were some of the most important engineering and technological developments?

**SHOW:** A TV. Was this an important development? How has this changed society?

**SAY:** Many inventions from the industrial age came from individuals.

**ASK:** Can you name some of the important inventors of the industrial age?

**ASK:** Does anyone know who Philo Farnsworth is?

**SHOW:** A computer.

**ASK:** How did this change society?

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**Outline**

**Outline (LSI Quadrant II):**

Instructors can use the PowerPoint presentation, slides, handouts, and note pages in conjunction with the following outline.

<table>
<thead>
<tr>
<th>MI</th>
<th>Outline</th>
<th>Notes to Instructor</th>
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<tbody>
<tr>
<td></td>
<td>Up to this point, students have learned by memorization and study of provided documents. This section can be defined by student-based research, writing papers, and presentations. Prepare to spend a week (or more) letting students perform research, writing, and preparing presentations.</td>
<td>Students are much more familiar with technologies from these eras, although they will take many important developments for granted. Get them to realize how fundamental and how important to our way of life many of these developments are.</td>
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</table>
| | I. The big theme here is the large number of especially important developments  
   A. Many things students take for granted, like electricity, television, the car.  
   B. There were big changes in society during this time. | Begin PowerPoint presentation. These are the big themes you should try to leverage student interest into academic work like papers or |

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II. In a short period of time, we have had a series of shorter and shorter ages
   A. The Industrial Revolution
   B. The second Industrial Revolution (in the 20th century, commonly associated with electrification)
   C. The Information Age (the computer and the internet)
   D. Virtual communication (cell phones, e-mail, facebook, texting)

There is a huge amount of research students can do over any number of topics. Let students select things that interest them.

Slides 2-5

III. There is an argument that we have entered a new age, the virtual communications age.
   A. Defined by connectivity, relations, and communication
   B. Constant availability
   C. No time or distance boundary

This topic could lead to a serious group discussion. Encourage your students to think of both positive and negative aspects of new communications technology. Can humans change the way they communicate over just one generation?

Slide 6

IV. Ethics
   A. A social conscience
   B. Consequences of technology
   C. Licensure
   D. Professional societies

There are trade-offs involved in any technology.

Slides 7-12

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<tr>
<th>Verbal</th>
<th>Logical</th>
<th>Linguistic</th>
<th>Visual</th>
<th>Spatial</th>
<th>Musical</th>
<th>Rhythmic</th>
<th>Bodily</th>
<th>Kinesthetic</th>
<th>Intra-personal</th>
<th>Inter-personal</th>
<th>Naturalist</th>
<th>Existentialist</th>
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### Application

**Guided Practice (LSI Quadrant III):** Have students complete Matching Activity if they have not completed yet.

**Independent Practice (LSI Quadrant III):** Have students research important inventors of the 20th century. Have students research different technologies and how they affected society.

### Summary

**Review (LSI Quadrants I and IV):**

- Question: How did the telephone change society? Were people always available? Was there telephone etiquette?
- Answer: Any reasonable answer.

- Question: How is the cell phone changing society? When did the cell phone become popular?
- Answer: Instant, constant communication. Late 1990s.

### Evaluation

**Informal Assessment (LSI Quadrant III):** Question/answer, discussion.

**Formal Assessment (LSI Quadrant III, IV):** Quiz.

### Extension

**Extension/Enrichment (LSI Quadrant IV):** Give students a variety of options on research papers: pair/share, PowerPoint, Videos, oral presentations.
Introduction to Engineering Fundamentals and Civilization – Part 3

Quiz

1. Which of the following always involves a method or process?
   a. Technology
   b. Engineering
   c. Invention
   d. Constraint

2. Which of the following is a limitation?
   a. Constraint
   b. Artifact
   c. Criteria
   d. Ethics

3. A model can be which of the following?
   a. A mathematical formula
   b. A miniature representation
   c. A simplified system
   d. All of the above

