Tech Gr 1 Unit 3 The Nature of Technology: Creativity and Innovation

Content Area: **Technology**
Course(s): **STEM-Technology**
Time Period: **Ten Weeks**
Length: **3rd Marking Period**
Status: **Published**

Stage 1 - Learning Outcomes

Unit Overview

Standard 8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Strand A. The Nature of Technology: Creativity and Innovation *Technology systems impact every aspect of the world in which we live.*

Strand B. Technology and Society: *Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.*

Enduring Understandings

- Manmade products are different from products made by nature.
- Our values affect how technology is used and designed.
- Technologies have changed over time due to human needs.
- Technology systems impact every aspect of the world in which we live.

Essential Questions

- How are products made by man or nature different or the same?
- How do our values affect how technology is used and designed?
- How have technologies changed over time due to human needs?
- What is a technology system?
- When I design a product, how do I know what materials are best?

Interdisciplinary Connections

1. Common Core Literacy

LA.1.CCSS.ELA-Literacy.CCRA.W.10	Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.
LA.1.CCSS.ELA-Literacy.CCRA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.1.CCSS.ELA-Literacy.CCRA.SL2	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
CCSS.ELA-Literacy.RF.1.4.a	Read grade-level text with purpose and understanding.
CCSS.ELA-Literacy.RI.1.10	With prompting and support, read informational texts appropriately complex for grade 1.
CCSS.ELA-Literacy.SL.1.1	Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups.
CCSS.ELA-Literacy.SL.1.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
CCSS.ELA-Literacy.SL.1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.

2. Common Core Math

- CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.
- CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.
- CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.

3. Career Ready Practices

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP5. Consider the environmental, social and economic impacts of decisions.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Stage 2 - Assessment

Formative Assessment

Teacher observation of completed projects

Teacher observation of student cooperation and class discussion

Matrix of skill development

End of Unit/Benchmark Assessments

Stage 3 - Learning Plan

Suggested Activities

- Select a unit labeled "Basic" (K-2) from the Elementary is Engineering curriculum that can be found at EiE.org.
    - Example, use the "A Sticky Situation: Designing Walls" unit found at http://www.eie.org/eie-curriculum/curriculum-units/sticky-situation-designing-walls
    - For an example of a teacher teaching this unit, look at http://blogs.ncs-nj.org/k4stemlab/?p=1503 and http://blogs.ncs-nj.org/k4stemlab/?p=1456 http://blogs.ncs-nj.org/k4stemlab/?p=986
    - How EiE units correlate to technology standards: http://www.eie.org/sites/default/files/ITEEA.pdf
- Create a structure using everyday items and present the product to the class (Recycling totem pole?)
- Discuss a design problem as a class and explore possible solutions.
- Draw and label a picture of a product that is no longer in use, explain its original function, and suggest how to improve it.
- Explain why we need to make new products.
- Take a simple product apart and put it back together.
- Discuss the strengths and weaknesses of a product.
- Create a simple toy and describe its features.
    - Example: Drawing program or virtual construction site (http://www.agame.com/game/mr-magoriums-toy-creator)

Many ideas below borrowed from pages 64 -76 of the Freehold (NJ) Technology curriculum at http://www.freeholdboro.k12.nj.us/cms/lib6/NJ01001089/Centricity/Domain/14/Technology%20Curriculum%20-%20Grades%20K-5%20June%202015.pdf

Websites: eie.org, pbs.org (PBS Kids DESIGN SQUAD), buildwithchrome.com

Resources: digital readers/tablets, MobiGo, V-Tech, hand held devices, Lego online, Legos, K'Nex, diagrams

- Class discussion: Why were phones made? / What was life like with no electricity?
- Sort products produced as a result of technology or nature.
- How are computers used at school, home, work? - Describe how designed products and systems are useful at school, home and work.
- Identify a system and the components that work together to accomplish its purpose.
    - Example: Turn a doorknob and the door opens. Lock the door using a key and the door locks.
- Choose a product to make and plan the tools and materials needed.
    - Make a paper tower or tower out of straws and masking tape.
    - Use index cards to design and create a paper tower.
    - Have the students design and create a marshmallow and spaghetti bridge to withstand a dynamic force (e.g.- a toy car passing through it). (See example of this here: http://blogs.ncs-nj.org/k4stemlab/?p=1551)
- Collaborate to design a solution to a problem affecting the community.
- Demonstrate how reusing a product affects the local and global environment. (Life cycle of paper waste, Lesson about reusing, reducing and recycling materials.)
- Design a product using Purple Mash "2 Design and Make" section.
  https://www.2simple.com/purple-mash
- Use a MAKEDO Cardboard kit to create.
  https://mymakedo.com/
- Teach a mini-lesson about the design process.
- Engineering is Elementary Image "The Design Process":
  http://www.eie.org/sites/default/files/downloads/EiEProject/eie_edp_graphic_c.png
- Discuss the basics of various simple machines.
- Use lesson: http://homeschooladventuresinengineering.blogspot.com/2013/11/weeks-8-9-electrical-engineering-design.html
- Reverse Engineering Activity: Have students take apart a toy, look how it fits together and then put it back together.
- Book with many STEM integration ideas: The Invent to Learn Guide to Fun by Josh Burker

