Makey Makey Ocean Acidification

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Subject/Grade: 6-8th STEAM (Robotics, Comp Sci, Comp/Technology, Engineering)

Lesson Summary

How are you going to share Ocean Acidification with your students? How will this fit into your regular scope and sequence?

I would like to teach students different aspects of ocean acidification such as: what is OA; how does OA impact coral reefs; how is climate change related to OA; etc. I have students create interactive posters that share information about what they have learned about OA. The contents of the poster will include among other things: explanation of OA; human modification and OA; and what are possible solutions for OA. The interactive poster is a regular paper poster that is connected to a microcontroller/Scratch so that when people touch "tabs" on the poster, the students' voice comes on to explain the concept on the poster. Students generally have three or four tabs on their poster.

Students will learn about ocean acidification (OA); its effects on coral reefs; how human modification impacts OA and what are some ways we can reduce OA. In addition, students will learn vocabulary related to these concepts. These lessons will take a few days and then will be followed by making an interactive poster about OA.

NOAA's Mission: Awareness of careers related to NOAA's mission (understanding and predicting changes in climate, weather, the ocean and coasts)

Oceanographer, marine biologist, climatologist

Ocean Literacy Education Framework Standards To which standard(s) does your lesson connect most closely?

#5 The ocean supports a great diversity of life and ecosystems.
#6 The ocean and humans are inextricably interconnected.

Learning Goals: Make sure to address how your lesson will:

- Involve your students in a Community Environmental Action
- Use the Science and Engineering Practices

Students will be able to:

- Define Ocean Acidification.
- Describe the process of ocean acidification.
- Explain the causes of ocean acidification.
- Analyze the effects of ocean acidification on coral reefs.
- Assess environmental problems caused by humans.
- Predict future consequences of ocean acidification.
- Describe how ocean acidification can be reduced.

Materials/Resources: Of the hands-on activities explored, which will you use in your classroom?

1) OA blow into water

2) OA using cups/chalk
3) Poster Materials:
    - Makey Makey microcontroller
    - alligator clips
    - paper fasteners
    - Poster paper w/colored paper and markers
    - SCRATCH (scratch.mit..org)

Instructional Outline: This should be the bulk of your writing. Bullets of what the students will do throughout the lesson to reach the learning goals you have set.
You may link to the hands-on activity you will use, but also explain any modifications you might need to make to it, as well as pre- or post- activities you will do with your students around it.

OA Introduction - Summary of lesson
Activity: OA blow into water
Ocean acidification is the outcome from excessive carbon dioxide - CO2 in the atmosphere which then dissolves into the ocean. The CO2 in the ocean increases the acidity of the water and causes harm to marine life in the ocean. Why is there excessive CO2? Carbon dioxide -CO2 is released from fossil fuel emissions and deforestation. Fossil fuel emissions are released by cars, airplanes, power plants and factories that burn oil, coal and gas. Deforestation also causes fossil fuel emissions. Burning forest causes the release of carbon dioxide into the atmosphere. An increased amount of CO2 in the atmosphere causes an increase in the amount of CO2 to be absorbed into the ocean water and acidifying the ocean.
Students complete an online form answering questions from their research: what is OA; what causes OA; and three vocabulary words w/definitions. This info will be used for their poster.
In the hands-on activity, students simulate the effects of increased acidity in the ocean caused by rising levels of atmospheric carbon dioxide.

OA Impact on Coral Reefs - Summary of lesson
Activity: OA using cups/chalk
Ocean acidification or the increase in acidity of the ocean affects coral reefs. Coral reefs are the most diverse of marine ecosystems. One quarter of the ocean species depend on the coral reefs for food and shelter. Coral reefs are made of a thin layer of calcium carbonate, when the ocean becomes more acidic, the calcium carbonate dissolves causing its destruction. How can we prevent harm to coral reefs?
• Community Level Solutions – increased public transportation use, support renewable energy,; help with community garden programs
• Individual/Household Solutions – unplug electronics (phone chargers, computer, laptops); reusable water bottles; purchase items from local community; etc.
Students complete an online form answering questions from their research: why are coral reefs important; what can we do to prevent OA; and three vocabulary words w/definitions. This info will be used for their poster.
In the hands-on activity, students will observe and compare the dissolving rates of chalk in differing concentrations of acidic water to model the increasing ocean acidification.

Interactive Poster of Ocean Acidification lesson
1) Working in pairs, students will create an interactive poster about OA.
2) Students will use that they have learned in the past few days and put the information together in a poster.
3) Your poster should include (expectations):
- What is Ocean Acidification and why is it important?
- List causes of ocean acidification
- List vocabulary words from your list and their meaning.
- Why are coral reefs important?
- List ways you can help reduce CO2 emissions in the atmosphere.

4) Students add pictures and titles to their posters.
5) Students organize what information/content they have from the previous few days to provide content for their poster according to the poster expectations.
6) Students prepare their scripts that contain the information for the poster.
7) Students will record themselves using their scripts on SCRATCH.
8) Students enable their interactive poster by connecting fasteners to the poster and a makey makey.
9) Students will use SCRATCH coding blocks to connect their SCRATCH recordings to the makey makey.
10) Each person should make a recording and contribute to the content of the poster.

Students from 6th/7th grade will be invited to interact with your poster so they can learn about ocean acidification.

Assessment: How will you check your students' understanding? Check out these creative assessments if helpful.

Forms that were filled out in the first few days will be assessed;
Participation in the labs; exit tickets connected to the labs;
Rubric for poster