

STEM Capstone

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Suggested Time: 60 minutes

Overview:

- The lesson will have students thinking about a structural building that can withstand floods. Students will be building on knowledge they have already learned about natural disasters. They will understand that these natural disasters can significantly impact someone's life and the house they are living in. Students will research different structural buildings that already exist to help prevent flooding and then they will create a building of their own, following the engineering design process, that will withstand a flood. Their buildings will be tested at the end of the series of lessons to evaluate the success of their creation.

Vocabulary

- Tsunami
- Flood
- Uproot
- Destruction
- Damage
- Shelter
- Surge
- Overflow

NGSS Standards:

- 3.ESS2-1. Make a claim about the merit of a design solution that reduces the impacts of a weather related hazard.

Common Core Math Standards:

- Measurement and Data
- Geometry

Project Materials:

- Cardboard
- Plastic Wrap
- Toilet paper cardboard rolls
- Tape
- Glue
- Student choice materials (brainstorm with students)

Multimedia Resources:

- Video: Anti-flood inventions: <https://youtu.be/5ZZyYyN2Dcw>
- Ebook: EPIC books- Floods by Julie Murray
- Ebook: EPIC books- Disaster Zone Floods by Vanessa Black
- Ebook: EPIC books- Safe Buildings by Kaitlyn Duling
- Videos from mysteryscience.com

Before the Lesson/Background Information

- Students should be familiar with the design engineering process and the teacher (or students) should have this somewhere in the classroom to refer to. Such as on the SMARTboard or in student notebooks.
- Students should have discussed what natural disasters are and how they can impact communities.

The Lesson

Part 1: Research and background information (20-30 minutes)

1. Start by reviewing with students natural disasters and what happens when there is a flood. Tell students we need to come up with a way that more buildings can survive floods. They are to research different types of structures that are used in areas that frequently flood and then share their findings with the class.
2. When students have researched and shared with the class, they will then be tasked with the project. They are a construction worker who has been tasked with creating a new design for a building that will not get wet if the area floods.
3. Students will be given approximately 10 minutes to use the knowledge they have learned to come up with a plan for their structural design. Tell students what resources they have available to them and the constraints of how many materials they can use. The building should also be a certain height, determined by the teacher, and be able to withstand a flood of about 5 inches.

Part 2: Design, test and reflect (30-40 minutes)

1. Students will continue their work from yesterday. In order to move forward they need to show their design/blueprint of their building to the teacher to ensure they have a clear idea of their goal.
2. Students will then start collecting materials and designing. Students can test the design if needed and can make adjustments based on their tests.
3. Give students a chance to share their work with the class, they will then test their designs by slowly lowering their house into a bin full of water, until the house is submerged all 5 inches.
4. Finally, they will reflect (orally or written) on what went well and what could be changed next time.

Extension: Students can upload videos of them testing their final projects to flipgrid. Have classmates give feedback on their designs and how to improve them further. If the structure did withstand the flood the students can reflect on the successful characteristics.

Technology Connection:

- If technology is available students can research different architecture of houses built in places where it commonly floods.

Art Connection:

- In addition to the lesson, students can decorate the outside of their house as long as it is weather-proofed for the flood test.