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.	**By the end of Grade 2**

Strand C: Design

Rationale: The design process is a systematic approach to solving problems.

Technology CPI

8.2.2.C.6

Investigate a product that has stopped working and brainstorm ideas to correct the problem.

Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Action and Expression: Provide a sample broken toy or object for inspection. Provide a graphic depiction of the model with malfunctioning areas labeled. Use small groups to generate reasons for malfunctions.

Sample Activity

Participate in shared research investigating a broken toy or object to identify potential causes for the malfunction. Use technology to record your questions and observations. Gather information identifying the parts and their interactions with each other. Produce a shared writing project describing the problem, your observations and how the object could be fixed or improved.

Content Area CPI

CCSS.ELA-LITERACY.CCRA.W.7
Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

Science K-2-ETS1-1

Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

Technology Options

- Audacity: An audio recorder and editor to create files containing content and/or directions for the lesson. Share content online to give students the ability to hear again as needed.

  Parents can access and increase student support. Some students may prefer creating an auditory file to hear their thoughts for reference.
- Book Creator: Create interactive ebooks whose files can be downloaded in multiple file formats.
- Graphic Organizer: Create an online organizer to view, align, and support a topic. Most may also be printed.
- My Storybook: Create individual or group storybooks. Images are available or other digital files can be used. Tutorials are included.

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Strand C: Design

Legend	Symbols used are a quick reference to indicate additional resources have been included. Additional information to locate resources is provided on a supplemental page.		
	Time Tips That Transform Practice		Supporting Research and Resources
	Professional Development and/or Classroom Resources		Multiple Means of Representation
	Lessons		Multiple Means of Actions and Expressions
	Technology Resources		Multiple Means of Engagement

	**CCSS.ELA-Literacy.W.7**: http://www.corestandards.org/ELA-Literacy/CCRA/W/ **Next Generation Science K-2-ETSS1-1**: http://www.nextgenscience.org/k-2ets1-engineering-design **Technology 8.2.2.C.6 and 8.1.2.E.1**: http://www.state.nj.us/education/aps/cccs/tech/
	**Multiple Means of Action and Expression: Provide Options for Expression and Communication-** http://www.udlcenter.org/aboutudl/udlguidelines/principle2 **Why Teach with an Interdisciplinary Approach**: http://serc.carleton.edu/econ/interdisciplinary/why.html
	**Engineering: Bridge Building** - http://www.resa.net/curriculum/curriculum/science/professionaldevelopment/ngss-pd/lesson-plans-exploring-ngss/ **Exploring Parts and Wholes**: http://sciencenetlinks.com/lessons/exploring-parts-and-wholes/
	**Audacity**: http://audacity.sourceforge.net/ **Book Creator**: http://www.redjumper.net/blog/2014/08/introducing-book-creator-free-android/ **Graphic Organizer** - http://www.eduplace.com/graphicorganizer/ **My EBook Maker**: http://myebookmaker.com/ Web site to create an electronic book. **My Storybook**: https://www.mystorybook.com/

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.	**By the end of Grade 5**

Strand C: Design

Rationale: The design process is a systematic approach to solving problems.

Technology CPI

8.2.5.C.2

Explain how specifications and limitations can be used to direct a product's development.

Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Engagement: Identify resources and fuel through Internet research, magazines, newspapers or through discussions with experts on Twitter. Draft results through speech-to-text, typed text or predictive text.

Sample Activity

Collaborate in a discussion examining a fuel source (i.e. gas, electric, wind, solar, fire). Investigate what influences its development and use. Identify the resources needed to produce the fuel and explain how availability of resources affects people both here and in areas around the world. Write an informational text examining how the fuel is produced and limited both here and abroad.

Content Area CPI

CCSS.ELA-LITERACY.CCRA.W.2

Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

Social Studies 6.1.4.C.9

Compare and contrast how the availability of resources affects people across the world differently.

