



Engineering Explorers: Introduction to the Engineering Design Process



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Time Frame 2-3 hours

Essential Question(s)

- How can we use the engineering design process to solve real world problems?

Summary

In this activity, students are introduced to the foundational concepts of the engineering design process through collaborative, hands-on problem-solving. They will learn to think critically, plan strategically, and revise thoughtfully as they tackle real-world design challenges. The goal is to help students internalize the value of iteration, teamwork, and applying structured thinking to creative problem-solving.

Learning Goals

Attachments

- [Activity Slides—Engineering Explorers.pptx](#)
- [Cognitive Comics—Engineering Explorers - Spanish.docx](#)
- [Cognitive Comics—Engineering Explorers - Spanish.pdf](#)
- [Cognitive Comics—Engineering Explorers.docx](#)
- [Cognitive Comics—Engineering Explorers.pdf](#)

Materials

- Activity Slides (attached)
- Cognitive Comics (attached; one per group)
- Pen/pencil
- Sticky Notes and Chart or poster paper (optional)
- Materials for STEM Activity:
Cups (assorted sizes; 10 per group); Pipe cleaners (20 per group); Scrap paper (plain, cardstock, or newspaper; 20 sheets per group); Tongue depressors / craft sticks (25 per group); Glue sticks (2 per group); White glue (1 bottle per group); Tape (masking or painter's; 1 roll per group); Rubber bands (20 per group); Velcro dots (optional; 6 pairs per group); Scissors (1 per student in group); and Ruler or measuring tape (1 per group).

30 minutes

Engage

Facilitator's Note: STEM Challenge Collection

The following activity is only part of a [STEM Challenge Collection](#) which consists of a variety of possible STEM related activities. We recommend starting with the following resource as it will best prepare students for the flow of each additional activity. Afterwards, feel free to go in any order based on student interest.

Use the **Activity Slides** to facilitate this session. Display **slide 2** and the title of this session. Have students find a partner or create a small group. Move to **slide 3** and instruct students to use the materials provided to create a tower within the allotted time. Try not to provide any additional information or feedback as students work. Start the [5-minute K20 timer](#) on the slide and allow students to work for only five minutes.

When the timer goes off, move to **slide 4** and measure each tower to see which was the tallest. Ask for volunteers to share their experiences. Be sure to have students highlight the challenges and ask guiding questions like: "What information they would have found helpful in completing the task? Or How do you think having a clear design process might have helped your team?"

Transition through **slides 5-6** to review the essential question and learning objectives in as much detail as necessary.

20 minutes

Explore

Move to **slide 7**. Share the scenario on the slide explaining that this was the guiding question for their earlier activity. Invite students to reevaluate their towers in light of the new information. Transition to **slide 8** and inform students they have five more minutes to make changes to their prototype. Afterwards, test the towers again and ask for volunteers to share what changes they made and why.

Share with students that they just participated in the engineering design process.

25 minutes

Explain

Move to **slide 9** and play the “[The Engineering Design Process: A Taco Party](#)” video by KQED Quest to introduce the engineering design process.

Embedded video

https://youtube.com/watch?v=MAhpFt_mWM

Next, transition through **slides 10-16** and review each phase of the design process in more detail as needed. Be sure to ask students how their experiences building their towers is reflected in each phase. For example, they participated in the “Reflect and Improve” when they went back and made adjustments.

Facilitator’s Note: Optional Elementary or Middle school Modification

Younger students may respond better to the video “[The Engineering Design Process](#)” by the Smithsonian as it simplifies the process into three main categories and has a more relatable example scenario.

25 minutes

Extend

Have students get back with their previous group or create a new group and pass out the **Cognitive Comics** handout one per group. Display **slide 17** and introduce students to the [Cognitive Comics](#) strategy. Instruct students to create their own scenario and visually depict how they would work through each of the Engineering Design Process phases. If students struggle to think of what to draw, consider un hiding **slide 18**. Allow students time to work.

After each group has completed their comic, ask for volunteers to share or if time allows, have everyone share.

250 minutes

Extend 2 (optional)

Facilitator's Note: Group Collaboration

We suggest providing students with a list of specific roles to play during the engineering design process. See list below: recorder, timekeeper, checker, facilitator, and reporter.

Or consider using the [Thinking Hats](#) strategy instead. Both will help students be more organized and engaged in the collaborative process. Also consider rotating roles for each new STEM Challenge activity.

If your students need more scaffolding with the engineering design process, we suggest walking through one of our STEM Challenge resources like [STEM Challenge: Eggstravaganza](#) as a class. The goal of working through a model scenario together is to familiarize students with the process of documenting their work in a science notebook and examining their expectations for each phase.

Facilitator's Note: Additional Resources

Founded in 2019 by Blue Origin, [Club for the Future](#) is a non-profit dedicated to inspiring and mobilizing future generations toward STEAM careers that serve Earth by enabling a future of life in space. The organization offers free, standards-aligned STEM lesson plans and activities focused on space topics—such as “Engineering for Space,” “Space Constitution,” and more—that span grade levels K-12.

We encourage you to explore more of their free [lessons](#) and other educational resources for additional classroom ideas. Club for the Future is just one of many valuable sources for engaging, space-themed STEM projects.

15 minutes

Evaluate

Move to **slide 19** and introduce students to the [Glow and Grow](#) strategy. Either pass out a sticky note to each student and have them write “Glow” and “Grow” at the top of each side or have them complete this in their scientific notebook. Invite students to read the essential question again and consider question 1: How they have done well with the engineering design process today? And then have them consider question 2: How they can improve using the engineering design process?

Research Rationale

This study responds to the global call for enhancing student engagement in STEM (Science, Technology, Engineering, and Mathematics) through both formal and informal learning environments. The authors highlight the growing importance of out-of-school STEM programs in fostering student interest and positive attitudes toward STEM disciplines and careers. Drawing on prior research, they emphasize that such programs offer flexible, interdisciplinary learning opportunities that are often constrained in traditional classroom settings. The study aims to evaluate the impact of a university-based, out-of-school STEM program on sixth-grade students' attitudes toward STEM and related careers.

For the full literature review click [HERE](#).

Resources

- Blue Origin. (2025). *Home*. Club for the future. <https://www.clubforfuture.org/>
- K20 Center. (n.d.). Cognitive comics. Strategies. <https://learn.k20center.ou.edu/strategy/198>
- K20 Center. (n.d.). Glow and grow. Strategies. <https://learn.k20center.ou.edu/strategy/4962>
- K20 Center. (n.d.). Thinking hats. Strategies. <https://learn.k20center.ou.edu/strategy/3434>
- K20 Center. (2021, September 21). 5 Minute Timer. YouTube. https://www.youtube.com/watch?v=EVS_yYQoLJg&list=PL-aUHEQeaZXLMF3fltNDxiuSkEr0pq0c2&index=7
- KQED Quest. (2017, April 12). The engineering design process: A tacopParty. YouTube. https://www.youtube.com/watch?v=MAhpfFt_mWM
- Smithsonian National Air and Space Museum. (2023, April 11). The engineering design process. YouTube. <https://www.youtube.com/watch?v=MFGg1calQ6k>
- Warren, M. (n.d.). [K20 LEARN | The impact of a STEM education program on students' attitudes toward STEM and STEM careers](#)