Distinguishing Practices in Science from Those in Engineering

Adapted from *A Framework for K-12 Science Education* (NRC, 2013, pp. 50–54)

Science	Engineering
1. Asking Questions and Defining Problems	
Science begins with a question about a phenomenon, such as "Why is the sky blue?" or "What causes cancer?"	Engineering begins with a problem, need, or desire that suggests an engineering problem that needs to be solved.
2. Developing and Using Models	
Science often involves the construction and use of a wide variety of models and simulations to help develop explanations about natural phenomena.	Engineering makes use of models and simulations to analyze existing systems so as to see where flaws might occur or to test possible solutions to a new problem.
3. Planning and Carrying Out Investigations	
A major practice of scientists is planning and carrying out a systematic investigation, which requires the identification of what is to be recorded and, if applicable, what are to be treated as the dependent and independent variables (control of variables).	Engineers use investigations both to gain data essential for specifying design criteria or parameters and to test their designs. Like scientists, engineers must identify relevant variables, decide how they will be measured, and collect data for analysis.
4. Analyzing and Interpreting Data	
Scientific investigations produce data that must be analyzed in order to derive meaning.	Engineers analyze data collected in the tests of their designs and investigations.
5. Using Mathematics and Computational Thinking	
In science, mathematics and computation are fundamental tools for representing physical variables and their relationships.	In engineering, mathematical and computational representations of established relationships and principles are an integral part of design.
6. Constructing Explanations and Designing Solutions	
The goal of science is the construction of theories that can provide explanatory accounts of features of the world.	The goal of engineering is to solve a problem or meet a need.
7. Engaging in Argument from Evidence	
In science, reasoning and argument are essential for identifying the strengths and weaknesses of a line of reasoning and for finding the best explanation for a phenomenon.	In engineering, reasoning and argument are essential for finding the best possible solution to a problem.
8. Obtaining, Evaluating, and Communicating Information	
Science cannot advance if scientists are unable to communicate their findings clearly and persuasively or to learn about the findings of others.	Engineers cannot produce new or improved technologies if the advantages of their designs are not communicated clearly and persuasively.