Project Probase
Enduring Understandings/Essential Questions Abstract

Students will understand:

1. that technological **progression** is driven by a number of factors, including individual creativity, product and systems innovation, and human wants and needs.
    a. How are new technologies **developed and marketed**?
    b. What social, cultural and political **pressures** lead to the need or want for new technologies?
    c. What are the specific **roles of professionals** involved in technological adaptation and change?
    d. What **factors** need to be in place for new technologies to viable in the national and international marketplace?
    e. What are the fundamental **processes/principles** used to develop new technologies?

2. that technological development for the solution of a problem in one context can **spin-off** for use in a variety of often unrelated applications.
    a. How do technologies **migrate** from one context (or location) to another and what are the implications?
    b. What **roles** do the patent, trademark and copyright laws play in the dissemination of technological ideas?
    c. How have technological innovations caused **paradigm shifts** throughout history and what are these major shifts?

3. that technological **change** can be positive and/or negative, and can have intended and/or unforeseen social, cultural, environmental, and political consequences.
    a. What are some of the unforeseen **consequences** of specific technological changes throughout history?
    b. How can a technology cause both good and harm and how do humans prepare for or respond to these **impacts**?

4. how technological **systems** work, the components of those systems, and how they fit into the larger technological, economic, and social systems.
    a. What are the systems and **subsystems** involved in the various contexts of technology?
    b. What are the key elements of the various technological **systems** and what are the **relationships** between these systems?
    c. How do various technological **systems influence** the economy, society, the environment and culture?

5. that there are compelling and controversial **issues** associated with the acquisition, development, use, and disposal of resources.
    a. What kinds of **resources** are required in each of the eight technological contexts?
    b. What is the **relative value** of specific resources used in technological systems?
    c. To what extent have **resource** issues (acquisition, development, use, and disposal) **affected** the direction of technological development?
    d. What **resources** are **needed** to solve a specific design problem (people, information, materials, tools, capital, energy, time, technical ability)?

6. that the complexities of technological **design** involve tradeoffs among competing **constraints** and requirements, including engineering, economic, political, social, and environmental considerations.
    a. To what extent have **optimal designs** been achieved in the eight technological context areas?
    b. What are the key **factors** that cause designers to make decisions about tradeoffs, limitations, and constraints when designing new products and systems?
    c. How can members of the public, politicians or the state of the economy **influence** the design of new technological products and systems?
    d. How can **social values** and **principles** guide in the development of solutions to technological problems

7. that **technological design** is a systematic process used to initiate and refine ideas, solve problems, and maintain products and systems.
    a. What are the five primary **methods** through which technological **problems** are **solved** and how do they differ (i.e., troubleshooting, research and development, experimentation, invention and innovation, design problem solving)?
    b. To what extent can design problems be approached through a series of generic procedures (the **design loop**)?
    c. What **design criteria** is typically considered when developing new technologies (i.e., marketability, safety, useability, reliability, cost, materials, etc.) and how do these influence the final product/system design?
    d. How are **decisions** made regarding **information** that should be discarded or ignored.
    e. How can the **attributes** of design and the **principles** of design aid in the development of quality solutions?
    f. How can the establishment of relationships, controlling variables, categorizing techniques, and making inferences aid in the development of new technological designs?

8. how to **evaluate** the benefits, limitations, and risks associated with existing and proposed technologies.
    a. How does a **risk/benefit analysis** aid the designer in addressing potential harmful effects prior to development?
    b. What are some important **ethical decisions** that should be considered when developing any new technology?
    c. Are all product/system designs created for the purpose of adding **social value**?
    d. How are ethical **considerations**, economic considerations, engineering realities, and political forces balanced during technological innovation?
    e. In what ways are technological needs and wants being balanced with long term environmental or social **consequences**?

9. how to **utilize** a variety of simple and complex technologies.
    a. How are technologies used to **control devices** and systems?
    b. How do **technologies communicate** with one another and provide information to humans?
    c. To what **extent** are technological systems and devices **controlled** by people and to what extent are they controlled by other technologies?
    d. How is technological **instrumentation** used to measure, calculate, manipulate, and predict the actions of technological devices and systems?