Picture Books to discuss with students (Re: STEM and The Design Process):

- The Most Magnificent Thing by Ashley Spires (risk-taking, failure, redesign)
- What Do You Do With an Idea? by Kobi Yamada (risk-taking, creativity, imagination)
- The Girl Who Never Makes Mistakes by Mark Pett (risk-taking, failure)
- Your Fantastic Elastic Brain by JoAnn Deak (risk-taking)
- Rosie Revere, Engineer by Andrea Beaty (engineering, risk-taking, failure)
- Iggy Peck, Architect by Andrea Beaty (building, risk-taking)

LESSON STRATEGIES:

- Interactive mini lecture/notes – Students take notes, answer questions, turn and talk, participate in class discussions, look up information in text/online.
- Do Nows – At start of class, students answer questions, reflect on learning, work on typing.com
- Video Clips- Shown to aid learning by providing a visual, engage the class
- Demonstrations- To enhance student learning, ignite curiosity, spur discussion, provide a visual, engage the class
- Research questions- Students are given a broad question to research. Students answer the question and provide evidence for their responses. (Independent or collaborative)
- Journaling- Responses to various ideas, thoughts, class activities, and content.
- Reflecting on Learning- Students self reflect on their learning and "rate" themselves on a learning scale.

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- Research questions- Students are given a broad question to research. Students answer the question and provide evidence for their responses. (Independent or collaborative)
- Resources: digital readers/tablets, MobiGo, V-Tech, hand held devices, lego online, legos, K'Nex, Diagrams
- Reverse Engineering Activity: Have students take apart a toy, look how it fits together and then put it back together.
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Supportive Strategies

1. Special Education

- Employ assistive technology as needed (For example, use of Dyslexie font, high contrast or screen magnification on Chromebook, or spoken text features)
- Graphic Organizers
- Modifications on IEP
- Provide written and oral directions, utilizing visuals and exemplars. (For example, teacher will show steps of the Design Process on the ActivBoard and provide the visual printout to students)
- Reduction in workload
- Repetition and Reinforcement of classroom material
- Strategic Grouping for all group work

2. ESL

- Employ assistive technology as needed (For example, online translation or Language text settings on Chromebook)
- For collaborative assignments, appropriate roles will be assigned. (For example, time-keeper, activity starter)
- Make content culturally relevant
- Partner English Learners with Strong English Speakers
- Provide written and oral directions for all lessons, utilizing visuals and exemplars
- Repeat classroom procedure and routines as much as possible to reinforce language learning
- Visual Aids

3. Student at risk of failure

- Employ assistive technology as needed (For example, use of Dyslexie font, high contrast or screen magnification on Chromebook, or spoken text features)
- Flexible acceptance of missing/lost/incomplete assignment
- Strategic Grouping for all group work

4. Gifted and Talented

- Higher level learners will be provided with more intellectually demanding learning activities. (For example, Add relevant images to your Design Process poster)
- Higher Order Questioning
- Utilize different reading levels appropriate for students

Core Instructional Materials/Resources

- Book with many STEM integration ideas: The Invent to Learn Guide to Fun by Josh Burker
- Engineering is Elementary Curriculum (Available for Purchase) http://www.eie.org/eie-curriculum/curriculum-units
- Kevin Jarrett K4 STEM Lab Blog http://blogs.ncs-nj.org/k4stemlab/ This blog details many Elementary is Engineering lessons “in action” with elementary students.
- Resources: digital readers/tablets, MobiGo, V-Tech, hand held devices, Lego online, Legos, K’Nex, Diagrams
- Websites: PBS.org (PBS Kids DESIGN SQUAD), buildwithchrome.com