

# LITERACY, SCIENCE, AND MY SINKING HOUSE

By Wendy Church and Lauren McClanahan

The village of Kwigillingok, Alaska, has one school that serves all K–12 students in the area. Students are taught in Yup'ik, their native language, through second grade, at which point English is integrated into the classroom. By high school, the level of English proficiency varies greatly among students. Developing challenging and engaging learning experiences for them is an ongoing process. Therefore, studying topics that have a high level of relevancy is key. Climate change is one of those topics.

Climate change is one of the dominant themes in today's global society and is likely to be so for the foreseeable future. The scientific foundation, human impacts, and potential solutions associated with global climate change make it an ideal context for interdisciplinary teaching. Given their location, the effects of climate change have special meaning to the Yup'ik high school students as they see, every day, the direct effects of it in their own backyards.

We thought that a project touching on these students' own experiences with climate change would be a good way to engage them in science and improve their English literacy. In this article, we describe the project, "The Effects of Climate Change on Living Things," and highlight some climate change resources we found useful in developing the materials.

## Addressing Standards

The project's learning objectives included several of Washington State's *Essential Academic Learning Requirements* (Office of Superintendent



of Public Instruction, n.d.): 1.1, prewrites to generate ideas and plan writing; 1.5, publishes text to share with an audience; 2.1, adapts writing for a variety of audiences; 3.1, develops ideas and organizes writing; 3.2, uses appropriate style. The project also addressed the National Research Council's (1996) *National Science Education Standards* A (science as inquiry), C (life science), and F (science in personal and social perspectives). It also addressed the following *Standards for the English Language Arts* (International Reading Association & National Council of Teachers of English, 1996):

- Standard 7: Students conduct research on issues and interests by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and nonprint texts, artifacts, people) to communicate their discoveries in

ways that suit their purpose and audience.

- Standard 8: Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.

- Standard 10: Students whose first language is not English make use of their first language to develop competency in the English language arts and to develop understanding of content across the curriculum.

- Standard 11: Students participate as knowledgeable, reflective, creative, and critical members of a variety of literacy communities.
- Standard 12: Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

## The Structure of the Project

The project was informed by a 2-week curricular unit for high schools developed by Facing the Future, which is called *Climate Change: Connections and Solutions*. A complete version of this unit can be downloaded free of charge from Facing the Future's web site ([www.facingthefuture.org](http://www.facingthefuture.org)). The section of the unit that we based our

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project on helps students learn about the potential impacts of climate change on living things in a variety of ecosystems. Students then communicate these impacts to their school community through informative posters or other media.

Students were assigned to take three or four photos of direct evidence of climate change that they see in their village. This first part of the project returned amazing results: Students captured everything from houses sinking into the permafrost to birds and animals that have had their migratory patterns altered. Not surprisingly, this part of the project really engaged the students.

Following the picture-taking portion, we gave students some writing prompts related to their photos. For example, we asked them to explain why they photographed what they did and how this was an illustration of climate change. Then we asked them about what worries them most in terms of seeing their village and their way of life succumb to such changes. Finally, we had them describe what they felt was worth preserving in Kwigillingok and who should be told about it.

### **Issues Highlighted by Students**

For the majority of the students, the melting of the permafrost was the most immediate concern. One student commented, "The melting of the permafrost causes hills, houses, and other buildings to sink." Another student wrote

about how the local seagulls were lingering into November and December, whereas in the past they would be gone by then and not foraging for food: "It is unusual for them to still be here, which suggests that [the ground] is not as cold as it looks."

When asked what worried them about the current condition of the permafrost (and, consequently, the landscape of the village and the stability of their homes), one student wrote, "We don't have a lot of money. We need to stay near the ocean so we can fish. We don't want to have to move farther and farther back each year. We can't leave, but we can't stay, either." This sentiment was shared by another student, who wrote, "If we don't do something, we could lose this beautiful land that we have lived in for thousands of years—forever."

As for who should be told about this very real problem, one student commented, "Please let your [university] students understand that what they do down where they live greatly affects the way we live up here! This is a global issue—it will reach everyone soon." Other students wanted to tell the government or other villages similar to theirs.

