Assistive Technology in STEM

Designing for accessibility and innovation

ENGAGE

Activity

Try to complete a simple task with the limitations below:

1. Writing with non-dominant hand
2. Navigating space with limited vision
3. Move varying objects without using fingers

Reflection

- What made this difficult?
- Any other physical limitations can you think of or have seen?

Activity (Discussion Question):

"The Cost Problem"

Advanced assistive technology can cost thousands of dollars

Many are:

- Not covered by insurance
- Not accessible to families
- Not household devices

This introduces the question:

Is technology truly innovative and inclusive if people can not afford to use it?

Spark Plug // Continued Discussion

- Who is technology usually designed for and for what reason?
  - Who might be left out?
- What is accessible technology?
- How do these technologies better society?
- How does this connect to fairness?

Guiding + Essential Question

How can we leverage engineering technologies to design affordable, accessible machines that increase autonomy and independence?

EXPLORE

Is this Assistive/Inclusive Technology: Yay or Nay?

Sidewalk

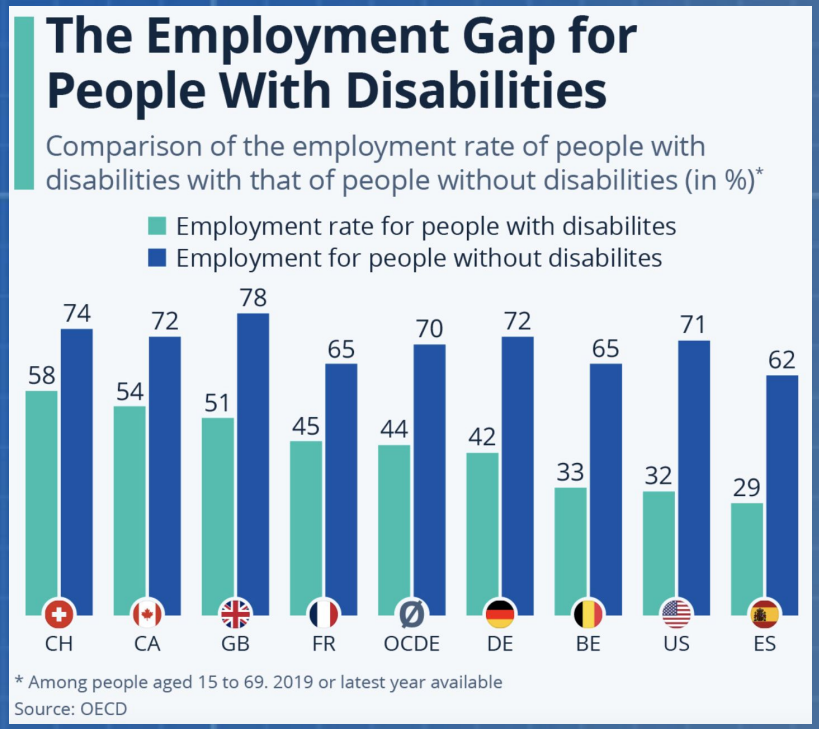
Car

Robotic Arms

Other Toys

Real-World Problem

Many assistive technologies are too expensive to become mainstream



<u>Lack of access impacts:</u>

- Independence
- Jobs
- Mental health
- Childhood development

Find additional resources in the background section of the written instructions

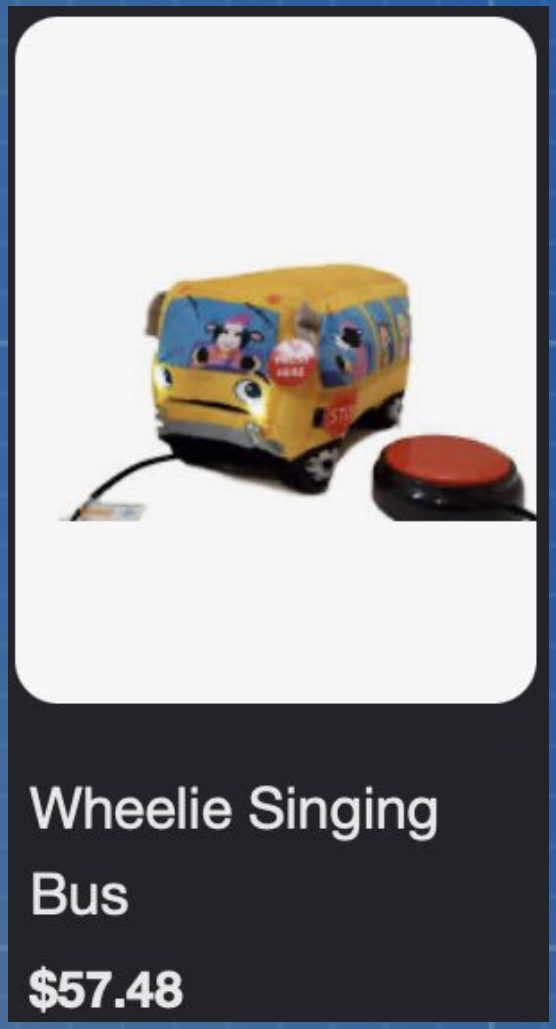
Compare Two Solution

High-Cost	← **Solutions** →	**Low-Cost**
Advanced mobility device ($$$$)	← **Examples**→	Modified toy car ($)
Limited access		Widely buildable
Specialized		DIY adaptable

