

Models For Involving Scientists in Outreach Efforts: A Multi-pronged Approach

Thorrold, A.L.; Crago, T.I.; Madin, K.A.C.; Murphy, S.A.

Abstract

The Woods Hole Oceanographic Institution (WHOI) is currently exploring several models of education outreach and report here on four of these models. Web-based initiatives are designed to immerse teachers and students in the process of oceanographic research and exploration and offer models for interactive distance learning. Professional development workshops for teachers serve to increase understanding of oceanographic topics by providing access to scientists and cutting edge oceanographic research. Connecting teachers and scientists through content-rich workshops is only half of the equation. As a partner in the New England Regional Center for Ocean Science Education Excellence, we are developing "reverse workshops" that provide a forum for scientists and educators to discuss pedagogical needs and constraints when incorporating scientific research into the classroom. This effort will help inform scientists and educators as they explore future outreach activities. The final model actively involves teachers in scientific investigation and will provide tools to integrate this experience into their curricula. We will continue to evaluate the effectiveness of these programs and determine the best methods for bringing scientific research into the classroom.

NER-COSEE Researcher Workshops

A key component of this project is the focus on high-quality evaluation and the commitment to determine best methods for ocean science education.

The **New England Regional Center for Ocean Science Education Excellence** (NER-COSEE) seeks to strengthen the New England region's capacity to develop and provide high-quality ocean science education in both formal and informal settings. Through WHOI's involvement in the NER-COSEE, we are developing "reverse workshops" designed to provide a forum for researchers to discuss with educators pedagogical needs and constraints when incorporating scientific research into the classroom. The goal of these workshops is to identify the opportunities for scientists to become involved in educational activities that have the greatest impact on ocean science education. A key component of this project is the focus on high-quality evaluation and the commitment to determine best methods for ocean science education.

The reverse workshop model is based on a WHOI pilot program that brought researchers and teachers together to discuss the realities and constraints of both classroom teaching as well as scientific research. An activity used to facilitate discussion has led to the development of a needs assessment survey for teachers and has initiated the next steps for documenting the needs of the research community.

The intent of this project is to foster interactions between the research and education communities, and catalyze formation of lasting cooperative networks that will meet New England's ongoing needs for ocean science education.

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Teacher Immersion Projects

WHOI's **Teacher Fellowship Program** involved teachers working with scientists over the course of 10 weeks during the summer. Teachers made a two-year commitment and became active participants in the research activities of the lab. Although this involvement enabled them to increase their knowledge of the scientific process, the long-term commitment dissuaded participation. An attempt to create this same sense of intimate involvement in science while addressing the needs and realities of what teachers are able to participate in has led to the development of the **Coast to Classroom** project.

In the Coast to Classroom project, teachers will participate in all aspects of a scientific investigation from collecting samples in the field to analyzing data in the laboratory. The difference in this project is that the teachers will only need to commit to a few days over the course of a year.

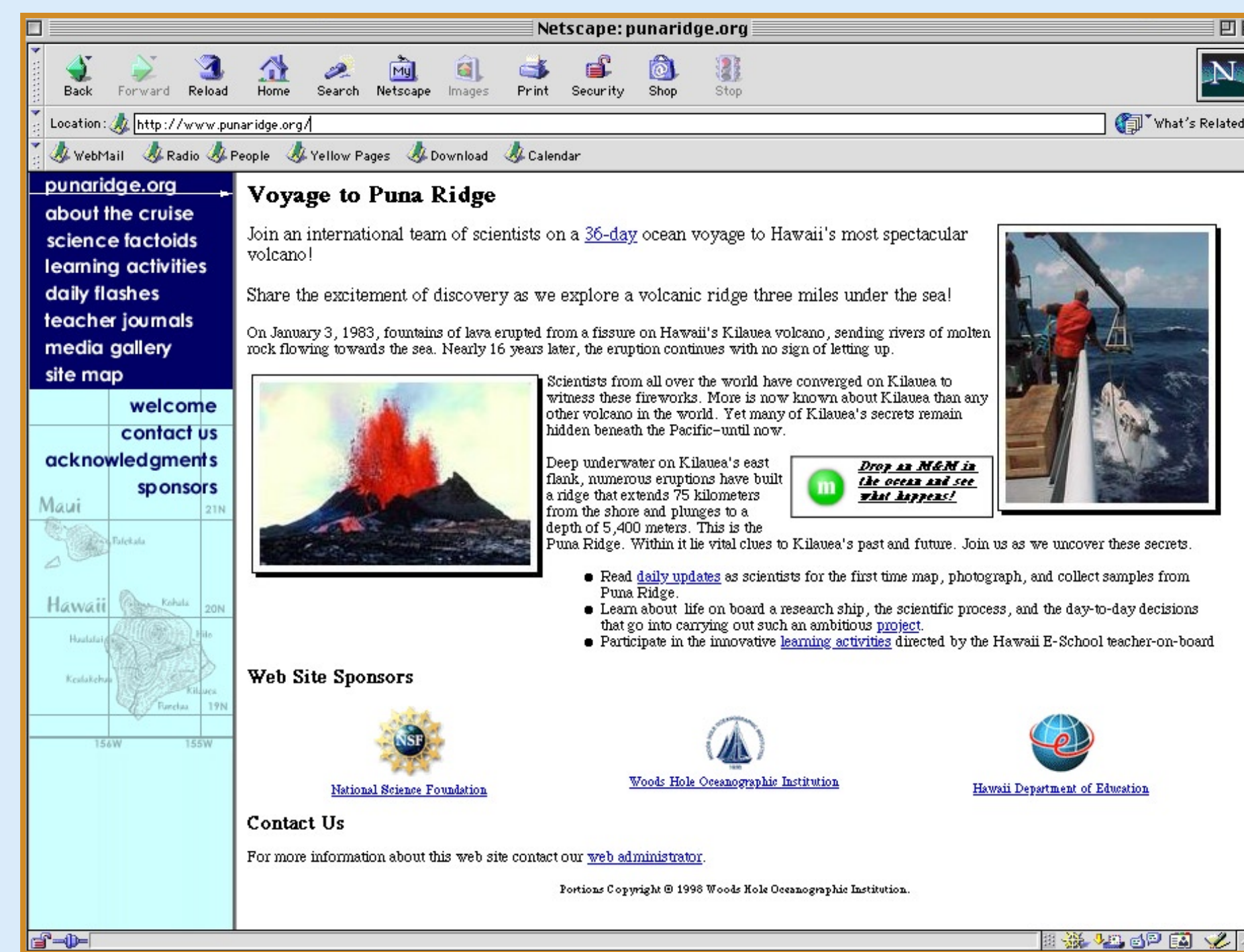
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Emphasis will be placed on the translation of the experience back to the classroom and will be supported by providing resource materials and by building a teacher community. After teachers have had the opportunity to reflect on the successes and challenges faced in incorporating this experience into their curriculum, they will meet to share their strategies for implementation of the materials. We hope that this component will not only help to bridge the gap between learning and implementing, but will also help to inform the researchers involved as to how to best overcome the challenges of integrating current scientific information into the K-12 classroom.

