



Engineering Mindsets Support Equity

As youth engage in engineering challenges using authentic practices, they develop an engineering mindset. This mindset can nurture competency and confidence, help youth envision their potential as engineers and problem-solvers, and spark interest, affiliation, and identities. Such opportunities invite broader and more equitable participation in engineering. Let's dive deeper into three of the critical features of an engineering mindset: [Using a systematic problem-solving process](#); [Exploring the properties and uses of materials](#); [Considering real-world problems](#).



Best Practices, Resources and Tools

Using a Systemic Problem Solving Process

- [What is Engineering Design](#) - this website shares basic information about the engineering design process: it is made up of a series of steps, it's goal is to solve problems, and anyone can use it.
- [Engineering Encounters: How to Develop an Engineering Design Task](#) - this article from Science and Children provides background information on engineering design and provides step-by-step advice on how teachers can develop high quality engineering challenges for their students.
- [The Engineering Design Process](#) - these posters include the seven steps of the engineering process on a chalkboard background. Each poster describes the step in kid friendly language.

Considering Real World Problems

- [Materials](#) - This short webpage provides a brief and clear explanation of the importance of knowledge of material properties in engineering.
- [Investigating Materials Properties is an Engineering Habit of Mind](#) - this blog describes and showcases video examples of students exploring properties of materials. By investigating materials, students make more informed decisions in their engineering design.
- [Primary Science Lesson Idea: Properties of Materials](#) - this video from Twig Education provides a quick review of materials properties such as hard, flexible, transparent, waterproof and absorbent. The information is presented in the context of why certain materials are used to make everyday objects.
- [Properties of Materials](#) - these posters are a visual aid for children as they learn about the different properties of materials. Along with common properties, this set also includes definitions and pictures of properties like dull, squishy, bumpy and brittle.

Exploring the Properties and Uses of Materials

- [The Search for Real-World STEM Problems](#) - this article describes the importance of providing real-world STEM challenges to students and explains that through real-world problems, students develop empathy. It outlines criteria for selecting authentic problems and provides tips for how to engage students in the process of developing their own challenges.
- [STEM Projects That Tackle Real-World Problems](#) - this article describes how the solving of authentic engineering challenges helps students see the genuine impact of their learning. The article also gives examples of nine real-world problems, such as cleaning up an oil spill or improving the lives of people with disabilities, that have been shown to engage and challenge students from elementary through high school.
- [Problem-Solving in Society](#) - this article by Dena McMartin describes how she, as a young woman, chose to study environmental engineering based on her interests in biology and her desire to make a difference in people's lives and the natural environment.

Together at Home

Additional Engineering & STEM Resources for Afterschool and Home

Using a Systemic Problem Solving Process

- [Video: Kid Engineer - The Design Process](#) - In this Design Squad video, a group of young engineers use the engineering design process to design a bike trailer for groceries.
- [Video: The Engineering Design Process: A Taco Party](#) - This witty video describes the steps of the engineering design process by likening it to throwing an impromptu taco party. It uses a fun example to describe the problem solving process engineers use.
- [Activity: Time for Design](#) - In this lesson, students are introduced to the engineering design process, focusing on the concept of brainstorming design alternatives. Students come to realize that they can be engineers and use the design process themselves to create tomorrow's innovations.
- [Activity: Introduction to the Engineering Design Process](#) - This activity is an introductory lesson that asks students to design a marshmallow tower. Students are introduced to the engineering design process and compare it to the process they used to create their marshmallow tower.
- [Activity Worksheets: Engineering Design Process](#) - This set of worksheets can be used with any engineering challenge. They walk students through the design process by providing space for recording data and consideration of each step.

Considering Real World Problems

- [Activity: Materials and Manufacturing](#) - In this activity based on the story of the three little pigs, students examine the properties, limitations, and durability of a variety of materials, then evaluate which of the materials would be best for building a model house.
- [Activity: The Property of Materials and Their Everyday Uses](#) - This resource provides a number of simple tests that educators can perform with young learners to investigate material properties.

Exploring the Properties and Uses of Materials

- [Activity: Engineering Solutions to Freshwater Problems](#) - In this activity, students are introduced to six freshwater supply problems in various locations around the world. Students brainstorm their own ideas for solving each problem and then learn about the specific solutions that engineers have proposed.
- [Activities: Community Engineering](#) - This website provides engineering challenges that are community-based and includes learning modules on topics like school gardening, classroom renovation, and designing an accessible playground.
- [Activities: EiE Storybooks](#) - Every Engineering is Elementary unit starts with a storybook that sets the context for the hands-on engineering design challenge. Includes 20 engaging storybooks about a child who solves a real-world problem through engineering. Storybooks integrate literacy and social studies with your engineering and science lessons—and help students understand how STEM subjects are relevant to their lives.



For professional development events, trainings, and webinars, visit ALACN.org:
"Million Girls Moonshot Page" Under "Resources"



ALACN is excited to be part of the Million Girls Moonshot, a collective impact initiative designed to increase diversity and equity in STEM. The Million Girls Moonshot will help close the persistent gender gap in STEM fields by engaging one million girls across the United States in STEM pursuits through high-quality, innovative afterschool learning opportunities over the next five years.