Lesson 3: Prototyping a Travel Solution

by Jonathan Coldoff

Grade Level(s)

Grade 5

Lesson Overview

In groups of 3-4 students will ideate solutions for the needs of their explorer. From the many ideas they generate they will need to choose one design to build. Each group will build one prototype.

Learning Objectives

Students will empathize with a historically based explorer and develop a viable solution to their travel goals.

Solutions can be wide (creative) or narrow (constrained by historical reality). It is up to the instructor to choose if they want to utilize constraints.

Standards

CCSS.ELA-LITERACY.RI.5.1
Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text.

CCSS.ELA-LITERACY.RI.5.3
Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.

Next Generation Science Standards.3-5.Engineering Design

3-5-ETS1-1.	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2.	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Preparation

- Understanding of Design Thinking, empathy maps and POV's (needs statement)
- Teach the first two lessons in this unit
- Collect a large variety of prototyping materials
- Construction materials – cardboard, paper, craft sticks, blocks, string rope, fabric, plastic bottles, etc.
- Cutting implements – scissors, mat knives, etc.
- Measuring devices – ruler, tape measure, compass, protractor, etc.
- Binding types – duct tape, painter's tape, scotch tape, glue, hot glue, etc.
- Decorating materials – pens, pencils, stickers

Materials and Resources

- POV statements
- Scratch paper, pens, pencils
- Sticky notes
- Prototyping materials (see above)

Activity 1: Ideate (*25 Minutes*)

- Groups meet together
- Have each group re-read their POV statement and review the route their explorer will take
- Before ideating, groups should briefly discuss how many people they will need to transport and what the needs of those people will be (food, water, shelter, entertainment, etc.)
- Individually have each child generate ideas that would meet the needs of their explorer using their signature sticky not color – post these in front of the group and name them. No explanations at this time and every idea are valid (no put downs!). Students may not copy others ideas, but are encouraged to be inspired by others. ***Add constraints here if needed or desired**
- When most ideas are up, have the kids explain their idea to the other members of their group.

Activity 2: Pick and Prototype (25 *Minutes*)

- Groups need to choose one solution that they think has the greatest possibility for success and that meets the needs of their explorer.
- Group then collaboratively construct a model prototype of their design. This may take more than one day, or can be quick if you are going to go through the prototyping process many times.

Activity 3: Test (*20-30 Minutes*)

- If desired, you can have groups present their prototype to the class and discuss their design in an open forum. I would suggest using warm and cool comments to help keep children positive but constructive at the same time. It is also advisable to follow a tuning protocol at this time.
- Groups should take notes on their peers' comments so that they can improve their design and prototype again.

Troubleshooting

Help to ensure that everyone is involved during the prototyping process. Without constraints, ideas can get pretty wild. Be prepared for some creative solutions that may not be historical realistic.

Assessment

- Completion – does the group complete a prototype?
- Alignment – how well does the prototype align with the group's POV?
- Viability – will the explorer survive; get to their goal, etc.?
- Constraints – if constraints were added, does the prototype reside inside a space defined by those constraints or outside?
- Note: Examples of Constraints: (1) Set a technology age limit – example no tech. that was invented after 1600, 1700, 1800, etc. (2) Do/don't include magic (3) Dollar figure – large minimums or small limits