Course Overview

In this course, middle school teachers will investigate the disciplinary core idea of ETS1: Engineering Design through the Performance Expectation MS-ETS1-2.

The new standards present several conceptual shifts. One of these is the idea that science concepts build coherently throughout K-12. The use of well-designed learning progressions provides a map that allows students; by the time they finish high school, to have mastered core ideas within science. This course is focused on the topic of ETS: Engineering Design, as it pertains to the Performance Expectation **MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. [Assessment Boundary: None Indicated.]**

You will experience information through a variety of media formats targeted to meet the following objectives:
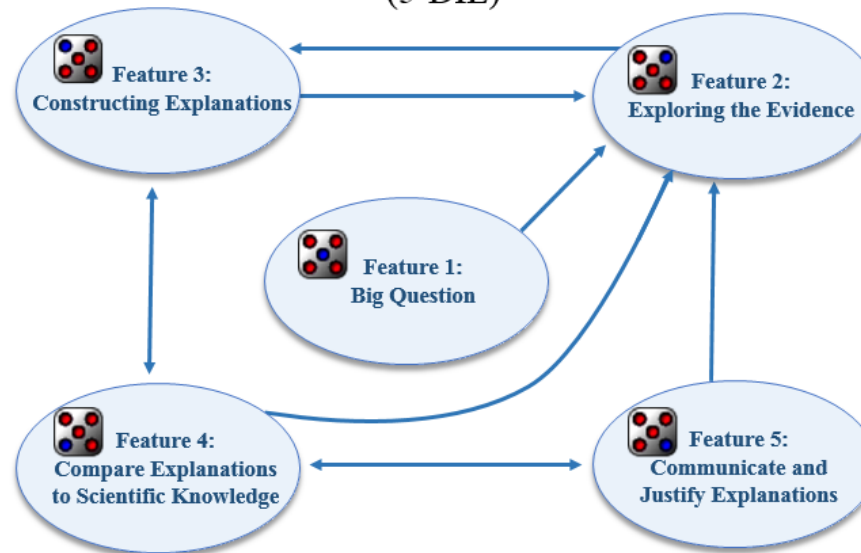
- Describe the three dimensions of learning (Science and Engineering Practices, the Disciplinary Core Ideas, and the Crosscutting Concepts) within the Performance Expectation.
- Present an argument for the types of lessons that you will need to implement in your classroom to help students reach a level of understanding needed to master a Performance Expectation of the Engineering Design page.
- Articulate what is expected from a scientifically literate student at this grade level.
- Generate a general lesson description to target the three dimensions represented in the Performance Expectation.
- Translate your general lesson description into an instructional design model.
- Explain how the Science and Engineering Practices and Crosscutting Concepts support students in deepening their understanding of the Science Disciplinary Core Idea.

Goals & Purpose: This course is focused on a Question (Big Question). The activities are divided into five features and use the 5-DIE model.

Feature 1

Formulate initial ideas related to the Big Question: ***What do I need to know to help students understand engineering design?*** In additional Features, you will have the opportunity to provide further thoughts or questions that arise as you investigate the main ideas and concepts behind the Performance Expectation of the Next Generation Science Standards Topic: ETS: Engineering Design.

5-Featured Dynamic Inquiry Enterprise (5-DIE)

Feature 3

Analyze your evidence and develop an argument for what type of lesson you would need to develop to explicitly target the three dimensions represented in the Performance Expectation.

Feature 2

Investigate and collect evidence from readings and video clips related to the three dimensions; Science and Engineering Practice, Disciplinary Core Idea, and the Crosscutting Concept of the Performance Expectation.

Feature 4

Understand the research associated with teaching and learning science and compare your argument with instructional design models as a mechanism to help you think about three-dimensional learning.

Feature 5

Synthesize, communicate, and discuss your understanding, explanations, and lesson design ideas with your peers and colleagues. Critically evaluate comparisons made by participants to strengthen your understanding of three-dimensional learning.

Throughout the course, we provide you with opportunities to 1) connect your learning experiences across sessions, and 2) explicitly apply these to your classroom practice. You will also be able to revisit your work and reflections by viewing your individual Course Portfolios.

This course focuses on the Performance Expectation MS-ETS1-2 Defining and Delimiting an Engineering Problem.

What's Next?

The following courses are recommended to complete the engineering design cycle at middle school:

MS-ETS1-1 Defining and Delimiting a Problem, & MS-ETS1-3 and MS-ETS1-4 Optimizing the Design Solutions.