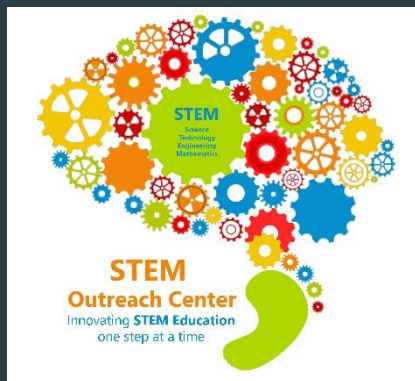


# Fairy Tale Engineering

## Incorporating Problem and Project Based Learning with the Engineering Design Process

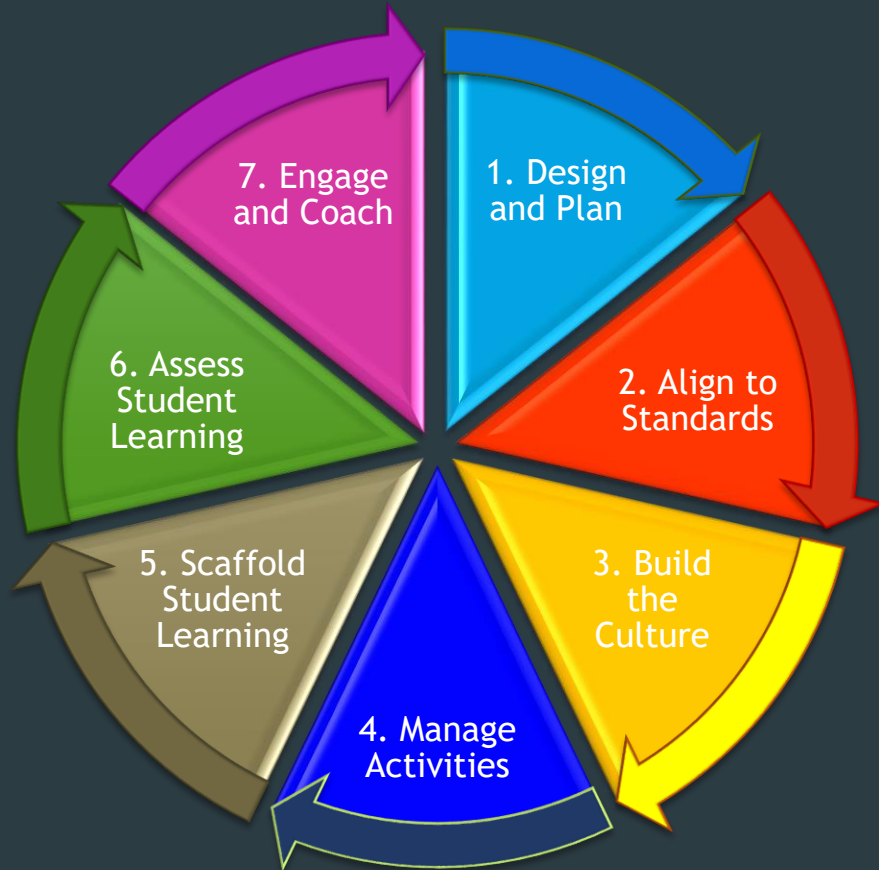
Teacher Professional Development



# Literature and STEM

- ▶ Select literature students are comfortable with
  - ▶ Elementary aged students - Fairy Tales
  - ▶ Middle school aged students - Graphic Novels
  - ▶ High school aged students - classic and young adult literature
- ▶ Fairy tales are already part of the elementary school curriculum
- ▶ Fairy tales are limitless in when it comes to engineering connections
- ▶ Fairy tales already bring in vivid imaginations so students find it easier to problem solve with characters and plot lines they are familiar with.
- ▶ Students know fairy tales, they easy to learn, incorporate multicultural perspectives and familiar traditions.
- ▶ Fairy Tales are short and easy to get through.

