

Classroom Implementation Strategy

Prior to deployment to Palmer Station Antarctica

- Advertise Polar Ambassador opportunity to all Learning Enrichment students (February-September 2011)
- Host initial meeting with interested students (early September 2011)
- Establish timeline for after school meetings with Polar Ambassadors
- Develop Polar Ambassador binder with background information and resources about Antarctica and sample lesson plans about ocean acidification (mid September 2011)
- Assign readings (September 2011-February 2012)
- Establish contact with classrooms that will be visited by Polar Ambassadors
- Find logical connections to existing science curriculum
- Develop ocean acidification lesson plan for 8th graders studying pH and chemistry in the district (see example table below)
- Develop elementary lesson plans relating to biomes
- Develop high school lesson plans relating to environmental science and oceanography
- Begin school visits (December 2011)

Upon return from Palmer Station Antarctica

- Meet with Polar Ambassadors to debrief
- Continue development of lesson plans for K-12 students
- Continue school visits (March 2012-June 2012 and beyond)

Title	Ocean Acidification
Subject	Science
Grade Level	8th Grade
Connection to National Standards	<p>Content Standard F: Science in Personal and Social Perspectives (Grades 5-8)</p> <ul style="list-style-type: none"> • Human activities (e.g. consumption of fossil fuels) can induce hazards. Students should understand the risks associated with such hazards (e.g. ocean acidification). • Technology influences society through its products and processes. Technological changes can be both detrimental and beneficial.
Connection to PA Standards	<p>Content Standard 3.6.7 and 3.8.7 Science & Technology (Grade 7-9)</p> <ul style="list-style-type: none"> • Identify the environmental impacts that waste (e.g. greenhouse gases) has in the environment. • Identify relationships between systems (ocean chemistry) and resources (fossil fuels)
Internet Links/Resources	<ul style="list-style-type: none"> • Boleman, C., Gravinese, P., Muse, E., <i>Dude, Where'd the Reef Go? Florida Tech InSTEP Program</i> at: http://www.instep.fit.edu • Kolbert, E. <i>The Acid Sea</i>. National Geographic; April, 2011.

	<ul style="list-style-type: none"> • The Journal of Marine Education. (2009). <i>Special Issue Featuring Ocean Acidification: from Ecological Impacts to Policy Opportunities.</i> Vol. 25 (1). • <i>Ocean Acidification: A Plague to Land and Sea.</i> Video can be viewed at: http://coseenow.net/blog/ocean-acidification • Virtual Urchin, an interactive website about ocean acidification can be viewed at: http://virtualurchin.stanford.edu/AcidOcean/AcidOcean2.htm
Major Events or Activities: "The Learning Plan"	This two-day lesson will be taught during the 8th grade unit on chemistry. It will incorporate a tie-in to "The Nature of Science" because it will include a discussion of experimental design as well as the difference between independent and dependent variables.
Essential Questions	<ul style="list-style-type: none"> • What is ocean acidification (OA)? • What are the causes of OA? • What are the effects of OA? • How can reducing a person's carbon footprint help?
Safety Considerations	Students will be using vinegar as the acid in this experiment. Although vinegar is not particularly caustic, safety goggles are a good idea.
Assessment	Assessment will involve the lab write-up and a follow up discussion about the results of an experiment in which a small piece of coral was dissolved in an acidic solution.
5 # Inquiry Model	Engage: The "hook" will be the video clip called: Ocean Acidification a Plague to Land and Sea.
	Explore: The exploratory phase will involve the actual experiment in which a piece of coral is dissolved in an acidic solution.
	Explain: This phase will happen 3-5 days after the experiment is set up. Students will find the final mass of a piece of coral and describe how their findings demonstrate ocean acidification.
	Extend: Extension activities include graphing the change in the mass of coral over time and using solutions of varying pH to see how rate of dissolution is affected.
	Evaluate: Final lab write-up and summary.