4. Which of the following uses a design team?
   a. Science
   b. Society
   c. Entrepreneur
   d. Engineer

5. Which of the following is iterative?
   a. Science
   b. Engineering
   c. Criteria
   d. Infrastructure

6. Where would the performance of an item be categorized?
   a. Criteria
   b. Innovation
   c. Technology
   d. System
7. Economics, environmental, and ethical can be considered examples of:
   a. Alloys
   b. Technology
   c. Infrastructure
   d. Constraints

8. Which of the following is almost always identified as a thing?
   a. Science
   b. Technology
   c. Engineering
   d. Criteria

9. Which of the following explains what is, or what already exists?
   a. Science
   b. Technology
   c. Engineering
   d. Inventions

10. Which of the following involves forming a hypothesis?
    a. Economics
    b. Innovation
    c. The scientific method
    d. The engineering process

11. In which of the following would you build a prototype?
    a. The scientific method
    b. The engineering process
    c. Economics
    d. Society

12. Which of the following is NOT a key resource for engineering?
    a. Time
    b. Capital
    c. Artifact
    d. People
13. What was Moore’s Law?
   a. Computing power increases exponentially
   b. Technology increases exponentially
   c. Capital increases exponentially
   d. Time increases exponentially

14. True or false, when all of mankind’s basic needs are met, engineers will be out of work?

15. In which of the following ages did mankind BEGIN to domesticate animals?
   a. The Stone Age
   b. The Bronze Age
   c. The Iron Age
   d. The Renaissance

16. In which of the following ages does mankind continue to domesticate animals?
   a. The Iron Age
   b. The Bronze Age
   c. The Twentieth Century
   d. All of the above

17. On which of the following ages was development of weapons a major driver of technological development?
   a. The Stone Age
   b. The Iron Age
   c. The Twentieth Century
   d. All of the above

18. What was the most important technology development of the Stone Age?
   a. Control of fire
   b. Smelting
   c. Use of water as a power source
   d. The chariot

19. What was the most important technology development of the Bronze Age?
   a. Control of fire
   b. Smelting
   c. Use of water as a power source
   d. The chariot
20. When did we see the first organized religion?
   a. The Stone Age
   b. The Bronze Age
   c. The Iron Age
   d. The Middle Ages

21. Which of the following is an alloy of iron and carbon?
   a. Bronze
   b. Tin
   c. Nickel
   d. Steel

22. When did solid waste disposal become a problem?
   a. The Stone Age
   b. The Bronze Age
   c. The Iron Age
   d. The Middle Ages

23. Which of the following is an example of solid waste?
   a. Slag
   b. Copper
   c. Bronze
   d. Tin

24. When did we start to see the widespread use of foundries and mills?
   a. The Iron Age
   b. The Middle Ages
   c. The Industrial Revolution
   d. The Twentieth Century

25. When was the printing press developed?
   a. The Middle Ages
   b. The Renaissance
   c. The Industrial Revolution
   d. The Twentieth Century
26. When did colonization become popular?
   a. The Middle Ages
   b. The Renaissance
   c. The Industrial Revolution
   d. The Twentieth Century

27. When was the steam engine developed?
   a. The Middle Ages
   b. The Renaissance
   c. The Industrial Revolution
   d. The Twentieth Century

28. When did education become common for regular people?
   a. The Middle Ages
   b. The Renaissance
   c. The Industrial Revolution
   d. The Twentieth Century

29. What did the rule of law allow for?
   a. Environmental pollution
   b. Private property
   c. Government
   d. Religion

30. Pick an innovation from the Twentieth Century and explain why that is the most important invention of that time.

31. Which is more important for mankind, the cell phone or the internet? Why?

32. Give an example of a non-technology that has had a great impact on society.
Introduction to Engineering Fundamentals and Civilization – Part 3

Quiz Key

1. Which of the following always involves a method or process?
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30. Pick an innovation from the Twentieth Century and explain why that is the most important invention of that time.
   **Look for any reasonable answer with a coherent explanation**

31. Which is more important for mankind, the cell phone or the internet? Why?
   **Either, as long as they can justify their answer**

32. Give an example of a non-technology that has had a great impact on society.
   **Government, religion, laws, ethics, morality, etc.**