GEORGIA | PEACH STATE PATHWAYS

Career, Technical, & Agricultural Education

ENGINEERING & TECHNOLOGY

PATHWAY: Engineering; Energy Systems

COURSE: Foundations of Engineering and Technology

UNIT 4: History and the Future of Engineering

INTRODUCTION

Annotation: Briefly describe the unit topics, tasks, methods, etc.

Students will identify key historical events & their impacts on engineering and technology.

Grade(s):

X	9th
X	10th
X	11th
X	12th

Time:

20 Hours

Author:

Gillespie

Additional Author(s):

Students with Disabilities:

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.

FOCUS STANDARDS

GPS Focus Standards: Please list the standard and elements covered.

ENGR-FET-2 – Students will describe the history of technological advancement.
ENGR-FET-5 – Students will describe the essential systems and processes involved with invention, innovation, and entrepreneurship.
ENGR-STEM-2 – Students will identify the impact of engineering and technology within global, economic, environmental, and societal contexts.
ENGR-STEM-4 – Students will apply principles of science, technology, engineering, mathematics, interpersonal communication, and teamwork to the solution of technological problems.
ENGR-STEM-6 – Students will enhance reading by developing vocabulary and comprehension skills associated with text materials, problem descriptions, and laboratory activities associated with engineering and technology education.

GPS Academic Standards:

ELAALRC2 The student participates in discussions related to curricular learning in all subject areas.
ELAALRC3 The student acquires new vocabulary in each content area and uses it correctly.
ELAALRC4 The student establishes a context for information acquired by reading across subject areas.
MM3P4. Students will make connections among mathematical ideas and to other disciplines.
SCSh3. Students will identify and investigate problems scientifically.
SCSh4. Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.
SCSh5. Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations.
SCSh6. Students will communicate scientific investigations and information clearly.
SCSh7. Students analyze how scientific knowledge is developed.
SCSh8. Students will understand important features of the process of scientific inquiry.
SSUSH11 The student will describe the growth of big business and technological innovations after Reconstruction.
SSUSH21 The student will explain economic growth and its impact on the United States 1945-1970.
SSUSH24 The student will analyze the impact of social change movements and organizations of the 1960's.
SSWH21 The student will analyze globalization in the contemporary world.

National / Local Standards / Industry / ISTE:

UNDERSTANDINGS & GOALS

Enduring Understandings: Enduring understandings are statements summarizing important ideas and have lasting value beyond the classroom. They synthesize what students should understand – not just know.

1. Students will understand the key historical events relating to engineering and technology.
2. Students will be introduced to issues of wealth, fame, power and necessity that have influenced innovation and technological developments.
3. Students will understand the evolution of engineering and technology.

Essential Questions: Essential questions probe for deeper meaning and understanding while fostering the development of critical thinking and problem-solving skills. Example: Why is life-long learning important in the modern workplace?

1. What are the key historical events and their impacts on engineering and technology?
2. What are the social issues that have influenced innovation and technological development?
3. Who are the key persons who have contributed to technological change?

Knowledge from this Unit: Factual information.

1. Students will be able to evaluate the technological advancements since their birth.
2. Students will be able to classify inventions by there importance to different systems.
3. Students will be able to assess timelines for engineering and technology improvements.

Skills from this Unit: Performance.

1. Student will be able to describe the history of technological advancement.
2. Students will describe the impacts political systems have had on technological innovation.
3. Students will able to describe the influences of social issues on the advancement of engineering and technology.

ASSESSMENT(S)

Assessment Method Type: Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

____ Pre-test
X Objective assessment - multiple-choice, true- false, etc.
__ Quizzes/Tests
_X_ Unit test
____ Group project
X Individual project
____ Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
__ Self-check rubrics
__ Self-check during writing/planning process
__ Journal reflections on concepts, personal experiences and impact on one's life
__ Reflect on evaluations of work from teachers, business partners, and competition judges
__ Academic prompts
__ Practice quizzes/tests
X Subjective assessment/Informal observations
__ Essay tests
_X_ Observe students working with partners
_X_ Observe students role playing
____ Peer-assessment
__ Peer editing & commentary of products/projects/presentations using rubrics
__ Peer editing and/or critiquing
____ Dialogue and Discussion
__ Student/teacher conferences
__ Partner and small group discussions
__ Whole group discussions
__ Interaction with/feedback from community members/speakers and business partners
X Constructed Responses
_X_ Chart good reading/writing/listening/speaking habits
__ Application of skills to real-life situations/scenarios
X Post-test

Assessment(s) Title:

Projects, tests, class work, and presentations

Assessment(s) Description/Directions:

Projects: Student projects
Tests: Unit test. Teacher may check for progress throughout.
Class work: Students will complete guided practice, collaborative assignments, presentations, & hands-on projects

Attachments for Assessment(s): Please list.

