

## Unit I – Lesson I

### Introduction to Technological Issues Using an Historical Case Study

**Lesson Duration:** Four (4) hours.

#### STL Standards

- Students will develop an understanding of the role of society in the development and use of technology. (6)
- Students will develop an understanding of the influence of technology on history. (7)
- Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation and problem solving. (10)
- Students will develop the abilities to use and maintain technological products and systems. (12)

#### STL Benchmarks

- The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures. (6I)
- Throughout history, technology has been a powerful force in reshaping the social, cultural, political, and economic landscape. (7I)
- Not all problems are technological, and not every problem can be solved using technology. (10K)
- Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate. (12P)

#### Learning Objectives

**Note:** For each objective below, the standards are identified under T- technology or STL standards, M- mathematics or NCTM standards, or S- science or AAAS standards. Standards are listed in the Unit Introduction, and in Appendices A and B.

Upon completion of this lesson, students will be able to:

1. Recognize various types of issues that arise from the implementation of technology. (T6, T10, S9Q)
2. Classify the influences of technological issues into categories such as social, economic, technological, environmental, etc. (T6)
3. Examine historical events using a multitude of viewpoints. (T7)
4. Research and record data through the use of tables, charts, or data bases. (T12, M14H)
5. Assess major significant issues and their consequences based on historical records. (T7, S3P)
6. Use representations to model and interpret physical and social phenomena. (M22C)
7. Explain how progress in science and invention depends heavily on what else is happening in society. (S3P)
8. Demonstrate how social and economic forces strongly influence which technologies will be developed and used. (S9Q)
9. Contribute positively to a group effort.

#### Student Assessment Tools and/or Methods

**Assessment Instrument – Quiz** (See Appendix E for pre/post test.)

### Assessment Instrument – Group Work

Category	Below Target	At Target	Above Target
<b>Participation</b>	Seldom participated. Did very little work.	Cooperative. Did their part of the work. Often offered useful ideas.	Always willing to do more. Routinely offered useful ideas.
<b>Reliability</b>	Did not have work done on time. Did not show up when the group met.	Group members could count on them.	Went beyond what was expected of them.
<b>Attitude</b>	Did not support group members. Did not share information. Had little interest in success of group.	Supported effort of others. Did not cause problems in the group.	Listened to and shared ideas with others. Was very self-directed.

### Assessment Instrument – Research/Analysis

Category	Below Target	At Target	Above Target
<b>Variety of Sources</b>	Use very little or varied sources.	Used multiple sources with multiple perspectives.	Used many sources with a variety of viewpoints.
<b>Documentation</b>	Little or inadequate documentation.	All sources documented and done so properly.	Documentation was well developed and referenced.
<b>Reflection</b>	Analysis showed little effort.	Analysis was thorough and well thought out.	Analysis was exceptionally well thought out—showed keen insight.

### Assessment Instrument – Presentation

Category	Below Target	At Target	Above Target
<b>Organization</b>	Presentation is not well organized and is hard to follow.	Presentation is well organized and easy to follow.	Presentation is exceptionally well organized and flows very well.
<b>Creativity</b>	Presentation not very creative and somewhat boring.	Presentation is creative, showing a good deal of planning.	Presentation extremely creative, showing a good deal of thought went into preparation.
<b>Feedback</b>	Audience did not participate in the presentation.	Audience was attentive to the presentation, participated when asked.	Audience was extremely interested and asked many questions.

### Assessment Totals

ELEMENT	CRITERIA	POINTS POSSIBLE	EARNED ASSESSMENT	
			SELF	TEACHER
<b>Quiz</b>	As per above			
<b>Group work</b>	As per above			
<b>Research/ Analysis</b>	As per above			
<b>Presentation</b>	As per above			

**Resource Materials****Print-Based Sources**

1. *Social Issues in Technology: A Format for Investigation* (1986) P. Alcorn
2. *Technology in Western Civilization* (1967) M. Kranzberg & C. Pursell
3. *Science & Technology in World History* (1999) James McClellan III

**Audiovisual Materials**

1. *Connections* – James Burke
2. *The Day the Universe Changed* – James Burke
3. *Industrial Revolution* (libraryvideo.com)

**Internet Sites**

1. [www.loc.gov/rr/scitech/tracer-bullets/historyoftechtb.html](http://www.loc.gov/rr/scitech/tracer-bullets/historyoftechtb.html) – Library of Congress site for History of Science and Technology
2. [www2.lib.udel.edu/subj/hsci/internet.htm](http://www2.lib.udel.edu/subj/hsci/internet.htm) – University of Delaware library starting point for history research

**Purpose of Lesson**

To introduce the students to the types of issues that arise in the adoption of technology, categorize them, and reflect on how they have influenced people.

**Required Knowledge and/or Skills**

Students should have the ability to research a variety of mediums (print, Web, audio/visual), graphically represent the information, and analyze its content. The use of materials and information from other classes (disciplines) should be encouraged.

**Lesson I-1:****Engagement**

1. The teacher may begin by discussing different periods of human history, drawing on information that students have received in other classes. How did people adapt to their environments in each of those periods? How did they feed themselves, prepare goods such as clothing and tools, transport items, communicate, etc.?
2. Students should discuss how people addressed their basic human needs (shelter, food, etc.) and how people organized their social structures during those periods of history (government, religion, commerce, social status, etc.).
3. The teacher can introduce examples of technologies that were developed during various periods of history. Using specific examples, students can discuss how the technology influenced social structures and how the structures influenced the introduction of the technology. The automobile is a good example to start with for class participation. Consider life prior to the introduction of the automobile. How did we transport people and products? How far away could we realistically socialize? How did we deal with the pollution from our current transportation (horses)? Where did we purchase most of our goods? How were products manufactured at that time? Why was local government so important at the time? And finally, how did this all change after the automobile arrived?