For the final presentation, the students decided to create a movie with Apple's iMovie software to showcase their photos and writing. The target audience was preservice teachers at the Woodring College of Education at Western Washington University. In the movie, students

read their writing aloud—in English and their native Yup'ik—to make an even greater impact on their audience. One student even provided a musical score using the keyboard in his English classroom. The result was a 4-minute documentary about the effects that global warming is having on just one fishing village along the coast of the Bering Sea ([www.youtube.com/watch?v=T4qPa2xIU4o](http://www.youtube.com/watch?v=T4qPa2xIU4o)).

To help students with the project, we provided "Ecosystem Role Cards," which are included in the Facing the Future climate change unit. The cards included descriptions of climate change's impacts on "Arctic Plants" and "Humans in the Arctic." We used them to help students generate ideas about what to photograph and write about. These kids really related to the symptoms listed on the cards, such as erosion of coastal lands, thawing permafrost, and soil instability, because these are things they see around them all the time.

### **Assessment**

For the assessment, we used the 6-trait analytic rubric developed by the Northwest Regional Educational Laboratory, which includes ideas, organization, voice, word choice, sentence fluency, and conventions. After students wrote their paragraphs describing the photographs they had taken, we informally analyzed them using the 6 traits. Due to the analytic nature of these traits, scores were initially assigned to certain ones

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(in this case, ideas, voice, and word choice) and then each written piece was assessed as a whole.

Analytic assessment is frequently used in the formative stages of writing, so we used it as a guideline rather than a summative, holistic assessment. Because of this, students felt that they had more control over their final outcome and were quite successful in reaching their target audience—the preservice teachers with whom they were corresponding. This was a unique concept to the high school students, who were used to writing for only one audience (the teacher) and being assigned a final letter grade. In this case, the final grade was the effect that their documentary had on the preservice teachers.

After viewing the movie, we asked the preservice teachers to answer several questions about what they had just seen. One question in particular struck a chord with them. When asked “As a future teacher, what effect does using the first-person narrative have on how you will approach your curriculum?” the responses were unanimous. The preservice teachers recognized that they need to value the backgrounds that their students will bring with them to the classroom, and understand that how they teach is just as important (if not more so) that what they teach.

This positive feedback has inspired us to expand this project to include even more student voices on the critical topic of climate change and the fact that its

effects are real and affecting students across this circumpolar region in Alaska.

### Additional Resources

You don't have to be an expert on climate change to implement a unit like this. The following Web sites include useful information on climate change, up-to-date data sets, and ready-to-go curricular resources:

- *Climate Classroom* ([www.climateclassroom.org](http://www.climateclassroom.org)): On this site, created by the National Wildlife Federation, you can download the excellent slideshow “What’s Up With Global Warming?” (in the For Kids section).
- *Greenhouse Gases, Frequently Asked Questions* (<http://lwf.ncdc.noaa.gov/oa/climate/gases.html>): The National Atmospheric and Oceanic Administration provides basic information about specific greenhouse gases, sources, and trends.
- *Greenhouse Gas Emissions* ([www.epa.gov/climatechange/emissions/](http://www.epa.gov/climatechange/emissions/)): This section of the U.S. Environmental Protection Agency’s climate change Web site gives an overview of greenhouse gases, greenhouse gas inventories, and emission trends and projections.
- *Basic Information on Greenhouse and Related Gases* (<http://gaw.kishou.go.jp/wdcgg/gas.html>): The Japan Meteorological Agency’s World Data Centre for Greenhouse Gases Web site provides basic information on numerous greenhouse gases.

- *Facing the Future* ([www.facingthefuture.org](http://www.facingthefuture.org)): This site offers free downloadable units on climate change as well as activities and materials on global sustainability. It also includes a Curriculum Finder that assists in quickly finding materials appropriate for specific grade levels and subject areas.

### References

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- Office of Superintendent of Public Instruction. (n.d.). *Essential academic learning requirements: Writing*. Retrieved July 27, 2009, from <http://www.k12.wa.us/CurriculumInstruct/writing/pubdocs/pdf/writing.pdf>

*Wendy Church is the executive director of Facing the Future, a national educational organization based in Seattle, Washington, in the United States.*

*Lauren McClanahan is an associate professor of education in the Secondary Education Department of the Woodring College of Education at Western Washington University, in the United States.*