

# Tech Gr 3 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

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### Unit Overview

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**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

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- 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

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- 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

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### 1. Common Core Literacy

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|----------------------------------|---|
| LA.3.CCSS.ELA-Literacy.CCRA.R.7  | Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.  |
| LA.3.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.3.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.3.CCSS.ELA-Literacy.CCRA.SL2  | Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.  |
| CCSS.ELA-Literacy.W.3.10         | 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 discipline-specific tasks, purposes, and audiences. |
| CCSS.ELA-Literacy.RF.3.4.a       | Read grade-level text with purpose and understanding.   |
| CCSS.ELA-Literacy.SL.3.1         | Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly.    |
| CCSS.ELA-Literacy.SL.3.3         | Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.   |
| CCSS.ELA-Literacy.SL.3.6         | Speak in complete sentences when appropriate to task and situation in order to provide requested detail or clarification.   |

### 2. Common Core Math

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- 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

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- 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

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## **Formative Assessment**

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Teacher observation of completed projects

Teacher observation of student cooperation and class discussion

Matrix of skill development

## **End of Unit/Benchmark Assessments**

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## **Stage 3 - Learning Plan**

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## **Suggested Activities**

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### 3rd Grade Unit 3

- Select a unit from the Elementary is Engineering curriculum that can be found at [EiE.org](http://www.eie.org).
  - For example, use the “A Long Way Down: Designing Parachutes” unit found at: <http://www.eie.org/eie-curriculum/curriculum-units/long-way-down-designing-parachutes>
  - For an example of a teacher teaching this unit, look at: <http://blogs.ncs-nj.org/k4stemlab/?p=1101> AND <http://blogs.ncs-nj.org/k4stemlab/?p=1066>
  - Another example unit that would correspond well with the “Pop’s Bridge” Lesson in the 3rd grade Journeys textbook is “To Get to the Other Side: Designing Bridges” at: <http://www.eie.org/eie-curriculum/curriculum-units/get-other-side-designing-bridges>
  - Engineering is Elementary: <http://www.eie.org/overview/engineering-design-process> and <http://www.eie.org/eie-curriculum/curriculum-units>  
How EiE Units Correlate to Technology Standards: <http://www.eie.org/sites/default/files/ITEEA.pdf>
- STEM sites for kids:
  - <http://www.mastersindatascience.org/blog/the-ultimate-stem-guide-for-kids-239-cool-sites-about-science-technology-engineering-and-math/>
- Videos: PBS Kids Design Squad Introduction Video

- Engineering.com Cargo Bridge Activity: <http://www.engineering.com/GamesPuzzles/CargoBridge.aspx>
- Compare and contrast how products made in nature differ from products that are human made in how they are produced and used.
- RECYCLING Lesson - (Must Do to cover Standards 8.2.5.B.2 and 8.2.5.B.3)  
Examine systems used for recycling and recommend simplification of the systems and share with product developers.  
Investigate ways that various technologies are being developed and used to reduce improper use of resources.  
  
ALTERNATIVE: “Designing Plant Packages” and “Designing Solar Ovens” Units in the Engineering is Elementary Curriculum cover RECYCLING.
- Video conference students in other states/countries to discuss how they collect water and how it impacts their life and how technology has been used to help any problems in their region.
- How do cars affect our environment? - Investigate and present factors that influence the development and function of a product and a system.
- How are buildings made to withstand so many dynamic forces?
  - Investigate and present factors that influence the development and function of products and systems, e.g., resources, criteria and constraints.
- Create a timeline of various technologies (phones, TVs, computers, etc.). Compare and contrast how technologies have changed over time due to human needs and economic, political and/or cultural influences.
- STEM Activity- divide students into groups of 3 and provide each student a different material (Popsicle sticks, clay, pipe cleaners (materials can be substituted)). Then have the team brainstorm ways to create the same item using the various materials that each student was given. Have students discuss how form follows function.
- Identify how improvement in the understanding of materials science impacts technologies.
- Examine ethical considerations in the development and production of a product through its life cycle.
- Investigate the uses of a light bulb/battery and how to dispose of it in a proper way to reduce environmental waste.
- Research technologies that have changed due to society’s changing needs and wants.
- Development of research robots (For example: outer space robots/rovers).
- Explain the purpose of intellectual property law.
- Mini-lesson about “What is Intellectual Property?” <http://www.educateip.org/images/pdf/FINAL+Lesson+1.pdf>
- Compare and discuss how technologies have influenced history in the past century.
- Discussion about how electricity impacts our lives.
- Conduct the Design Squad: The Design Process in Action Lesson: <http://pbskids.org/designsquad/parentseducators/workshop/process.html>  
(Go through the design process in order to meet all the standards).
- Design a keychain for a 3D printer using Thingiverse and Tinkercad: <https://www.tinkercad.com/>  
(3D Design, Classroom Example: <http://blogs.ncs-nj.org/k4stemlab/?p=1494> )
- Design a product and use a 3Doodler (3D printing pen) to create it.

<http://the3doodler.com/>

- Use a Makey Makey Kit to design a product  
<http://www.makeymakey.com/>
- Use a MAKEDO Cardboard kit to create something from cardboard alone.  
<https://mymakedo.com/>
- Design a product using Purple Mash “2 Design and Make” section.  
<https://www.2simple.com/purple-mash>
- Book with many STEM integration ideas: The Invent to Learn Guide to Fun by Josh Burkner

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)

Please note that the following 3rd grade Language Arts lessons in the Journeys textbook correspond with this unit.

- Journeys Unit 2 Lesson 9 - Kamishibai Man  
(Essential Question: How can a new invention cause people's lives to change?)
- Journeys Unit 2 Lesson 10 - Young Thomas Edison (inventions)
- Journeys Unit 3 Lesson 12 - The Science Fair
- Journeys Unit 6 Lesson 27 - The Power of Magnets  
(How can a new invention cause people's lives to change?)

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.

- Book with many STEM integration ideas: The Invent to Learn Guide to Fun by Josh Burkner
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- Design a product and use a 3Doodler (3D printing pen) to create it. <http://the3doodler.com/>
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recycling and recommend simplification of the systems and share with product developers. Investigate ways that various technologies are being developed and used to reduce improper use of resources. ALTERNATIVE: “Designing Plant Packages” and “Designing Solar Ovens” Units in the Engineering is Elementary Curriculum cover RECYCLING.

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## Supportive Strategies

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### 1. Special Education

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- 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 provide an example of a poorly designed parachute and a well designed parachute. Teacher will allow time for students to sketch before building)
- Reduction in workload

- Repetition and Reinforcement of classroom material
- Strategic Grouping for all group work

## **2. ESL**

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- 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**

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- 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**

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- Higher level learners will be provided with more intellectually demanding learning activities. (For example, students will be allowed to work independently to design their parachute)
- Higher Order Questioning
- Utilize different reading levels appropriate for students

## **Core Instructional Materials/Resources**

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- 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. Book with many STEM integration ideas: The Invent to Learn Guide to Fun by Josh Burkner
- Materials needed for benchmark: Coffee Filters (1 each - small, medium and large) Curtain liner Pipe Cleaners Grocery bag Felt Cheesecloth Scotch Tape Masking Tape Paper clips Copy paper String Pipe Cleaners Index Cards Crayons Binder clip to attach weight
- 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](http://buildwithchrome.com)



