

Chapter VII

Interactivity Techniques: Practical Suggestions for Interactive Science Web Sites

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Abstract

This chapter shares our observations, research, and experience with creating interactivity. We explore useful techniques for creating interactive science-oriented online displays, and describe a series of occasions and methods for making exhibits interactive. For each technique, the design issue is described, the methods for addressing the issue are summarized, and there is a discussion of the approach. We explore what kinds of interactivity have proven to work well online, and, perhaps more importantly, what does not work. Generally, technical solutions are prescriptive rather than descriptive, leaving the actual implementation up to the programmers involved in the project.

Introduction

The modern Web browser allows visitors to interact and explore. Over the last decade, a number of techniques have evolved to convey scientific information, and engage visitors.

At time of writing, the Internet has become commonplace, and most museums are committing resources to online exhibits. The Internet is so pervasive, that major museums, such as the U.S.'s *Smithsonian*, have twice the number of virtual visitors than in-person visitors (McMillan, 2004). It is likely that this trend in museum attendance will continue, with more and more content accessed online. It therefore behoves the curator to consider the quality of their online presentations, and make the best use of interactivity to teach and engage visitors.

This chapter is based on experience garnered over the last five years with the *WebExhibits* online museum of science and art exhibits. This site receives over 24 million page views per year from 8 million visitors (webexhibits.org). For comparison, in 2004, *WebExhibits* had slightly less online traffic than the *Exploratorium*, and slightly more than the *London Science Museum*, the *Ontario Science Center*, or the *Museum of Science* in Boston. Over the last two years, while online science museums overall have drawn a smaller fraction of Internet users, *WebExhibits'* traffic ranking is increasing (Alexa Data Services, 2004). We periodically add new exhibits, and make extensive use of interactive technologies.

This chapter shares our observations, research, and experience (Douma & Henchman, 2000a, 2000b). We explore useful techniques for creating interactive science-oriented online displays, and describe a series of occasions and methods for making exhibits interactive. For each technique, the design issue is described, the methods for addressing the issue are summarized, and there is a discussion of the approach. We explore what kinds of interactivity have proven to work well online, and, perhaps more importantly, what we have learned does not work well. Generally, technical solutions are prescriptive rather than descriptive, leaving the actual implementation up to the programmers involved in the project. This is due to the multitude of tools available to designers, none of which is necessarily ideal.

Comparing Data or Images

Data analysis is fundamental to the scientific process. The e-learning environment can allow students to make their own discoveries, and thus participate in the process of discovery. Good e-learning designs are often based on constructivist and learner-centered principles which put the student in control, encourage the student to look at issues from multiple perspectives, and create his own meaning (Wilson & Lowry, 2000). Science inquiry is central to scientific literacy, and has been shown to help students gain skills like questioning, explaining, and making predictions (Songer, Lee, & Kam, 2002; Songer, Lee, & McDonald, 2003). Research shows that this type of inquiry process and support has a strong impact on students' understanding of scientific concepts and content (Bransford, Brown, & Cocking, 2000).

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