Building Bridges K-2
A STEM Read lesson based on
Iggy Peck, Architect by Andrea Beaty

Overview

In the book Iggy Peck, Architect by Andrea Beaty, Iggy must build a bridge to save his teacher and classmates from an abandoned island. In this engineering challenge, students use the Engineering Design Cycle to build their own bridges and then write a reflection paper.

Grade(s): P ☐ K ☒ 1 ☒ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12 ☐

Suggested Time Frame: Two to three sessions

Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
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<tbody>
<tr>
<td>K-2-ETS1-1</td>
<td>Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.</td>
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<tr>
<td>K-2-ETS1-2</td>
<td>Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</td>
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<tr>
<td>SL.K-2.1</td>
<td>Participate in collaborative conversations with diverse partners about kindergarten to grade 2 topics and texts with peers and adults in small and larger groups.</td>
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<td>K.MD.1</td>
<td>Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</td>
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<tr>
<td>K.G.5</td>
<td>Model shapes in the world by building shapes from components (e.g., sticks and clay balls) and drawing shapes.</td>
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Objectives

At the conclusion of the lesson, students will know or be able to

- Describe how Iggy Peck would have used the Engineering Design Cycle to plan, design, and test his creations.
- Identify techniques in creating a sturdy bridge, both from the text and video.
- Design a bridge, using the Engineering Design Cycle, to hold an 8 ounce water bottle.
- Discuss their designs with the class and explain how they crafted their bridge.

Key Terms

Architect – a person who designs buildings.

Engineer – a person who designs or builds engines, machines, or structures.

Engineering Design Cycle – steps engineers follow to design and build solutions to a wide variety of problems. The engineering design cycle helps engineers come up with the best solutions to problems.
Materials

- *Iggy Peck, Architect* by Andrea Beaty
- Newspaper or other large paper
- Masking tape
- Popsicle Sticks
- Colorful scraps of paper
- Glue
- Rulers
- Paper clips
- Other miscellaneous materials (i.e. sequins, pipe cleaners, pom pons)
- Computers/mobile devices for videos
- 8 ounce water bottle

Procedure

1. Prior to the lesson, place two desks, tables, or other flat surfaces 12 inches apart.

2. Read the book *Iggy Peck, Architect* by Andrea Beaty and then ask the following questions and have discussions.
   - What is an architect?
   - What are some jobs an architect might do?
   - What kinds of buildings did Iggy build?
   - What is something useful you would like to build?

3. Watch a video on bridges. Here are two suggestions:
   - [www.youtube.com/watch?v=qFZGmHbjLSM&t=268s](http://www.youtube.com/watch?v=qFZGmHbjLSM&t=268s)
   - [https://www.youtube.com/watch?v=GJpHS6-iUrs](https://www.youtube.com/watch?v=GJpHS6-iUrs)

4. Discuss techniques they used in the videos to design stronger bridges and how those techniques could be used to design their own bridge that will hold an 8 ounce bottle of water for 10 seconds. Pass the water bottle around so the students will know how heavy it is. Show them the 12 inch gap you have created and tell them that is the length their bridge will need to span. Show and discuss the items that are available for them to use in their design. Tell them they can use some or all of the materials. It is up to their groups to design. They are also allowed to go back after they test their bridges to get more or different materials if needed.

5. Discuss the Engineering Design Cycle and how an architect or engineer would use it when designing a bridge. Discuss how the students should use the cycle while designing their own bridges.

6. Have students work in groups to design and build their bridges utilizing the Engineering Design Cycle. Allow them to test their bridges on the 12-inch span using the water bottle. Encourage them to go back and evaluate their design and improve
upon it if need be. They should repeat the process until they are successful, or time is up.

7. Students should then individually write a reflection paper describing the Engineering Design Cycle and how they utilized it in their bridge design. They should write about the steps they took, challenges they faced, and how they solved those problems.

8. Groups will then present their bridges and demonstrate how well it holds up the water bottle. They should be prepared to answer questions about the process they followed using their reflection papers.

Extensions

1. Students can design and build a bridge to hold a larger water bottle.

2. Creative writing prompt – Imagine you are Iggy Peck. What type of structure would you build and what everyday materials would you use to build it? Draw a picture of your structure and write how you built it.

3. Students can build bridges out of other objects such as blocks, Legos, markers, etc.

4. A competition can be held by slowly adding weight to the bridges to see which bridge will hold the most weight.

Considerations

For younger students, the water bottle can be replaced by a less heavy object.

Assessments

Use or adapt the attached rubric
### Rubric

<table>
<thead>
<tr>
<th></th>
<th>Exceeds (3)</th>
<th>Meets (2)</th>
<th>Partially Meets (1)</th>
<th>Does Not Meet (0)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Collaboration</strong></td>
<td>Worked well with others and discussed ideas in a fair, respectful, encouraging way and was considerate of the feelings of others.</td>
<td>Worked okay with others and discussed ideas in a fair, respectful way, but may not be encouraging. Considered the feelings of others.</td>
<td>Worked with others, but did not contribute a fair share of work OR was discouraging and did not consider the feelings of everyone.</td>
<td>Did not participate or discussed ideas in an unfair, disrespectful way.</td>
</tr>
<tr>
<td><strong>Engineering Design Cycle</strong></td>
<td>Student clearly understood and fully utilized all four steps of the Engineering Design Cycle.</td>
<td>Student basically understood and utilized all four steps of the Engineering Design Cycle.</td>
<td>Student vaguely understood and utilized some steps of the Engineering Design Cycle.</td>
<td>Student did not understand AND/OR only utilized one or none of the steps of the Engineering Design Cycle.</td>
</tr>
<tr>
<td><strong>Use of Materials</strong></td>
<td>Inventively chose materials that were interesting and supported the project’s purpose.</td>
<td>Appropriately chose materials to support the project’s purpose.</td>
<td>Chose materials but some work against the purpose of the project.</td>
<td>Did not choose appropriate materials.</td>
</tr>
<tr>
<td><strong>Bridge Design</strong></td>
<td>The bridge design was inventive, aesthetically pleasing, and was able to hold an 8 ounce water bottle for over 10 seconds over a 12 inch span.</td>
<td>The bridge design was able to hold an 8 ounce water bottle for 10 seconds over a 12 inch span.</td>
<td>The bridge design held an 8 ounce water bottle for less than 10 seconds.</td>
<td>The bridge design was not able to hold an 8 ounce water bottle.</td>
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<tr>
<td><strong>Total N/12</strong></td>
<td></td>
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