

Engineering Design Process: Icebreaker Activity



Introduction:

Think about playing your favorite sport or musical instrument. What does it take to improve? *(Take student ideas)* These things take time and practice. As we learn, our skills improve and we get stronger/more confident. It is important to work on these skills on our own, but if we are on a team or in a band we also must practice together.

The same is true as we brainstorm engineering or invention ideas. It is a skill we can develop and improve, but it takes practice to think creatively and “outside-the-box.” If we are working on a team, brainstorming together is important.

Today, we will do a brainstorming activity. With your team, you will brainstorm a list of different ways you can use a metal coat hanger. *(Younger students might not have experience with a metal coat hanger. Have one to show as a sample.)* As you brainstorm, imagine you can manipulate the coat hanger by bending it or using wire cutters. It does not have to stay in its original shape.

Procedure:

- a. Divide students into groups of 3-5. This could be a good team building activity to have students work with their blade building partners.
- b. Have students put away their phones & computers. Each group will select a scribe to record the group’s ideas with pencil and paper. *(Putting devices away prevents students from googling ideas. Using a pencil and paper replicates the method they will use in the engineering process where they will brainstorm blade ideas and then draw their design.)*
- c. Ask the question, “What are all the ways you can use a coat hanger?”
- d. Team Goal: To list as many uses for a metal coat hanger as you can with your group. The team with the longest list wins.
- e. Share a couple examples: Roast marshmallows, hang a shirt
- f. There is only one rule. You can only list a specific “type” of use once. Example: Hang a shirt, coat, pants, and skirt only count was one use, not four.
- g. Set a timer for three minutes.
- h. Groups brainstorm. *(Playing music during the brainstorm time will prevent eavesdropping on ideas from other groups.)*
- i. At the end of three minutes, ask each group how many items they listed.
- j. Have the group with the most uses share their list.
- k. Remaining groups share items from their lists not already shared.
- l. Celebrate creativity.

Processing:

1. Describe the process of brainstorming ideas with your group. What was exciting? Was anything challenging? *(Celebrate collaborating and spurring each other on to new ideas. Acknowledge*

that working as part of a team can be challenging and we need to learn to accept different ideas.)

2. I set this up as a competition. The group with the longest list wins. How did that feel?

Responses could include:

- *I wanted to win so I worked harder.*
- *The pressure of competition was hard for me and I struggled to be creative.*

Recognize we all think differently. Some group members might have been excited about the competition, while others struggled. We are facing lots of challenges in our world where everyone will win with great engineering/inventions (examples: Covid, Climate Change).

Imagine we all work for the same organization, but on different sub-teams. We put all the best ideas together for the good of the organization. It isn't about only one team winning, but as we work together, we are able to excel as an organization.

3. During the brainstorming phase, how do you decide when someone on the team has a bad/crazy idea and it shouldn't be included on the list. *In brainstorming, every idea should be included, even if it seems crazy or not viable. In this phase, critiquing an idea or saying it is stupid can shut a person down. Sometimes crazy ideas can become viable. Other times, crazy ideas can trigger another viable idea. Be curious about ideas and ask questions to understand.*

Repeating the Exercise:

- If the idea of “practicing” engineering/invention skills resonates, repeat this activity regularly. Other examples of items that could be used:
 - Water bottle
 - Bandana
 - Pop can
 - 6” of string
 - Sheet of paper
 - 6” of PVC pipe
- Let students brainstorm and then choose the next item they will use for the activity.
- As students improve this skill, they will need longer than 3 minutes brainstorming time. Add 30 seconds or a minute each time the activity is repeated.

This was adapted from an activity facilitated by [Tom Heck](#) at the [2021 Infosys Pathfinders Summer Institute](#).