

# Technology, Engineering and Design

## Unit 2: Technological Changes History

### Class Notes – Mr. Dion

**Big Idea:** Knowledge of the history of technology helps people understand the world around them by seeing how people of all times and places have increased their capability by using their unique skills to innovate, improvise, and invent.

#### Key concepts:

1. The use of technology has had profound effects on the course of history.
2. This unit looks into some of those occurrences that have affected society and the environment.
3. Additionally the unit encourages students to think about our future with technology.

#### Unit Vocabulary:

- **Technology** - Human innovation that involves the generation of knowledge and process to develop products that solve problems and extend human capabilities. Anything that was created to solve a human's problem.
- **Technological Advancement** - Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.
- **History** - Chronological record of significant events.
- **Engineer** –Its root lies in the Latin word *ingeniare*, "to design or devise."
- **Microliths** - Very small geometric form tools commonly used in composite tools. Major impacts on history include.
- **System** - Building block of technology
- **Economic Impacts** - Increased tax base and employment/jobs.
- **Environmental Impacts** - Loss of habitat & wetlands, water pollution, air pollution, noise pollution, light pollution.
- **Political Impacts** - Leadership decisions, laws & enforcement.
- **Cultural Impacts** - Historical, archeological & geological.
- **Social Impacts** - Recreation facilities, places of worship & clubs and organizations.
- **Paleolithic Age** - 500000 – 10000 BC - Characterized by the earliest known stone tools. Major impacts on history include better hunting and defense. Artifacts include:
  - Use of Fire
  - Unpolished stone tools
  - Sculpture
  - Musical instruments
  - Burial of dead
  - Cave dwellings
  - Cave paintings
  - Stone axes
  - Bone needles

- Hearth sites
- **Mesolithic Age** – 10000 – 4000 BC - Associated with the rise to dominance of microlithics or very small geometric form tools commonly used in composite tools. Major impacts on history include the gradual domestication of plants and animals leading to the first settled communities. Artifacts include:
  - Microliths
  - Sail
  - Wheel and axle
  - Leatherwork
  - Basketry
  - Fishing tackle
  - Canoes
  - Bows
  - Domesticated animals
  - Stone circles
  - Sickles
- **Neolithic Age** – 4000 – 2300 BC - Characterized by the development of agriculture and an increasing emphasis on year-round settlements. Major impacts on history include developing a dependable year round food supply which allowed more time for invention and innovation. Artifacts include:
  - Stone and mud dwellings
  - Pottery
  - Polished stone tools
  - Spinning and weaving tools
  - Wooden and stone plows
- **Bronze Age** - 2300 – 700 BC - Characterized by the development of metallurgy, mainly the combining of copper and tin to make bronze. Major historical impacts include the gradual replacement of stone tools with metal ones which enabled humans to alter their environment at a more rapid pace. Artifacts include:
  - Metal pots and pans
  - Pottery wheel
  - Chariot
  - Pulley
  - Metal jewelry
  - Metal tools
  - Metal weapons
- **Iron Age** - 700 BC – 450 AD - Characterized by iron being used as the main metal for tools and weapons. Major impacts on history include military dominance with the use of iron weapons and iron blade plows increased food production. Artifacts include:
  - Block and tackle
  - Pump
  - Lathe
  - Iron dagger
  - Iron chisel
  - Iron axe
  - Iron spearhead
- **Middle Age** – 450 – 1400 AD - Period of time between the fall of Rome and the Renaissance. Major impacts on history include the rise of money and capitalism and the beginning of urbanization and industrialization. Artifacts include:
  - Waterwheel
  - Windmill
  - Cannon
  - Mechanical clock
  - Wheeled plow

