

The Engineering Design Process

Engineers use a structured, iterative process to solve problems. YES structures students' work with an age-appropriate, cyclical Engineering Design Process. Naming design phases helps students understand the goal of the activity and organize their work.

This is not a rigid process—as students engineer, they move back and forth between phases. After proceeding through the basic phases, students improve their design by repeating the cycle.

Middle school learners engage with a seven-phase process.

Frame: Students examine a problem from multiple perspectives to identify the requirements for the design (criteria) and how their choices may be limited (constraints). This includes considering the needs of users and implications of the solution.

Investigate: Students explore scientific phenomena, materials properties, and other relevant questions through experiments, model construction, and research.

Brainstorm: Students creatively generate a number of possible solutions to the problem independently and in teams.

Plan: Drawing on evidence from the Investigate phase and their teamwork skills, students combine their best ideas to decide on one design. They sketch their plan and list the materials they will need.

Create: Teams work together to make the solution they designed.

Test: Teams test their solution against the performance criteria. Teams gather quantitative and qualitative data to determine how their design performed.

Evaluate: Teams analyze their data and identify opportunities for improvement.

Iterate Cycle: Teams iterate their designs by going through the Engineering Design Process again. This enables them to compare multiple designs and consider how to further improve their technology.

