LESSON 5

TECHNOLOGY ALL AROUND US (PART TWO)

PURPOSE

IN TECHNOLOGY ALL AROUND US (PART TWO), STUDENTS WILL:

- Review what is technology and engineering.
- Build a structure (Tower) using index cards.
- Apply the elements of the Engineering Design Process in building their structure.
- Using 21st Century Skills in their engineering challenge.

BACKGROUND FOR THE TEACHER

The word “technology” often creates in students, as well as adults, the ideas of electronic devices or latest computer type gadgets. When the word “technology” is mentioned, many misconceptions are revealed of what technology is. In this lesson, technology is defined and how technology is connected to the field of engineering.
One definition of technology is:

> ***“Technology is an object (marble, spoon), a system (pen, pencil, glue stick), or a process (step-by-step procedure that is man-made, a recipe) whose purpose is to solve a problem or make life easier (meets a need).***

Once all the students understand technology, the need to connect it to engineering is the next step. Engineering is where students will plan, create, and improve their projects.
Engineering is defined as:

> ***“Engineering is using anything human-made (creativity, understanding of materials, tools, mathematics, and science) to design things to solve a problem or fulfill a desire.***

Students will use the Engineering Design Process to get a better understanding of engineering and how it is used in daily practices.
The Engineering Design Process (EDP) has many steps, however, for elementary purposes, the EDP, according to Engineering is Elementary, can be summed up in five steps.

Students will be given an engineering challenge. They will be given criteria and constraints for their design problem. The students will then be guided through the Engineering Design Process.

The Engineering Design Process

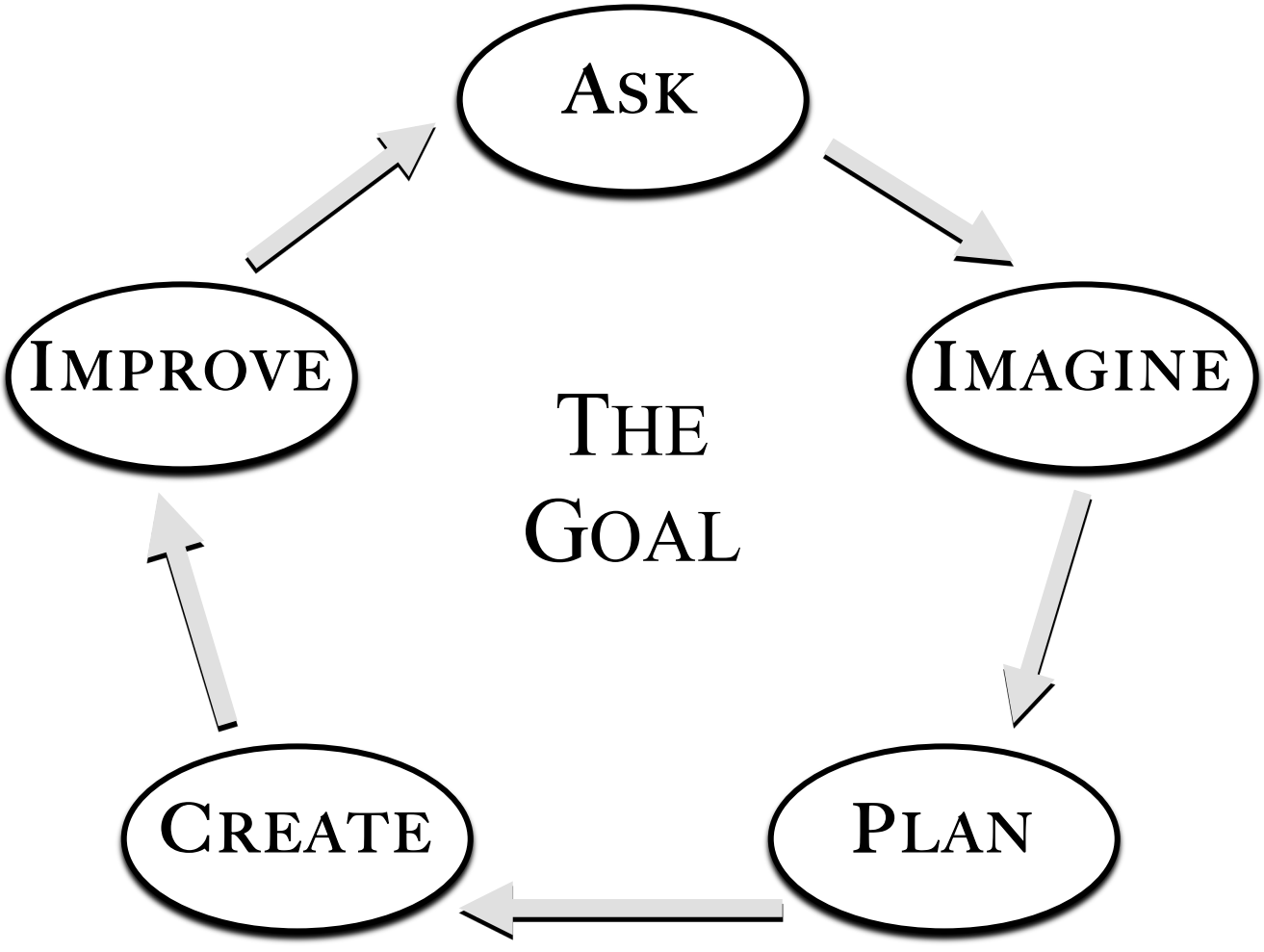
1. **Ask:** What is the Problem?
   What are the Constraints?
   What have other's done?

