

COURSE: Industrial Arts & Technology

LEVEL: Grades 6-8

UNIT/FOCUS: The Nature of Technology:
Creativity and Innovation

Desired Results

Related standard(s):

- 8.2.8.A.1
- 8.2.8.A.2
- 8.2.8.A.3
- 8.2.8.A.4
- 8.2.8.A.5

Transfer

Students will be able to independently use their learning to...

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)

Students will understand that...

- Technology systems impact every aspect of the world in which we live.

Essential Questions (EQs)

Students will keep considering...

- What are the characteristics and scope of technology?
- What are the core concepts of technology?
- What are the relationships among technologies and the connections between technology and other fields?

Grade Level Benchmarks

Knowledge

Students will know...

- New products and systems can be developed to solve problems or to help do things that could not be done without the help of technology.
- The development of technology is a human activity and is the result of individual and collective needs and the ability to be creative.
- Technology is closely linked to creativity, which has resulted in innovation.
- Corporations can often create demand for a product by bringing it onto the market and advertising it.
- Technological systems include input, processes, output, and at times, feedback.
- Systems thinking involves considering how every part relates to others.
- An open-loop system has no feedback path and requires human intervention, while a closed-loop system uses feedback.
- Technological systems can be connected to one another.
- Malfunctions of any part of a system may affect the function and quality of the system.
- Requirements are the parameters placed on the development of a product or system.
- Trade-off is a decision process recognizing the need for careful compromises among competing factors.
- Different technologies involve different sets of processes.

Skills

Students will be able to...

- Research a product that was designed for a specific demand and identify how the product has changed to meet new demands (i.e. telephone for communication - smart phone for mobility needs).
- Examine a system, consider how each part relates to other parts, and discuss a part to redesign to improve the system.
- Investigate a malfunction in any part of a system and identify its impacts.
- Redesign an existing product that impacts the environment to lessen its impact(s) on the environment.
- Describe how resources such as material, energy, information, time, tools, people, and capital contribute to a technological product or system.

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| | <ul style="list-style-type: none">• Maintenance is the process of inspecting and servicing a product or system on a regular basis in order for it to continue functioning properly, to extend its life, or to upgrade its quality.• Controls are mechanisms or particular steps that people perform using information about the system that causes systems to change.• Technological systems often interact with one another.• A product, system, or environment developed for one setting may be applied to another setting.• Knowledge gained from other fields of study has a direct effect on the development of technological products and systems. | |
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COURSE: Industrial Arts & Technology

LEVEL: Grades 6-8

UNIT/FOCUS: Technology and Society

Desired Results

Related standard(s):

- 8.2.8.B.1
- 8.2.8.B.2
- 8.2.8.B.3
- 8.2.8.B.4
- 8.2.8.B.5
- 8.2.8.B.6
- 8.2.8.B.7

Transfer

Students will be able to independently use their learning to...

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)

Students will understand that...

- Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.

Essential Questions (EQs)

Students will keep considering...

- What are the cultural, social, economic, and political effects of technology?
- What are the effects of technology on the environment?
- What is the role of society in the development and use of technology?
- What is the influence of technology on history?

Grade Level Benchmarks

Knowledge

Students will know...

- The use of technology affects humans in various ways, including their safety, comfort, choices, and attitudes about technology's development and use.
- Technology, by itself, is neither good nor bad, but decisions about the use of products and systems can result in desirable or undesirable consequences.
- The development and use of technology poses ethical issues.
- Economic, political, and cultural issues are influenced by the development and use of technology.
- The management of waste produced by technological systems is an important societal issue.
- Technologies can be used to repair damage caused by natural disasters and to break down waste from the use of various products and systems.
- Decisions to develop and use technologies often put environmental and economic concerns in direct competition with one another.
- Throughout history, new technologies have resulted from the demands, values, and interests of individuals, businesses, industries, and societies.
- The use of inventions and innovations has led to changes in society and the creation of new needs and wants.
- Social and cultural priorities and values are reflected in technological devices.
- Meeting societal expectations is the driving force behind the acceptance and use of products and systems.

Skills

Students will be able to...

