

Chapter 1.36

Real Science: Making Connections to Research and Scientific Data

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ABSTRACT

Almost since the inception of the World Wide Web, scientific images in a variety of fields of study have been publicly available. However, in most cases the images lacked support materials making them difficult for the public to understand. Recently science centers and other educational organizations have begun to create Web-based resources that help mediate and explain compelling scientific imagery. This chapter looks at the development of four educational Web sites that utilize actual scientific imagery. Ideum developed these sites over the last four years with the Exploratorium, NASA's Sun-Earth Connection Education Forum, and the Tech Museum of Innovation. From a developer's perspective, the creation process for each site is presented. A critical examination explains why certain decisions concerning design, site structure, technical

approach, content, and presentation were made and how lessons learned from one project were applied to the next. Finally, the chapter looks at how sites that utilize "real science" can help science centers fulfill their mission of reaching the public and assisting them in better understanding scientific research and the scientific process.

INTRODUCTION

Originally developed as a tool to help scientists share information, the World Wide Web continues to be an important mode of communication for scientific inquiry. Rich science datasets in a variety of fields are publicly available, and can provide a catalyst for learning. Science centers can act as mediators, organizing information across scientific disciplines and providing tools for understanding complex scientific research. Users can gain valuable insight into the scientific

process and science centers can do what they do best—make science understandable and interesting to the public.

Physical exhibits work well in showing scientific phenomena but not necessarily the scientific process (Bradburne, 1998). Providing exhibits that allow visitors to manipulate phenomena or exhibits that simply demonstrate it in compelling ways is one of the things that science centers do best (Ansel, 2003).

However, common sense dictates that due to their physical nature, most exhibits cannot be converted into effective online experiences. They tend to be pale cousins of their physical counterparts—“virtual” exhibits in the worst sense of the word. It is better to focus on creating “real” experiences for Internet visitors. In early 1996, I began working for the Exploratorium in San Francisco. Although the Web site at that time was just a few years old, this philosophy (Semper, 2001) was already in place. Over the next few years we experimented in developing various types of online resources, everything from simple experiments that online visitors could try at home to Web casting live events from remote locations.

This spirit of experimentation, coupled with the desire to create “real” experiences for Internet users, eventually led to exploring sites that utilized actual scientific imagery.

In 2000, I developed the *Solar Max* and *Auroras* sites for the Exploratorium (by that time I had formed my own firm, Ideum) that used near “real-time” data from NASA satellites and ground-based observatories.

These early experiments showed promise. In developing subsequent sites (for the Exploratorium and for other clients such as the Tech Museum and NASA) we found that creating online resources that mine data from real scientific endeavors sheds light on the scientific process. Furthermore, these types of resources provide a link, both actual and metaphoric, to the scientific community.

Additionally, developing resources that use sci-

entific data helps ameliorate some of the problems inherent in developing traditional educational Web sites. The question of validity as to whether the user is seeing a “reliable representation of reality” (Pollock, 1999) can be addressed by the nature of these types of resources. The online visitor is seeing what scientists see. How data are presented and mediated for the visitor becomes the more important question.

During the last few years, science centers have been rethinking their mission and more actively exploring the role that science plays in society (Bahls, 2004). Science centers provide the public with tools and opportunities to better understand science and its impact on society. There is strong interest among the public too. A recent National Science Foundation survey found that approximately 9 out of 10 adults were either very or moderately interested in “new scientific discoveries and the use of new inventions and technology” (National Science Board, 2002). Furthermore, millions of people visit the Web sites of Science Centers. The Exploratorium alone boasts 15 million visitors a year (http://www.exploratorium.edu/about/about_web.html).

This chapter focuses on how science centers can in part help fulfill their mission of reaching the public through the development of Web-based resources that utilize actual scientific data. The nature of the Web allowing direct and mediated access to scientific research and data provides opportunities for science centers not found elsewhere. Science centers and other educational organizations can present data across fields of research and can make scientific data and images understandable to the public.

I’ll show examples that include specific approaches for developing resources that make direct connections to scientific research and data. From a developer’s perspective, I’ll outline the creation process and explain how decisions concerning the content, structure, and design of these Web sites came about. I will look critically at these works, but obviously much of what I will present here

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