2. **Imagine:** What are Possible Solutions?
   Brainstorm Ideas.
   Select the Best Ones.

3. **Plan:** Draw a Diagram.
   Make a List of Needed Materials.

4. **Create:** Follow Your Plan and Create it.
   Test it!

5. **Improve:** Make Your Design Even Better.
   Test it!



MATERIALS

LESSON 5: TECHNOLOGY ALL AROUND US (PART TWO) (BUILDING A STRUCTURE)

FOR EACH STUDENT

- Student science notebook

FOR EACH GROUP

- 1 Pack of 100 index cards (3” x 5”)

FOR THE LESSON

- 1 Small stuffed animal, 6” tall, 2-4 oz.
- 1 Stopwatch, timer
- 1 Yard stick

GUIDING THE LESSON

LESSON 5: TECHNOLOGY ALL AROUND US (BUILDING A STRUCTURE)

1. **Present Engineering Challenge**

    - Start with a short story, telling students that they need to build a structure for the new statue (stuffed animal) for their school.

2. **Give The Criteria And The Constraints**

    - **Criteria:**
        - A structure that will hold the statue with no help.
        - The structure must be at lease 15 inches tall.
        - The structure must be free standing.
        - The structure must hold the statue for 10 seconds.

    - **Constraints:**
        - The team has 20 minutes to build the structure.
        - The team only has 100, 3” x 5” index cards.
        - Teams may not test their structures with the stuffed animal.

3. **Follow The Engineering Design Process**

    ASK: WHAT IS THE PROBLEM?
    WHAT ARE THE CRITERIA/CONSTRAINTS?
    WHAT HAVE OTHER’S DONE?

    IMAGINE: WHAT ARE POSSIBLE SOLUTIONS?
    BRAINSTORM IDEAS.
    SELECT THE BEST ONES.

    PLAN: DRAW A DIAGRAM.
    MAKE A LIST OF NEEDED MATERIALS.

CREATE: FOLLOW YOUR PLAN AND CREATE IT.
TEST IT!

IMPROVE: MAKE YOUR DESIGN EVEN BETTER.
TEST IT!

4. **Imagine And Plan**

   - Give Teams 5 minutes to **Imagine** and **Plan** their design of the structure. Have them draw their design in their science notebooks.

5. **Create**

   - Let the teams build their designs for the next 20 minutes. Teams should be able to improve their designs within the 20 minutes.
   - When time is up, no one can touch the structures.

6. **Test**

   - Have all groups observe and test the structures one at a time.
   - Have teams discuss their designs and why they chose those design features.

7. **Reflection/Wrap Up**

   - Review definitions of technology and engineering
   - Review the Engineering Design Process
   - Have students record in their notebooks any concepts, vocabulary, and the EDP.

8. **Internet Connection:**
   http://www.eie.org/overview/engineering-design-process