- Evaluate the history and impact of sustainability on the development of a designed product or system over time and present results to peers.
- Identify the desired and undesired consequences from the use of a product or system.
- Research and analyze the ethical issues of a product or system on the environment and report findings for review by peers and /or experts.
- Research examples of how humans can devise technologies to reduce the negative consequences of other technologies and present your findings.
- Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries and societies.
- Compare and contrast the different types of intellectual property including copyrights, patents and trademarks.
- Analyze the historical impact of waste and demonstrate how a product is upcycled, reused or remanufactured into a new product.

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| | <ul style="list-style-type: none">• Many inventions and innovations have evolved using slow and methodical processes of tests and refinements.• The specialization of function has been at the heart of many technological improvements.• The design and construction of structures for service or convenience have evolved from the development of techniques for measurement, controlling systems, and the understanding of spatial relationships.• In the past, an invention or innovation was not usually developed with the knowledge of science. | |
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COURSE: Industrial Arts & Technology

LEVEL: Grades 6-8

UNIT/FOCUS: Design

Desired Results

Related standard(s):

- 8.2.8.C.1
- 8.2.8.C.2
- 8.2.8.C.3
- 8.2.8.C.4
- 8.2.8.C.5
- 8.2.8.C.5a
- 8.2.8.C.6
- 8.2.8.C.7
- 8.2.8.C.8

Transfer

Students will be able to independently use their learning to...

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)

Students will understand that...

- The design process is a systematic approach to solving problems.

Essential Questions (EQs)

Students will keep considering...

- What are the attributes of design?
- What is engineering design?
- What is the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving?

Grade Level Benchmarks

Knowledge

Students will know...

- The Design is a creative planning process that leads to useful products and systems.
- There is no perfect design.
- Requirements for design are made up of criteria and constraints.
- Design involves a set of steps, which can be performed in different sequences and repeated as needed.
- Brainstorming is a group problem-solving design process in which each person in the group presents his or her ideas in an open forum.
- Modeling, testing, evaluating, and modifying are used to transform ideas into practical solutions.
- Established design principles are used to evaluate existing designs, to collect data, and to guide the design process.
- Troubleshooting is a problem-solving method used to identify the cause of a malfunction in a technological system.
- Invention is a process of turning ideas and imagination into devices and systems.
- Innovation is the process of modifying an existing product or system to improve it.
- Some technological problems are best solved through experimentation.

Skills

Students will be able to...

- Explain how different teams/groups can contribute to the overall design of a product.
- Explain the need for optimization in a design process.
- Evaluate the function, value, and aesthetics of a technological product or system, from the perspective of the user and the producer.
- Identify the steps in the design process that would be used to solve a designated problem.
- Explain the interdependence of a subsystem that operates as part of a system.
- Create a technical sketch of a product with materials and measurements labeled.

COURSE: Industrial Arts & Technology

LEVEL: Grades 6-8

UNIT/FOCUS: Abilities for a Technological World

Desired Results

Related standard(s):

- 8.2.8.D.1
- 8.2.8.D.2
- 8.2.8.D.3
- 8.2.8.D.4
- 8.2.8.D.5
- 8.2.8.D.6

Transfer

Students will be able to independently use their learning to...

- Apply the design process
- Use and maintain technological products and systems
- Assess the impact of products and systems

Meaning

Enduring Understandings (EUs)

Students will understand that...

- The designed world is the product of a design process that provides the means to convert resources into products and systems.

Essential Questions (EQs)

Students will keep considering...

- How do I apply the design process?
- How do I use and maintain technological products and systems?
- How do I assess the impacts of products and systems?

Grade Level Benchmarks

Knowledge

Students will know...

- The design process can be used to solve problems in and beyond the laboratory-classroom.
- Criteria and constraints are necessary for design.
- Design solutions can be represented in both two-dimensions and three-dimensions.
- Tools, materials, and machines can be used to diagnose, adjust, and repair systems.
- Computers and calculators can be used in various applications.
- Data can be used to analyze and interpret trends in order to identify the positive and negative effects of a technology.
- Technological development often follows trends and can have potential consequences.
- Not all information is useful.

Skills

Students will be able to...

- Design and create a product that addresses a real world problem using a design process under specific constraints.
- Identify the design constraints and trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.
- Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution.
- Research and publish the steps for using and maintaining a product or system and incorporate diagrams or images throughout to enhance user comprehension.
- Explain the impact of resource selection and the production process in the development of a common or technological product or system.
- Identify and explain how the resources and processes used in the production of a current technological product can be modified to have a more positive impact on the environment.