Technology Options

- AWWAPP.com: An online whiteboard app that lets you use your computer, tablet or smart phone to easily draw sketches, collaborate with others and share them with the world.
- Creately: A web-based tool for creating interactive graphic organizers: Venn Diagrams, Storyboards, Mind Maps, Cycle Diagrams, Fishbone Diagrams, KWL Charts, T Charts, Y Charts and more.
- Here There and Everywhere: News developed for elementary students and older that is searchable by category and key words.
- Houghton Mifflin Harcourt Education Place: Provides printable graphic organizers. This site can be used to organize and record visualized thinking for feedback.

Tech Tip: Auto Correct can be customized or turned off on your device. Search online to locate directions for your device.

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Strand C: Design

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	Lessons		Multiple Means of Actions and Expressions
	Technology Resources		Multiple Means of Engagement

	**CCSS.ELA-Literacy.CCR.W2**: http://www.corestandards.org/ELA-Literacy/CCRA/W/ **Social Studies 6.1.4.C.9**: http://www.state.nj.us/education/cccs/2014/ss/ **Technology 8.2.5.C.2**: http://www.state.nj.us/education/aps/cccs/tech/
	**Inquiry Learning**: http://21stcenturyhsie.weebly.com/inquiry-pedagogy.html **Multiple Means of Engagement: Minimize Threats and Distractions-** http://www.udlcenter.org/aboutudl/udlguidelines/principle3
 	**"Do You Want Paper or Plastic?"**: An inquiry-based environmental education unit for grades 3–5 providing six lessons with scoring rubrics and additional resources links- http://teachunicef.org/sites/default/files/units/do_you_want_paper_or_plastic.pdf **Engineering for the Three Little Pigs**: http://teachers.egfi-k12.org/3-little-pigs/ **Simple Musical Instruments**: http://teachers.egfi-k12.org/simple-musical-instruments/
	**AWWAPP**: https://awwapp.com/ **Creately**: http://creately.com/Free-K12-Education-Templates **Here There and Everywhere**: http://htekidsnews.com/about/ **Houghton Mifflin Harcourt Education Place**: http://www.eduplace.com/graphicorganizer/

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Strand C: Design

Rationale: The design process is a systematic approach to solving problems.

Technology CPI

8.2.8.C.6
Collaborate to examine a malfunctioning system and identify the step-by-step process used to troubleshoot, evaluate and test options to repair the product, presenting the better solution.

Sample Activity

Collaborate with peers to examine a product or process which is not operating, not meeting current needs or could be improved. Write an explanatory text identifying the step-by-step process used to troubleshoot, evaluate and test options to repair or improve the product. Analyze classmates' solutions and evaluate them using a systematic process to determine how well they meet the criteria and solved the problem.
(See Nano Waterproofing lesson)

Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Actions and Expressions: Small group collaboration engages learner to learner interaction and allows feedback from peers. Offer opportunities for students to write, type, draw, act and/or create a video of the examination of a product or process.

Content Area CPI

CCSS.ELA-LITERACY.W.2
Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.

Science MS-ETS1-2
Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Technology Options

- CAST Science Writer: A tool that supports middle school and high school students in writing lab and class reports. Text to speech is embedded for easy access.
- The Global Classroom Project: This site facilitates global connections by allowing teachers to register for an existent open project or to offer their own project seeking collaborators.
- ooVoo: This tool provides free video calls, voice calls and text messaging.
- Google Drive: A free digital storage site allowing users to create, store, share and download products.
- **Tech Tip:** There are many free options available to use on the devices presently in your classroom. Inventory the resources available and search to locate compatible freeware, open source or apps.

