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| **3-5 ETS1 Engineering Design**  *www.nextgenscience.org/topic-arrangement/3-5engineering-design*  ***The chart below makes one set of connections between the instruction outlined in this article and the NGSS. Other valid connections are likely, however space restrictions prevent us from listing all possibilities. The materials, lessons, and activities outlined in the article are just one step toward reaching the performance expectations listed below.*** | |
| **Performance Expectation** | **Connections to Classroom Activity**  ***Students:*** |
| 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 ETS1-3. 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. | * Students identify and describe a problem that they are interested in solving. Students then identify the criteria for success and how they may be constrained by materials, time, or cost. * Students plan how they would test their prototype/process at the final stage of prototype design. |
| **Science and Engineering Practices** |  |
| Asking Questions and Defining Problems   * Use prior knowledge to describe problems that can be solved. * Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.   Constructing Explanations and Designing Solutions   * Apply scientific ideas to solve design problems. * Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. | * Students identify and define problem of interest * Students design a simple prototype solution to the identified problem while identifying what determines success of the prototype and constraints they could face in further development * Students use background research and personal experience to design a solution to their identified problem. * Multiple versions of prototypes are created and revised using feedback from peers and teachers |
| **Disciplinary Core Idea** |  |
| ETS1.B: Developing Possible Solutions  Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)  At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)  Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3) | * Student defined problem * Student designed prototype/process solution. * Peer and Teacher feedback procedures * Student designed plan to test/improve prototype/process. |
| **Connections to Engineering, Technology, & Application of Science** |  |
| Influence of Science, Engineering, and Technology on Society and the Natural World.  Engineers improve existing technologies or develop new ones to increase their benefits, to decrease known risks, and to meet societal demands. | * Student identified problem related to personal interest/concern with a focus on how technology supports their proposed solution. |