- Horseshoes
- Stirrups
- Crank
- Compass
- Oceangoing ships
- **Renaissance/Enlightenment Age** – 1400 – 1750 AD - Humanistic revival of classical influence. Major impacts to history include instrumentation that allowed scientists to observe and test natural phenomena. Artifacts include:
  - Telescope
  - Microscope
  - Thermometer
  - Barometer
  - Printing press
  - Rifle
- **Industrial Age** – 1750 – 1950 AD - Characterized by first use of complex machinery, and factories. People move from agricultural to industrial societies. Major impacts to history include the creation of large urban centers, population expansion, improved standards of living. Artifacts include:
  - Steam engine
  - Electricity
  - Automobile
  - Radio
  - Airplane
  - Television
  - Telephone
  - Rocket
- **Information Age** – 1950 – Present - Characterized by the gathering, manipulation, classification, storage, and retrieval of information. Exponential Growth and technological obsolescence. Artifacts include:
  - Transistor
  - Integrated circuit
  - Computer
  - Communication satellite
  - Digital photography
  - Artificial heart
  - Nuclear power plants
  - Space shuttle
  - iPod
  - Laptop
  - GPS
- **Mesopotamian Engineers** – Developed clay tablets to document city plans.
- **Babylonian Engineers** – Developed primitive algebra and asphalt road coverings.
- **Egyptian Engineers** – Developed pyramids, building techniques and extensive irrigation systems.
- **Greek Engineers** – Developed the catapult and the cross bow for conquering territory.
- **Roman Engineers** – Developed aqueducts for moving water, extensive road systems and sanitary systems.
- **Middle Age Engineers** – Developed paper in Arab countries and gun powder/telescopes in China.

- **Renaissance Engineers** – Leonardo DaVinci designed weapons, buildings, machinery and is most known for the modern day tank. Galileo was a pivotal figure in the development of physics, specifically astronomy.
- **Industrial Age Engineers** – Henry Ford created the assembly line, James Watts refined the steam engine, Alessandro Volta discovers the principles for a battery. Pieter van Musschenbroek creates the forerunner to the capacitor.

## Lesson 1: Society and the Environment

**Big Idea:** People are better able to understand the world around them when they explore how people of all times and places have used their unique skills to innovate, improvise, and invent.

### **Key Concepts:**

1. Technological advancements have historic significance on human society.
2. Ethical considerations are important in the development, selection, and use of technology. The social, economic, cultural, political and environmental impacts can be positive and negative.
3. Technological systems occur when small systems are combined into larger ones. Science, technology, engineering, and mathematic principles combine to form small systems

### **Learning points:**

- An automobile engine is an example of a smaller system that is embedded into a larger technological system called the automobile.
- Science, technology, engineering, and math are so closely related that progress in one area promotes advancements in all other areas.
- Decisions to use technology result in trade-offs between positive and negative effects.
- Early in the history of technology, the development of many tools and machines was based not on scientific knowledge but on technological know-how.

### **A case study on the impacts of technology:**

A Direct Current power line has been proposed to cross your state to deliver needed electricity to a large metropolitan area. The right of way will be 150 feet wide, The towers will be 75 feet tall.

- **Social Impacts**
  - Recreation facilities, hiking, cross-country skiing, ATV
  - Places of worship

- Clubs and organizations
- **Economic Impacts**
  - Increased tax base from industry and business
  - Employment/Jobs
- **Cultural Impacts**
  - Historical - Meeting House/Town Hall/Church, etc...
  - Archeological - Ancient civilizations (burial grounds, native hunting sites, etc...)
  - Geological - Land forms, rivers, valleys
- **Political Impacts**
  - Leadership decision
  - Laws and enforcement
- **Environmental Impacts**
  - Loss of habitat and wetlands
  - Water pollution
  - Air pollution
  - Noise pollution
  - Light pollution

## Lesson 2: Technological Through Time

**Big Idea:** Technology is in a constant state of change as humans continue to improve and innovate “old” technologies for “new” applications.

### **Key Concepts:**

1. New technologies are used to create new processes. A good example of this is how robots have changed the automobile manufacturing process.
2. Technology transfer takes place when a new user applies an existing technology developed for one purpose in a different function.
3. All technologies have effects other than those intended by the design, some of which may have been predictable and some not.
4. Side effects of technologies may turn out to be unacceptable to some of the population and therefore lead to conflict between groups.

### **Learning points:**

- The steel and iron tools from the Iron Age were harder and stronger than the earlier bronze and stone tools.
- Leonardo DaVinci designed weapons, buildings, machinery and is most known for the modern day tank.
- The Industrial Revolution saw the development of continuous manufacturing, sophisticated transportation and communication systems, advanced construction practices, and improved education and leisure time.
- The most significant result of the development of windmills and waterwheels is the beginning of industrialization.