The STEPS Young Engineers Award

STEP 3	LESSON PLAN	BUILD
REFERENCE TEACHERS GUIDE CHAPTER 3 STEP 3	**Time Required** 45mins (or 2 sessions)	**Date**
Subject Science and Engineering	**Class Level**	
Strand Materials	**Strand Unit** Properties and characteristics of materials	
Title BUILD		
Objectives Build the prototype!		
Skills Required Working scientifically: questioning, predicting, Designing and making: making, evaluating		

Learning Objectives	Learning Activities
Students will: • Learn that modifications of the plan may have to be made • Understand that material choices are important in engineering • Understand that written instructions (drawings) need to be clear • Learn how to investigate what went wrong • Learn how to think of practical solutions quickly	**Build** Build the prototype using Worksheet 2 in the Project Book. **Instructions:** Hand out the Project Books, or a copy of Worksheet 2, their design drawing, (if they want to keep the book clean) to each team and let them build. They should start by using the drawing. However, they will most likely have to make alterations as they build. Set up a table of spare materials, so the teams can change materials if they need to as they build. **Tips for Teachers** Avoid instructing or guiding. The teacher's role is to facilitate and support the students through the experience. Expect the students to feel frustrated if their designs don't work. This is great engineering experience! They now need to learn how to analyse what went wrong and think outside the box about how they will solve the problem. Encourage them to practice the skills they learnt in STEPS 1 and 2: listening (listening to ideas, thinking, then asking questions) and evaluating (evaluating the positives and negatives of the solutions).

	Reflect (optional)
Students will: • Learn how to analyse what designs or methods were successful	After the prototype has been built it is worthwhile to reflect on the experience. This will be of great help in the next 2 steps. Choose one or more of the exercises below – or make up your own. **Reflection Exercises** 1. **Draw a Selfie -** Teams select an 'Artist' to draw a picture of the team at work. Team members tell the artist what to include. Label the drawing with notes/explanations. This is a tool to get them to reflect on the engineering experience (redesigning/problem solving). Give them 5 minutes to do this. Then discuss each team's drawing as a class. The teams will likely have shared similar experiences. Engineers gain experience by learning from others and sharing experiences. 2. **Materials –** Ask the teams to look at the list of materials on their design. Ask them: *Are there any you didn't use? Why?* Now ask them about their prototype: *Are there any materials you didn't expect to use? Why did you choose to use that material?* Here are some ideas on how to discuss materials with your class. **https://www.sfi.ie/engagement/discover-primary-science-and-maths/activities-search/index.xml#result** 3. **Problem Solving –** Ask the teams to describe a time when they were building the prototype that something didn't go as planned. Ask them: *How did you feel? What went wrong? Why do you think it went wrong? What did you do? Did it work?* 4. **Overall Evaluation –** Ask the teams what part of the project worked best? *Examples: If they were doing it again, what would they do differently? Why? Examples: listen to each other better, plan our time better, choose better materials.*
Want more fun engineering?	**Swap Drawings!** Ask the teams to swap design drawings. Give them 15mins to build a prototype of the other team's design. After, ask the teams if their designs were reproduced correctly. Discuss why engineers need to produce clear drawings with lots of instructions.
Resources	'Junk Art' materials. Collect material from home or from nature for building the prototype. Have a communal table of spare materials in the class for the teams if they need to change their designs.

Integration

English oral language – verbalising ideas, solutions and methods as a team

Geography - Human environments