Rosie Revere, Engineer Ecobrick Challenge, Student Developed Lesson Plan (Resource Exchange)

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Rosie Revere, Engineer Ecobrick Challenge

Student Developed Lesson Plan (Resource Exchange)

Grade Level

6th grade (adaptable for K-MS)

Subjects + Topics

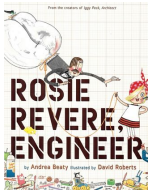
Engineering, Sustainability, Density

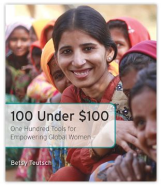
Resources

- *Rosie Revere, Engineer* by Andrea Beaty
- *100 Under $100: One Hundred Tools for Empowering Global Women* by Betsy Teutsch
- The Questioneers (found at questioneers.com)
- Six Bricks Booklet by The LEGO Foundation (found at legofoundation.com)
- Ecobricks.org
- HugItForward.org
- EarthBench.org
- http://artdesignforacause.org/Ecobricks-transforms-plastic-waste-to-building-blocks/

Materials + Technology

- Engineering design process visual aid for easy reference
- A copy of *Rosie Revere, Engineer* OR Computer and projector if watching *Rosie Revere, Engineer* on YouTube
- A copy of *100 Under $100: One Hundred Tools for Empowering Global Women*
- Plastic bottles - these can be gathered by partnering with a local recycling facility (also a great field trip for students!), or by having plastic bottle collections around the school
- Other recyclables (plastic or wrappers preferred)
- Tape
- Hot glue
- Scissors
- Internet access
- Engineering design notebooks





Student Learning Outcomes

Next Generation Science Standards:

MS-ETS1-1 Engineering Design: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2 Engineering Design: Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3 Engineering Design: Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Students will be able to...

- Make connections between *Rosie Revere, Engineer* and *100 Under $100: One Hundred Tools for Empowering Global Women*
- Make connections to real world problems and organizations
- Use the Engineering Design Process to design an Ecobricks building or tool
- Connect engineering and empathy

Opening + Anticipatory Set

The lesson will start by reading *Rosie Revere, Engineer*. While reading, have the students identify steps of the engineering design process and make observations.

Engineering Design Challenge

Students will be challenged to pick an Ecobricks community partner and, looking at their mission, create a building or tool out of Ecobricks. This community partner offers a "customer constraint" that engineers often need to consider when designing a product. The other constraint during this lesson is the constraint of time, as the students need to create a product by the end of the lesson. Students will need to be able to determine a community need in addition to designing and creating a smaller-scale example of their solution. They will need to keep in mind *who* they are designing for; it is not for themselves! Once complete, students will present their projects in an engineering exhibit, and evaluate each other's solutions.

Looking for more inspiration? You can prompt your students to design something more specific. For example: Have your students design a shelter for victims of natural disasters or political conflict. Have your students design a library for small villages without access to this resource. The possibilities are endless!
Project Checklist: What are you trying to solve? Who will benefit from your solution? Do you have a prototype of your solution? Why do you think your design will work? What makes your design unique?

Lesson Plan

Day 1: Introduction

- Start with opening motivation + anticipatory set: reading *Rosie Revere, Engineer*!
    - Start a discussion. When asking questions, first have students pair and share, and then have a few students share their ideas with the whole class. Ask students what they notice throughout the book. Build on their observations.
- Overview *100 Under $100: One Hundred Tools for Empowering Global Women* #74, Bottle Bricks/Ecobricks
    - Overview what Ecobricks are and how they are made. (They are made from recyclable materials or left over plastics and are set to a specific range of densities.) Show them Ecobricks.org for reference.
    - Explain what projects have been completed with Ecobricks (Ex: Rebuilding houses after hurricanes, building schools).
        - How can bottle bricks show creativity? Is there any waste using bottle bricks? How does this idea show empathy?

Day 2: Brainstorming

- Allow students time to brainstorm ideas for the engineering design challenge outlined above in their engineering design notebooks.
- Remind students to refer to resources from Ecobricks community partners listed above.
- They will start their construction tomorrow!

Day 3: Build, Build, Build!

- Students will work on prototyping their design they brainstormed yesterday.
- Remind students to refer back to the project checklist listed above and their notes in their engineering design notebooks.

Day 4: Build, Build, Build (continued)!

- Students will finish prototyping their design and create a brief presentation for tomorrow's engineering exhibit.

Day 5: Engineering Exhibit + Closure

- Have the students present their completed designs! It should be clear what the context of their project is; what problem are they trying to solve? Who will it help?
- Have students evaluate each other's ideas; specifically focus on the positives. How can each of these ideas be pulled together to create a final design?
    - "I like how Emma's project solved the problem of lack of housing in earthquake affected areas" or "Caroline did a great job ensuring that light would still be able to reach inside the Ecobrick house", etc.
- Closure: Have students complete an exit ticket reflection. This activity should show student understanding of listed objectives.
    - What would they change about their design next time?
    - How can Ecobricks affect your own community?

Contingency Plan

If students are struggling to be inspired, allow them time to research ideas online, as well as look at the *100 Under $100: One Hundred Tools for Empowering Global Women* book to see the pictures of Ecobricks at work! Additionally, because this project can easily be picked up where it was left off, allow students to work on them in other free time so that they are not constrained by time or frustrated if they do not finish in the allotted time.

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