Unit 1-4 Design It [STEM Level 1]

Content Area: **Technology**
Course(s): **Technology 5**
Time Period: **MP1-4**
Length: **1st half of MP**
Status: **Published**

Essential Questions

- How do we identify the components of a system?
- What is the design process?
- How can we use technological devices in the design process?
- How can we use technology to predict and evaluate data and interpret results?
- Why is it important to communicate and collaborate globally?

Big Ideas

- The attributes of design.
- The application of engineering design.
- The role of troubleshooting, research and development, invention and innovation and experimentation in problem solving.
- Systems are comprised of many different parts to create the whole.
- The design process is necessary when creating new products.
- Technology can simplify and enhance the collection and display of data and the prediction and interpretation of results.
- Technology can be used to communicate globally.
- Computing devices may be connected to other devices to form a system as a way to extend their capabilities.
- Engineering design is a systematic and creative process of communicating and collaborating to meet a design challenge. Often, several design solutions exist, each better in some way than the others.
- Societal needs and wants determine which new tools are developed to address real-world problems.
- Technology innovation and improvement may be influenced by a variety of factors. Engineers create and modify technologies to meet people's needs and wants; scientists ask questions about the natural world.

Cross-Curricular Integration

English Language Arts

- RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

- RI.5.2 Determine two or more main ideas of a text and explain how they are supported by key details; summarize the text.

- RI.5.3 Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

- RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

- RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

- RI.5.10 By the end of the year, read and comprehend informational texts, including history/social studies, science, and technical texts, at the high end of the grades 4-5 text complexity band independently and proficiently.

- SL.5.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly

Science

- 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
- 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
- 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

CRLLKS- 21st Century

Performance Expectations

- 9.4.5.DC.4: Model safe, legal, and ethical behavior when using online or offline technology (e.g., 8.1.5.NI.2)

- 9.4.5.IML.1: Evaluate digital sources for accuracy, perspective, credibility and relevance (e.g., Social Studies Practice - Gathering and Evaluating Sources).

- 9.4.5.IML.2: Create a visual representation to organize information about a problem or issue (e.g., 4.MD.B.4, 8.1.5.DA.3).

- 9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

- 9.4.5.IML.6: Use appropriate sources of information from diverse sources, contexts, disciplines, and cultures to answer questions (e.g., RI.5.7, 6.1.5.HistoryCC.7, 7.1.NM. IPRET.5).

- 9.4.5.IML.7: Evaluate the degree to which information meets a need including social emotional learning, academic, and social

- 9.4.5.TL.1: Compare the common uses of at least two different digital tools and identify the advantages

and disadvantages of using each.

- 9.4.5.TL.2: Sort and filter data in a spreadsheet to analyze findings.
- 9.4.5.TL.3: Format a document using a word processing application to enhance text, change page formatting, and include appropriate images, graphics, or symbols.
- 9.4.5.TL.4: Compare and contrast artifacts produced individually to those developed collaboratively (e.g., 1.5.5.CR3a).
- 9.4.5.TL.5: Collaborate digitally to produce an artifact

Practices

- Act as a responsible and contributing community member and employee.
- Consider the environment, social and economic impacts of decision.
- Demonstrate creativity and innovation.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Model integrity, ethical leadership and effective management.
- Use technology to enhance productivity, increase collaboration and communicate effectively.
- Work productively in teams while using cultural/global competence.

Diversity

Objective:

Students will research a career of their choice and compile a comprehensive list of all required training, skills, and certifications necessary for success in that profession.

Activity:

After compiling the information, students will write a brief reflection (1-2 paragraphs) about why they chose this career and how they feel about the required qualifications.

Enduring Understandings

- 8.2.5.ED.1: Explain the functions of a system and its subsystems.

- 8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system.
- 8.2.5.NT.1: Troubleshoot a product that has stopped working and brainstorm ideas to correct the problem. **[R]**

Activities and Assessments

- Brainstorm different kinds of systems around us and what parts make it up (ranging from very simple to complex, e.g. biological, mechanical, human/mechanical, ecological, computer, etc.)
- Body parts work together to build a body system. Students go on-line to *All Systems Go!* And play the game about body systems [http://sciencenetlinks.com/media/filer/2011/10/13/allsystems.swf]
- Discuss the Design Process; students will then create a poster illustrating each component [https://teachengineering.org/engrdesignprocess.php]
- Activity Resource: https://teachengineering.org/engrdesignprocess.php; click on *Introduction to Engineering*
- Activity Resource: http://pbskids.org/designsquad/parentseducators/guides

Additional Resources

- Muscles | Science Trek: https://ny.pbslearningmedia.org/resource/muscles-science-trek/muscles-science-trek/
- Skeletons | Science Trek: https://ny.pbslearningmedia.org/resource/skeletons-science-trek/skeletons-science-trek/
- Digestive Systems | Science Trek: https://ny.pbslearningmedia.org/resource/3ffc6955-3012-4169-9587-ddbb8ad1c49a/digestive-system-science-trek/
- Ecosystems | DIY Science Time: https://ny.pbslearningmedia.org/resource/ecosytems-diy-video/diy-science-time/
- SciGirls | Robot Body language: https://ny.pbslearningmedia.org/resource/4463279e-0987-4305-b408-fc68daa08f71/robot-body-language/