

141. Augmenting and Sustaining Informal Science Education: A Project for Professional Development and Community Building for Informal Science Educators

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Abstract. When critical issues arise such as climate change and energy transitions, when natural disasters occur (e.g., hurricanes, earthquakes, floods, drought, etc.), or when local populations are asked to make important decisions regarding Earth science issues (e.g., drilling for oil or gas, clear-cutting forests, building dams, etc.) local populations need credible scientific information on these subjects in a timely manner. Most people get their information about Earth science issues from informal sources (outside of formal—kindergarten through college—education). A decade ago that meant that most of the public got their information about science from informal venues: science centers, museums, zoos, parks, aquaria, etc. Today, however, informal sources of information also include Facebook, Google, Wikipedia, and other websites and media. Although there are some media and online resources that do disseminate credible science research, many do not reflect accurate scientific information, and the struggle to get credible information to the public has greatly increased.

There are thousands of informal science venues across the globe – many in rural areas serving groups underrepresented in the sciences. These venues can be excellent sources for dissemination of credible, timely science information to the public. The fact that an estimated 150 million people in the U.S. visit the more than 400 U.S. member museums of the Association of Science-Technology Centers every year (www.astc.org) and that in total American museums average over 865 million visits per year (www.aam-us.org) reflect incredible opportunities within these venues to educate the public about Earth science. Most Americans have never taken a geoscience course; yet in the informal setting of a museum, learning can occur among audiences of all ages and backgrounds. Unlike formal education settings, the open-environment, collections, exhibits and resources that informal science venues provide allow for a more visitor-directed learning experience, allowing visitors to ask questions and discover at their own pace—an “inquiry-based” environment. This can lead to enriched lives, Earth stewardship, and public understanding of Earth science research. Many scientists can trace their first motivation to pursue a career in science from such informal experiences as visiting a museum.

To assess the current state of informal Earth science education, the Paleontological Research Institution (PRI) conducted a U.S. National Science Foundation (NSF) funded study to survey museums and science centers throughout the United States—a sampling of the informal Earth science community that offer at least some Earth science education and/or exhibits. The survey was mailed to over 300 institutions, and was filled out and returned by individuals from 75 organizations. We believe that the museums that responded to our survey are fairly representative of the whole sample, and any bias would likely, if anything, over estimate the amount of Earth science available in museums since organizations with little Earth science exhibits and programming would most likely not have replied to the survey. Most museums in our sample are less than 10,000 sq meters (median of 1,900 sq meters) with a median number of 44 full time staff equivalent. The median number of staff per organization involved with education and exhibits who have geoscience training (degreed in Earth or geo-science) is only one (1), and about 1/3 of institutions have no Earth science trained staff. The lack of qualified, Earth science educated staff in informal science institutions underscores the need for quality professional development for these educators.

To give staff working at these informal science venues an opportunity to enhance their Earth science knowledge and to develop inquiry-based programs, in 2007 PRI partnered with the Institute for Global Environmental Strategies and the Earth System Science Education Alliance (ESSEA) to develop and pilot a 10-week, one-credit graduate-level course for informal educators, called “Global Climate Change and Informal Earth System Science.” In this course, the participants review the basics of Earth system science and how to gather and disseminate credible information on climate change in a module entitled “Global Climate Change.” Next, the students put this knowledge into practice by expanding upon existing collections, exhibits, and/or programming at their venue in a second module, “Earth System Science in Your Backyard”. The course culminates with participants creating a “Virtual Fieldwork Experience”, in which they focus on a local site and create an inquiry-based exhibit or program from an Earth science perspective that is relevant to their local population. The course is asynchronous and entirely online; content and resources for the course are all online, and a website was developed by Dr. Buckler for forums and discussion groups. Students complete

weekly assignments, working both in teams and as individuals. Graduate credit for the course is offered through State University of New York, Oneonta, (SUNY) and Dr. Buckler (Adj Asst. Professor, Earth Sciences Department at SUNY) is available online for participants, and gives regular feedback to facilitate participants' learning.

The response for the course has been overwhelming; for three consecutive years, 60 – 100 registration requests were received for the 10-participant class. Since the course is online and asynchronous, both geographic and time zone restrictions are transcended, thereby permitting a truly global community. During the three year pilot of the course we have been fortunate to have several participants working in territories and countries outside the U.S., including: in 2007, from Modena University, Modena, Italy; in 2008 from the Caritas Natural Preserve in Puerto Rico; and in 2009, a Cornell University graduate student working in the Bandipur National Park, Bangalore, India. After taking the course, V. Padovani, from Modena University, came to the U.S. for a 3-month internship at PRI to study how public science exhibits and programming are produced in the U.S. Dr. Buckler was then asked to be a PhD advisor to V. Padovani, and PRI has also since collaborated with and loaned a number of specimens from its collections to Modena University for study and use in outreach exhibits to the public. The experience of international cooperation and sharing of resources between participants and their venues has persisted to the present.

To continue providing quality informal science professional development and further build a global informal science education community, PRI is now seeking funding from NSF and the National Oceanic and Atmospheric Administration (NOAA) to expand and refine the current course. Based on three years of experience and evaluation, the course offerings would include:

- a module on incorporating evaluation into public outreach programming and exhibits,
- bridging the gap between informal and formal educators by learning to establish collaborations between informal educators and their local schools and teachers, and
- establishing a database of program and exhibit resources created by participants that can be used by other informal—and formal—science educators from around the world.

Under the current project, for international non-credit students, tuition for the informal educator professional development course is waived; access to all resources is universal to all participants, and past participants are strongly encouraged to act as mentors for incoming students.

The primary goals of this course are:

- to offer quality professional development in Earth science so that participants can create their own, in-house, inquiry-based, relevant programming for their local audiences;
- to establish a core set of resources for informal educators to communicate science to the public; and
- to create global community among informal science educators, to enhance communication and share resources and ideas.

In this process, the value of an international exchange of resources and ideas among informal science venues from around the globe cannot be understated—especially given the need for global cooperation in addressing issues such as climate change, disaster preparedness, and natural resource preservation. Although many of the science issues and concerns facing populations around the world are unique, there are commonalities among effective methods by which informal science venues communicate reliable scientific information to the public.

In addition to offering this course, for the past decade PRI and its Museum of the Earth have also demonstrated its success in working with researchers at Cornell University and across the U.S. and in Europe to create exhibits and programming outreach for the public. Exhibits have included, “Marine Life versus the Gulf Oil Spill: Under Siege”, “Darwin: Modena and 200 years of Evolution”, “The Global Climate Change Project”, “The Green River Formation”, and “Exploring the Evolution of Biodiversity”. Currently, PRI is actively seeking to expand upon its current associations with informal science educators in Italy, Germany and Japan to include collaborators from across the globe.