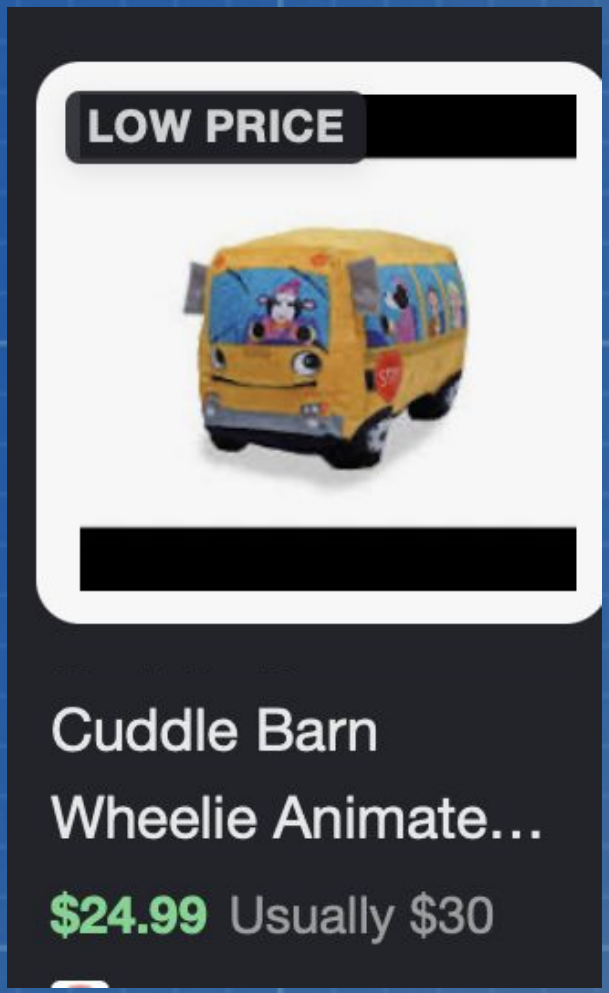
Which solution has a greater real-world impact?

Why?

Comparison: Guess the Price



Adapted



Regular

Comparison: Guess the Price

Regular

Adapted

Engineering for Affordability

Good engineering is not just about complexity.

It is about:

- Accessibility
- Cost-efficiency
- Scalability

EXPLAIN

What is the Go Baby Go Initiative?

Take 5 minutes to research what is the GBG initiative and the Adaptive Toy Car Project. What is its goal? Share at your tables.

Helpful links:

Oregon State University

NEPA GO BABY GO CHAPTER

Answer:

1. Designed for children with limited mobility
2. Supports motor rehabilitation therapy and autonomous mobility
3. Uses engineering design process to solve real-world problems

Simplified Overview of Car Adaptation

Goal: Rewire pedal circuit system to accommodate external control through a pressure-sensitive button, making it easier to use for children with limited mobility.

In other words, bypass the pedal-controlled accelerator to replace with a more accessible controller.

ELABORATE

Mini-Design Challenge

Design an adaptive solution for a real-world problem

Options:

- Improve an existing product
- Create a new device
- Modify a common object

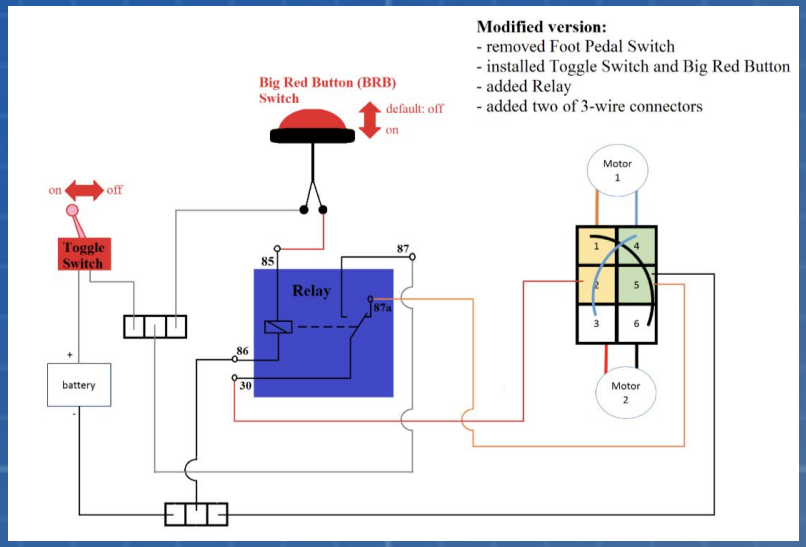
Project Requirements

Students must:

- Identify a user need
- Explain the problem
- Design a solution
  - With circuit blueprint or engineering drawing
- Justify how it improves access

Build/Prototype Ideas + Inspiration

- Cardboard models
- Circuit mockups
- Drawing or diagrams
- Optional: program or demonstrate use of Arduino/switches



EVALUATE

Presentation

Students present:

1. Problem
2. Solution
3. Who it helps
4. Why it matters

Reflection Questions:

1. How does your design increase independence?
2. Who benefits most?
3. Why is accessibility important in STEM?

Review Essential Question

How can we leverage engineering technologies to design affordable, accessible machines that increase autonomy and independence?

PROJECT: Adapting Toy Car

ROLES

- 2-3 people adapting car
- 1-2 people drawing schematic
- Optional addition: 1 person create a Fusion 360 model of car components and added button/adaptation(s)

Helpful Links

Reviewing basic design techniques (soldering, circuits, etc)

How to Adapt Ride-on Cars:

Step-By-Step Instructional Video

Written Instructions (with pictures)

Example Pictures