|  |  |
| --- | --- |
| **TEXAS CTE LESSON PLAN**  [www.txcte.org](http://www.txcte.org) | |
| **Lesson Identification and TEKS Addressed** | |
| **Career Cluster** | Science, Technology, Engineering & Mathematics |
| **Course Name** | Principles of Applied Engineering |
| **Lesson/Unit Title** | Introduction to Engineering Fundamentals and Civilization |
| **TEKS Student Expectations** | **130.402. (c) Knowledge and Skills**  (2) The student investigates the components of engineering and technology systems.  (A) The student is expected to investigate and report on the history of engineering science  (B) The student is expected to identify the inputs, processes, and outputs associated with technological systems  (C) The student is expected to describe the difference between open and closed systems  (D) The student is expected to describe how technological systems interact to achieve common goals |
| **Basic Direct Teach Lesson**  (Includes Special Education Modifications/Accommodations and  one English Language Proficiency Standards (ELPS) Strategy) | |
| **Instructional Objectives** | The students will be able to:   * 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. |
| **Rationale** | It is important to know how the developments of engineering and technology influenced society and the development of civilization |
| **Duration of Lesson** | Teacher’s Discretion |
| **Word Wall/Key Vocabulary**  *(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* |  |
| **Materials/Specialized Equipment Needed** | Instructional Aids:   * Matching Activity handout * Matching Activity key   Materials Needed:   * Pen or pencil * Simple examples of technology, like a spoon * A book   Equipment Needed:   * Computer * Overhead projector |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | **Learner Preparation:**  Have students research the history of technology using Wikipedia.  **Introduction:**  SAY: We are now going to learn about the history of engineering and technology.  ASK: Does anyone know when technology development began?  SHOW: Something simple like a desk or a pencil.  SAY: Is this an example of technology?  ASK: When do you think this was developed? Was this a major development of its time?  SHOW: Students a book.  ASK: Is the ability to create this new or old? How did the development of the ability to publish books change society? |
| **Direct Instruction \*** | I. About Gordon Moore. One of the major points is for students to view technology differently. From a historical perspective, development was slow, humans had time to acclimate.  A. The major point here is to get students to think about the rate of technology development.  B. Throughout our history, technology development has been slow.  C. It took thousands of years for some developments to become widespread (writing, agriculture), hundreds for others.  II. Wants vs. needs - Many things we take for granted now were major developments that significantly improved life at the time.  A. This provides a general framework to categorize technology development.  B. What want or need does it satisfy?  C. When did technology development change from satisfying needs to satisfying wants?  III. Stone Age - How did some of the early developments lead to some of the basic elements of society like villages and communities?  A. Simple developments  B. Many years to spreads, become common.  C. Fire, writing, the wheel  IV. Bronze Age - Religion may be a touchy subject, approach it with caution. However, order and the sense of community comes from shared values and cultures.  A. Agriculture and the ability to feed large numbers of people lead to cities  B. Cities and large numbers of people created a need for order, leading to religion and government  C. Many of the centers of civilization are unfamiliar to students (Mesopotamia, Eurasia, China, and the Indus Valley)  V. The Iron Age  A. The emergence of cultures we associate with: the Romans and the Greeks  B. The first use of iron was in weaponry, but iron plows allowed the tilling of heavier soils  C. Ox drawn plows and wheeled vehicles were other major agricultural innovations  VI. The Middle Ages  A. Very slow transformation of culture  B. Feudalism, which is where a very large number of small and culturally diverse states and societies were dominant  C. Christianity became the dominant religion in Europe  D. Fragile central authority repeatedly damaged by invasions  E. Agricultural based economic system  VII. The Renaissance  A. Revival of learning based on gradual but widespread educational reforms  B. The printing press allowed rapid spread of new ideas  C. A revival of scholarship, art, and literature  D. The scientific method was a significant development, creating a systematic process for discovery  VIII. The Industrial Revolution  A. Enormous increase in productivity driven by the introduction of machinery and factory organization  B. Manufacturing went from the home and the workshop to the factory  C. Power driven machines replaced human and animal power  D. Change from rural and agricultural society to urban and industrial  E. Overcrowded and unsanitary living coupled with terrible working conditions  IX. Negative effects of technology  A. Students need to understand that even as the quality of life improves over time, increased sophistication of technology leads to greater environmental consequences. |
| **Guided Practice \*** | *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*   * Students may pair-share to review the terms on Definitions handout. |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | Students will complete Matching Activity to match definitions and categorize the different technology developments from each age according to which need or want it satisfies. Use Maslow (or not).  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  None |
| **Lesson Closure** | Question: How does engineering from the Stone Age differ from what we think of as engineering now?  Answer: Back then, control of fire and domestication of animals were engineering processes, but in our age of cell phones and computers, we would not consider them that way.  Question: List the most important technology developments from each era.  Answer: Any, so long as they defend their answer.  Question: How did these technological developments change or influence society?  Answer: Answers must make sense in the context of the times. |
| **Summative/End of Lesson Assessment \*** | *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  None |
| **References/Resources/**  **Teacher Preparation** | Hacker, et al. (2010). *Engineering and Technology, 1st ed*. Delmar, Cengage Learning.  Karsnitz, O’Brian, Hutchinson. (2008). *Engineering Design: An Introduction, 1st ed*. Delmar, Cengage Learning.  Gomez, Oakes, Leone. (2010). *Engineering Your Future, 2nd ed.* Great Lakes Press.  Rogers, Wright, Yates. (2010). *Gateway to Engineering, 1st ed*. Delmar Cengage Learning.  Wikipedia  Other references as noted |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** |  |
| **Recommended Strategies** | |
| **Reading Strategies** |  |
| **Quotes** |  |
| **Multimedia/Visual Strategy**  **Presentation Slides + One Additional Technology Connection** |  |
| **Graphic Organizers/Handout** |  |
| **Writing Strategies**  **Journal Entries + 1 Additional Writing Strategy** |  |
| **Communication**  **90 Second Speech Topics** |  |
| **Other Essential Lesson Components** | |
| **Enrichment Activity**  (e.g., homework assignment) |  |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSA  Technology Student Association (TSA) |
| **Service Learning Projects** |  |
| **Lesson Notes** |  |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)