- Historical Engineers
- History of Engineering
- GPS Implants
- Paper Catapult Cutout

LEARNING EXPERIENCES

Instructional planning: Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

Sequence of Instruction

1. Identify the Standards. Standards should be posted in the classroom for each lesson.

ENGR-FET-2 – Students will describe the history of technological advancement.
ENGR-FET-5 – Students will describe the essential systems and processes involved with invention, innovation, and entrepreneurship.
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ENGR-STEM-4 – Students will apply principles of science, technology, engineering, mathematics, interpersonal communication, and teamwork to the solution of technological problems.
ENGR-STEM-6 – Students will enhance reading by developing vocabulary and comprehension skills associated with text materials, problem descriptions, and laboratory activities associated with engineering and technology education.

2. Review Essential Questions.

1. What are the key historical events and their impacts on engineering and technology?
2. What are the social issues that have influenced innovation and technological development?
3. Who are the key persons who have contributed to technological change?

3. Identify and review the unit vocabulary.

Engineering

Technology

Invention

Timeline

Collaborative

GPS

Implants

Catapult

4. Assessment Activity.

Day 1

- Interest approach-have students brainstorm for examples of inventions & innovations of the past.
- Can show slideshow on History of Engineering or Inventors

Day 2

- While discussing past engineering innovations, can discuss catapults & how they work.

- There is a website listed below that will allow students to “build” a catapult & test it out using different variables.

Day 3

- Online there are many templates for building paper catapults. This is an easy hand-on activity that exposes students to many of the forces & terms that they will encounter throughout the program

Day 4

- Complete building catapults

Day 5

- Test catapults

Day 6

- Discussion on Ethics, Impacts & Society
- Standards, rules, or guidelines- who decides? Ethics facing engineers. Impacts of inventions of society. What impact will we see in the future?

Day 7

- Choose an invention (examples include airplanes, cars, assembly lines, etc) & have students analyze the effects on individuals, society, & the environment-groups of 3 or less.
- Can give each group the same invention or have each group research different innovations to share with the class.

Day 8

- GPS Implant research activity—can substitute for any topic of your choosing

Day 9

- GPS Implant research activity

Day 10

- Groups present to class on Ethics of their device

Day 11

Day 12

- Choose Invention (can adapt list to include obsolete, current, & emerging innovations)
- Begin Research with Timeline Worksheet

Day 13

- Complete Invention Research
- Begin work on PowerPoint & Mini-Poster

Day 14

- Work on PowerPoint & Mini-Poster

Day 15

- Work on PowerPoint & Mini-Poster

Day 16

- Work on PowerPoint & Mini-Poster

Day 17

- Students Complete Technology Before I Was Born & turn in Mini-Poster
- Begin Student Presentations if time

Day 18

- Student Presentations

Day 19

- Complete Student Presentations
- Display Mini-Posters in timeline form around classroom
- Review for unit test

Day 20

- Test

Attachments for Learning Experiences: Please list.

Notes & Reflections: May include notes to the teacher, pre-requisite knowledge & skills, suggestions, etc.

CULMINATING PERFORMANCE TASK (Optional)

Culminating Unit Performance Task Title:

Technology Before I Was Born

Culminating Unit Performance Task Description/Directions/Differentiated Instruction:

Students will choose an invention to research. They will identify the purpose of the invention & describe how it works. They can identify which type of engineering their invention uses. A presentation & a timeline poster is created for this activity. All slideshows are presented to the class.

Attachments for Culminating Performance Task: Please list.

UNIT RESOURCES

Web Resources:

3D simulation of catapult design:

http://www.forgefx.com/casestudies/prenticehall/ph/catapult/catapult.htm

Paper catapult-template & directions:

http://www.instructables.com/id/Launch-It%3a-The-Paper-Catapult./

How Stuff Works:

http://www.howstuffworks.com

Invention Dimension:

http://web.mit.edu/invent/invent-main.html

Smithsonian: Inventors and Innovation:

http://www.si.edu/Encyclopedia_SI/science_and_technology/EngineeringandIndustry_Technology.htm

Attachment(s): Supplemental files not listed in assessment, learning experiences, and performance task.

Materials & Equipment:

Powerpoint equipment, internet access

What 21st Century Technology was used in this unit:

X	Slide Show Software		Graphing Software		Audio File(s)
	Interactive Whiteboard	X	Calculator	X	Graphic Organizer
	Student Response System		Desktop Publishing	X	Image File(s)
	Web Design Software		Blog	X	Video
X	Animation Software		Wiki		Electronic Game or Puzzle Maker
	Email	X	Website		