**Exploration**

1. Working in small groups, students will select an historical technology and research its development (e.g. printing press, radio, assembly line, steam power, glass production, electricity, microscope, etc.).

2. The student groups will research a variety of sources and gather information about issues surrounding the development of the technology. These can be organized into categories such as technological, economical, political, social, ethical/cultural, environmental, and others.
3. Students will organize their collected information into a table, chart, or other database format.

### Explanation

1. Student groups will select a technology and briefly explain to the class some background information on the topic and why they selected it.
2. The teacher may lead a discussion on types of issues and some obvious examples from history. For example, throughout our history, the introduction of new technology has created social issues. Often, a technological solution to one problem created additional issues that required attention. For example, the industrial revolution changed how we work, moving large numbers of people away from farms or small cottage industries into large companies centered in cities or near energy sources. In many cases, new technology has created social issues. People who worked in factories in the early industrial revolution became alienated with their jobs. Additionally, social issues have sparked the need for new technology. Finally, some issues we have encountered may not have had technological solutions. In order for us to face current and future issues, it is important for us to examine how technology and society are closely related.
3. The teacher will work with the groups to help them identify issues and show them how to place the issues in specific categories. The student worksheet will help the groups organize and collect their information.
4. The teacher will work with the groups to help them determine consequences of the issues for their selected technology.

### Extension

1. Students will collect and record references for their data, using a variety of sources to get various perspectives and issues related to the development of their selected technology.
2. Students will analyze the research material, and determine which information should be used in their presentation.
3. Students will develop a visual table, chart, or other database that includes the issues categories, the issues that occurred at that period of time, and the consequences or changes that resulted in that category (e.g. the development of construction techniques for medieval churches based on cultural needs to design taller buildings).
4. Students will make a brief (3-5 minute) presentation to the class, showing their chart/table and describing the most important aspects of the issues related to their technology.

### Evaluation

Students' knowledge, skills, and attitudes will be assessed using a quiz, and rubrics will be used for group work, research/analysis, and presentation.

### Additional Extension Activities

1. Students may research an historical technology that was important to their local community or region (e.g. canal or railroad development).
2. Student presentation models may be displayed in a local library or museum for a period of time.
3. Students may make their presentations to other classes, local or regional community or social groups, in or out of the school.
4. Class work could be collated into a booklet, CD, or other format for dissemination, or used to collect donations for the technology program.

**Laboratory-Classroom Preparation**

Students should have access to information gathering and research, room for small-group and whole-class discussion, and media and equipment for graphic production and presentations.

**Tools/Materials/Equipment**

- Research materials and Web access
- Computers/software
- Printers
- Poster/sign maker
- Media projector

**Laboratory-Classroom Safety and Conduct**

- Students will use tools and equipment safely, maintaining a safety level for themselves and others in the lab.
- Students will demonstrate respect and courtesy in regard to the ideas expressed by others in the class, and show respect and appreciation for the efforts of others.

## Assignment – Lesson 1-1

### Introduction to Technological Issues

#### Using an Historical Case Study

#### Selecting an Event

Select an historical event that includes a technological innovation, invention, or new application of an older technology. Look for an event that has had significant impact on one or more social institutions. You may need to review several references to find the social connections. Be sure to record the publishing information for each reference you use. A few technology examples are provided here, and are categorized:

*Information:* printing press, radio, television, technology and music, photography, computer, cell phone

*Manufacturing:* Industrial Revolution (Europe), Industrial Revolution (America), assembly line, interchangeability of parts, robotics

*Transportation:* sail power, steam power, waterways and trade, railroads, flight

*Construction:* history of glass, housing, dam building, steel frames, electricity, architecture

*Biotechnology:* artificial insemination, horticulture, genetic engineering, cross pollination, medical technology, hydroponics

*Technology and Design:* plow, microscope, telescope, plastics and new materials, refrigeration, nuclear power, laser

#### Examining the Event

As you research your event, record the issues and problems encountered as the new technology was introduced. Examine how things were before and after the introduction of the technology. What changed, and how significant were the changes? You can use the chart on the worksheet as you research, and later use it for your analysis. The worksheet chart can be reproduced as needed. Be sure to get all sides of each issue as you research, and try to get the perspective of all the people involved.

#### Analysis

As you research, try to complete as much of the table as you can. This may require using a variety of sources and views from different people, such as technologists, politicians, economists, historians, scientists, and others. When you have exhausted your research, it is time to reflect upon your data and develop some analysis. You should be able to describe the significant issues, problems, and solutions encountered during the introduction of your technological event. You should also describe the changes brought about by the technology. You may add your own conclusions (opinions) at the end, based on your findings.

#### Presentation

You may present the analysis in a variety of methods (check with your teacher). The presentation should focus on your analysis. Be sure to include your references, as another student may want to do some further research on your event.

**Assignment Worksheet – Lesson I-I**

**Student Name(s):**

**Event:**

**Date:**

**Research** (copy as needed)

<b>Issues Categories</b>	<b>Issues</b>	<b>Consequences or Changes</b>
<b>Technological</b>		
<b>Economic</b>		
<b>Political</b>		
<b>Social</b>		
<b>Ethical/Cultural</b>		
<b>Environmental</b>		
<b>Individual Freedom, Work &amp; Leisure</b>		
<b>Other:</b> _____		

**Bibliography** (list all sources used)

**Analysis Notes**

**Ideas for Presentation**