

Inventing with Empathy

Grade level: 4-5

Summary of lesson: Students read *El Deafo* (Cece Bell), a graphic novel memoir about the author's experience growing up with hearing loss and the challenges of using a bulky hearing aid device. Using this literature as a launching point, students build a prototype invention for the deaf community.

Time/Duration: Eight, 45-minute lessons (can be broken into 16 classes)

Learning Principles:

- Develop empathy for others and the problems they face
- Learn about the Deaf community, historical inventions that have helped them, and problems they continue to face
- Gain circuitry and coding skills by building gizmo robot and using Scratch
- Learn about the invention process and how to solve a problem through brainstorming, research, and prototyping
- Learn how to storyboard using Scratch

Subject areas/Standards:

4-PS3-2, 4-PS3-4, 5-PS1-1, 3-5-ETS1-1, 3-5-ETS1-3, CCSS.ELA-LITERACY.RL.4.1/RL.5.1, CCSS.ELA-LITERACY.SL.4.1/SL.5.1, CCSS.ELA-LITERACY.W.4.9/W.5.9, CSS.ELA-LITERACY.W.4.3/W.5.3

Breakdown of lessons:

- Class 1: Introduction to invention and warm-up activities, including building a gizmo robot (optional)
- Class 2: Building Empathy
- Class 3: Understanding Deaf Culture
- Class 4: Problem Identification and Research
- Class 5: Identify Solutions and Refine the Problem
- Class 6: Invent – Prototyping
- Class 7: Prepare Ideas for Optional Ideas4Ears Submission
- Class 8: Present prototypes

Materials:

- Recycled materials such as thin cardboard (i.e., cereal boxes), cardboard tubes, egg cartons, etc.
- 60 cups
- Rubber bands
- Scissors
- Masking and duct tape
- Copper tape
- LEDs
- Coin cell batteries
- Hummingbird
- Micro:Bit
- 2 rotation motors
- MakeCode or similar programming language
- Distance sensor and/or sound sensor
- Alligator clips
- Computer/projector/internet access/speaker
- String
- Earplugs
- Markers
- Large post-it poster paper
- Sticky notes
- Paper and pencils
- Timer
- Brass plated fasteners
- Popsicle sticks
- Pipe cleaners
- Google eyes
- Pom poms
- Air-dry clay
- Clay tools
- Plastic wrap
- Trifold posterboards (optional)