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Web-based Initiatives

While the WHOI web site contains many resources that serve to educate a variety of audiences, WHOI scientists have initiated two web-based projects directed at the K-12 education community – the *Voyage to Puna Ridge* and *Dive and Discover*. These successful projects illustrate the benefits and challenges inherent in this type of outreach.



The *Voyage to Puna Ridge* (www.punaridge.org), WHOI's first live-from-sea event took teachers and students on a virtual expedition to explore the undersea section of the Kilauea volcano. This project initially focused on Hawaiian schools, but continues to serve as a resource for teachers and students from around the world.

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Dive and Discover (www.divediscover.whoi.edu) is an interactive distance learning web site that highlights deep-sea exploration of the Pacific and Indian Oceans. The project goes live from sea once or twice each year and targets middle and high school teachers and students.

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Lessons learned

- Collaboration**
While it is essential to have scientists passionately involved in this effort, it is equally important to collaborate with those responsible for translating the scientific endeavor for a K-12 audience: writers, web designers, illustrators, photographers, technical staff, and outreach personnel.
- Planning**
As most teachers need several months lead-time to incorporate the live site into the curriculum, it is important to select a cruise early enough to promote it to teachers.
- Motivation**
An unexpected outcome of the live-from-sea sites was the fact that family and friends of those onboard had first-hand access to their lives and work at sea. This benefit motivated further involvement in the project of everyone onboard.

Challenges

- Time**
When the site is live, it is a very time-intensive process for both those working on the ship as well as for the shore-based web person.
- Technology**
In addition to the technical challenges of transmitting from remote locations far at sea, there are often obstacles to viewing and using the sites in the classroom as access to computers varies across the country.
- Evaluation**
Although web statistics and user information is collected, the information is not particularly useful or easy to interpret. Since it is difficult to know who is really using the site as a classroom tool, evaluation of the impact of the site is complicated.

Based on the positive feedback to the site from educators, the "live" aspects of the site make it an exciting educational tool. The students show particular interest in the video and still images from sea, and are drawn by the high level of interactivity of the sites. Even when not "live", the site continues to serve as a useful resource for both K-12 education as well as scientists who use the site to help explain their work to the public.

Teacher Professional Development Workshops

Science teachers today need to find ways to keep pace with ever changing science content and advances in technology. To address that need, WHOI offers *Topics in Oceanography*, half-day professional development workshops for middle and high school educators.

Sessions feature scientists or engineers who describe their current research, answer questions, and discuss how it fits into our present knowledge of the oceans. The workshops are an opportunity for educators to learn about current oceanographic research directly from the people who have designed and carried it out.



Lessons Learned

- Communication**
Although some speakers have previous experience communicating their science to teachers, many have found the guidance regarding understanding the expectations of a teacher audience and suggestions for interacting with teachers very helpful.
- Involvement**
Scientist involvement in the workshop often goes above and beyond the request to speak about their research. Many of the scientists have shown an interest in helping teachers demonstrate the scientific concepts back in the classroom by creating and demonstrating activities to use with students.
- Audience**
Many of the teachers who attend have noted that they participate in these workshops as adult learners who appreciate hearing about scientific research without having to directly link the information to science teaching standards.

Challenges

- Reach**
The workshops are designed for teachers interested in hearing about current research, and those who attend are largely self-selected and repeat visitors. We hope to be able to expand the reach of this program to a broader range of participants.
- Presenters**
The researchers who participate as presenters at our workshops do so voluntarily. As the program continues into its 3rd year, the challenge will be to continue to expand researcher involvement.
- Topic**
Hand in hand with selecting presenters is selecting topics with broad interest and applicability to classroom teachings while keeping content at the correct level for most attendees.

The *Topics in Oceanography* workshops provide a useful way for WHOI scientists to present current research to educators, encourage use of existing resources, and provide teachers with access to cutting edge oceanographic research. The workshops represent a "win-win" situation for educators interested in increasing their knowledge base and researchers looking for a way to interact with the educational community.

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In addition to the background and reference material provided, teachers indicated that the actual demonstrations of classroom activities increased the likelihood that they would use the activities with their students.

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