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	Lessons		Multiple Means of Actions and Expressions
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	**CCSS.ELA-Literacy.W.2**: http://www.corestandards.org/ELA-Literacy/CCRA/W/ **Next Generation Science MS-ETS1-2**: http://www.nextgenscience.org/msets1-engineering-design **Technology 8.2.8.C.6**: http://www.state.nj.us/education/aps/cccs/tech/
	**How to Use Assessment Strategies**: http://serc.carleton.edu/introgeo/assessment/strategies.html **Multiple Means of Actions and Expressions:** Enhance capacity for monitoring progress - http://www.udlcenter.org/aboutudl/udlguidelines/principle2
	**Nano Waterproofing**: http://tryengineering.org/lessons/nanowaterproofing.pdf **Space Transportation: Reshooting the Moon** – http://www.nasa.gov/pdf/475494main_HEP_II_MS_8.pdf
	**CAST Science Writer**: http://sciencewriter.cast.org/welcome;jsessionid=64D97BE37DFEDADBDC44D17A377F1DFC **The Global Classroom Project** : http://theglobalclassroomproject.wordpress.com/ **ooVoo**: synchronous video chat or video recording - http://www.oovoo.com/home.aspx **Google Drive**: https://tools.google.com/dlpage/drive **Getting Started with Google Drive**: https://support.google.com/drive/answer/2424384?hl=en

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.	**By the end of Grade 12**

Strand C: Design

Rationale: The design process is a systematic approach to solving problems.

Technology CPI

8.2.12.C.7
Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.

Sample Activity

Use a design process to devise a technological product or system that addresses a global problem (e.g. pollution, water, food, etc.). Research and use available data to write an informative text describing specific events (historical, scientific or technical) causing the problem. Identify the impacts both locally and globally. Propose and evaluate a solution to improve the situation, prioritizing a range of constraints and trade-offs. (See Problem Solving lesson plan)

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Instructional Design Ideas

- Interdisciplinary Learning: Content area standards are developed while cultivating relevant technology applications and skills.
- Multiple Means of Representation: Offer alternatives for visual information such as tangible examples or songs with explanatory lyrics. Increase access for all students by incorporating technology tools such as screen readers, word predication programs, magnifiers and highlighters in projected materials.


Content Area CPI

CCSS.ELA-LITERACY.WHST.11-12.2

Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Science HS-ETS1-3

Evaluate a solution to a complex real world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts.

Technology Options

- Audacity: A tool to create and edit audio files to share online.
- ePals: An internet site where there are ready-to-join projects for teachers and their students to join, or a teacher can submit a request to lead their own project.
- Live Binder: An online three ring binder. It organizes links to external documents and resources.
- NaturalReader: A text to speech application used to support reading, language barriers and other unique needs.
- Wikispaces Classroom: Create a class page shared with all learners. Students see entries of their classmates. Individual pages can be created too where students may draft a response and copy to the shared page. The creator and instructor can see all pages and historical entries.

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	**CCSS.ELA-Literacy.WHST.11-12.2**: http://www.corestandards.org/ELA-Literacy/WHST/11-12/2/ **Next Generation Science HS-ETS1-3**: http://www.nextgenscience.org/hs-ets1-3-engineering-design **Technology 8.2.12.C.7**: http://www.state.nj.us/education/aps/cccs/tech/
	**Multiple Means of Representation:** Offer alternatives for visual information - http://www.udlcenter.org/aboutudl/udlguidelines/principle1 **Teacher vs Student-Centered Instruction:** http://www.nclrc.org/essentials/goalsmethods/learncentpop.html
	**Let it Rain: The Benefits of Rain Gardens-** http://files.earthday.net/lessonplanspdf/Let%20It%20Rain_%20Lesson%20Plan.pdf **Problem Solving Energy Project**: http://www.clarkson.edu/highschool/k12/project/documents/energysystems/2-Problem-Solving.pdf **Working Together to Live Together**: http://teachers.egfi-k12.org/working-together/
	**Audacity**: http://audacity.sourceforge.net/ **ePals**: Provides collaborative projects- http://www.epals.com/#!/main **Live Binder**: http://www.livebinders.com/welcome/education?showsubtab=education **Live Binders Tips and Tricks**: http://www.livebinders.com/play/play?present=true&id=3342 **NaturalReader**: http://www.naturalreaders.com/ **Wikispaces Classroom**: https://www.wikispaces.com/content/classroom