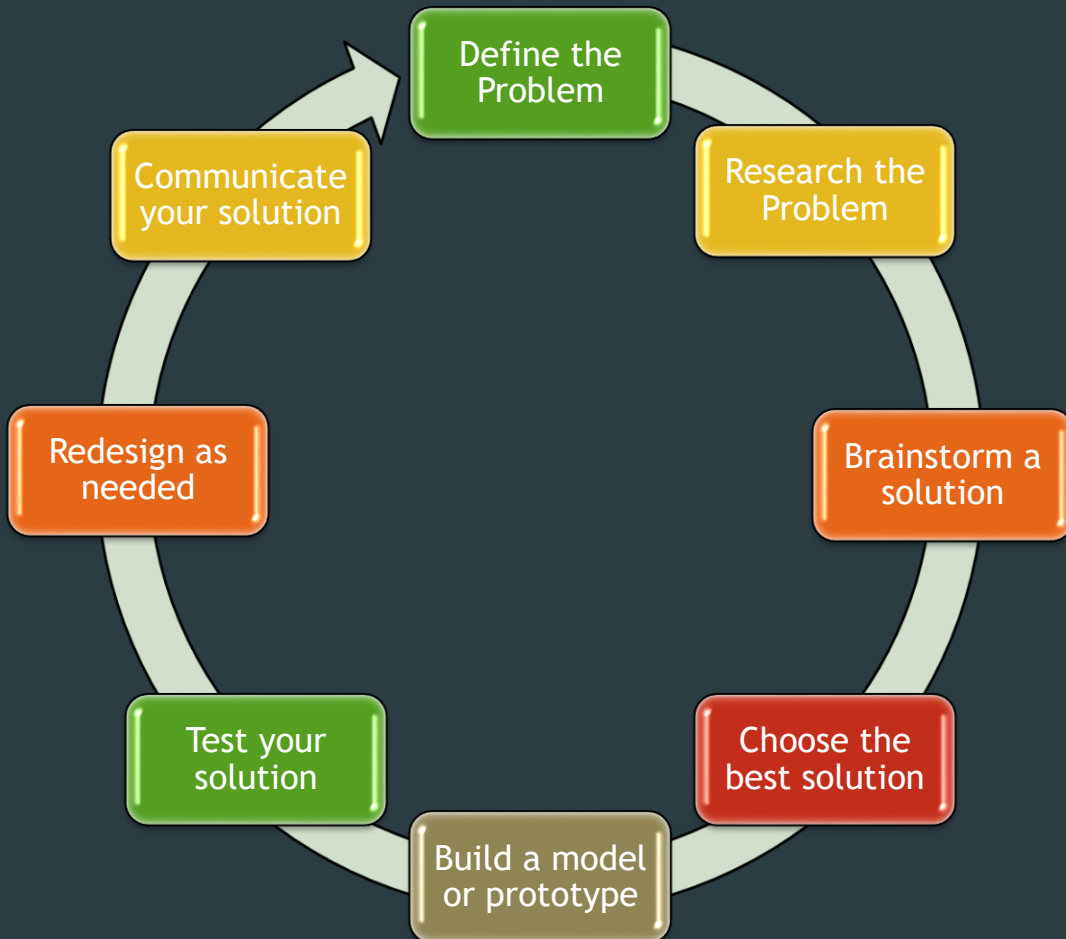
# Problem and Project Based Learning



- ▶ Inquiry based process for teaching and learning
- ▶ Great for content integration
- ▶ Address complex questions
- ▶ Use critical thinking and collaboration to investigate problem
- ▶ Students will learn content, positive peer interaction, and research skills for continued success
- ▶ Face real world problems

# Engineering Design Process

Engineers' initial ideas rarely solve a problem. Instead, they try different ideas, learn from their mistakes, and then try again. The steps engineers use to arrive at a solution are called the design process. As students work through a challenge, use the questions below to tie their work to specific steps of the design process.



**BRAINSTORM** • what are some different ways to tackle today's challenge? • Off-the-wall suggestions often spark GREAT ideas. How creative can you be?

**RESEARCH AND DESIGN** • which brainstormed ideas are really possible, given your time, tools, and materials? • What are some problems you need to solve as you build your project? • How can a sketch help clarify your design?

**BUILD** • what materials will you need? • What can you learn by looking at other students' projects?

**TEST, EVALUATE, AND REDESIGN** • why is it a good idea to keep testing a design? • What specific goal are you trying to achieve, and how will you know if you've been successful? • How does the design meet the criteria for success presented in the challenge?

**SHARE SOLUTIONS** • what's the best feature of your design? Why? • What were the different steps you did to get your project to work? • What was the hardest problem to solve? • Did you have to do something a few times to get it to work? What? • If you had more time, how would you improve your project?

**Important to ask once this process is explored further:**  
**What real world problems can be resolved using this process?**

# Procedures

- ▶ Get into groups of 3
- ▶ Select a story
- ▶ Read the story - be animated and make it memorable for your students if you are the reader otherwise encourage your students to develop their story telling skills.
- ▶ Work through the Engineering Design Process - select the story, define problem, brainstorm, build, test and re-test
- ▶ 25 minutes to engineer your solution to your problem
- ▶ 10 minutes to share

# Materials

- ▶ It's important to use consumable supplies that are easily attainable
- ▶ Use technology to support your learning environment to support this project.
- ▶ Challenge students to reuse and repurpose items so the classroom is conserving supplies.

## Sample supply list:

- dominos
- tape
- meter sticks
- tubes
- cubes
- marbles
- yarn
- cars
- LEGOS
- LEGO plate
- fan
- balsa wood
- popsicle sticks
- ▶ balloons
- ▶ funnels
- ▶ index cards
- ▶ construction paper
- ▶ pipe Cleaners
- ▶ aluminum foil
- ▶ stopwatch
- ▶ drinking straws
- ▶ beads
- ▶ glue sticks
- ▶ cups
- ▶ ping pong balls
- ▶ rulers

# Technology!!

- ▶ 3D Pens
- ▶ Lego we do
- ▶ Cubelets

