

Understanding By Design 1-Page Template

Title: Technological Systems

Standards:

Standard #2: Students will develop an understanding of the core concepts of technology.

- **Systems thinking applies logic and creativity with appropriate compromises in complex real-life problems.**
- **Systems, which are the building blocks of technology, are embedded within larger technological, social, and environmental systems.**
- **The stability of a technological system is influenced by all of the components in the system, especially those in the feedback loop.**
- **Complex systems have many layers of controls and feedback loops to provide information.**

Standard #6: Students will develop an understanding of the core concepts of technology.

- **The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.**
- **A number of different factors, such as advertising, the strength of the economy, the goals of a company, and the latest fads contribute to shaping the design of and demand for various technologies.**

Standard #14: Students will develop an understanding of and be able to select and use medical technologies.

- **Telemedicine reflects the convergence of technological advances in a number of fields, including medicine, telecommunications, virtual presence, computer engineering, informatics, artificial intelligence, robotics, materials science, and perceptual psychology.**
- **The sciences of biochemistry and molecular biology have made it possible to manipulate the genetic information found in living creatures.**

Standard #15: Students will develop an understanding of and be able to select and use agricultural and related biotechnologies.

- **Agriculture includes a combination of businesses that use a wide array of products and systems to produce, process, and distribute food, fiber, fuel, chemical, and other useful products.**
- **Biotechnology has applications in such areas as agriculture, pharmaceuticals, food and beverages, medicine, energy, the environment, and genetic engineering.**

Standard #18: Students will develop an understanding of and be able to select and use transportation technologies.

- **Intermodalism is the use of different modes of transportation, such as highways, railways, and waterways as part of an interconnected system that can move people and goods easily from one mode to another.**
- **Transportation services and methods have led to a population that is regularly on the move.**
- **The design of intelligent and non-intelligent transportation systems depends on many**

processes and innovative techniques.

Stage 1: Desired Results

Understandings

Students will understand that...

- The basic parts and function of the Universal Systems Model (USM)
- How the USM applies to every technological system
- How troubleshooting, analyzing and maintaining a system affect its function

Essential Questions

- ◆ What technological systems have you used?
- ◆ What types of malfunctioning systems have you diagnosed and repaired?
- ◆ What are the common elements involved in every technological system?
- ◆ Why are systems considered the building blocks of technology?
- ◆ How does troubleshooting, analyzing and maintaining a system affect its function?

Knowledge & Skill

- ◆ USM feedback loop parts & functions
- ◆ Define: troubleshoot, analyze, system, input, process, output, feedback, production processes, management processes, seven resources of a system (types of input)
- ◆ Problem Solving Process (PSP) parts & function

Stage 2: Assessment Evidence

Performance Task Summary

- ◆ Technological Systems Project

Rubric Titles

- ◆ Food Process Project

Self-Assessments

- ◆ Check each section of project against rubric

Other Evidence, Summarized

- ◆ PSP vs. USM Diagram
- ◆ Lung transplant questions
- ◆ Select a System Presentation
- ◆ Heart in a Box Activity

Stage 3: Learning Activities

- ◆ Where: Introduce essential questions & discuss pre-established knowledge
- ◆ Hook: Describe a technological system. Have students identify technologies that fit the description.
- ◆ Explore & Equip: Complete the USM PowerPoint with basic definitions and functions. Define the parts and function of the PSP
- ◆ Rethink & Revise: Examine many different systems and apply USM & PSP
- ◆ Evaluate Understandings: Food Process Project
- ◆ Tailor: Give students two options during the Food Process Project, but allow them to pick another food process if they have a high interest.
- ◆ Organize & Sequence:
Day 1: Technological Systems Basics notes & practice

Day 2: Compare PSP to the USM & complete the Venn diagram.

Day 3: Examine a Sample system questions & discussion. Begin work on types of systems presentations

Day 4: Finish Types of Systems

Day 5: Present Types of Systems Projects

Day 6: Complete Heart in a Box system diagram. Answer questions and discuss answers

Day 7: Research a career as a Systems Engineer

Day 8: Technological Systems Project: Food Processes Begin work

Day 9: Technological Systems Project: Food Processes Continue working

Day 10: Technological Systems Project: Food Processes Finish Project