

Teachers' Materials on the Internet

A Progress Report

Thomas E. Lowderbaugh

Introduction

Last spring — May 8, to be exact — the Smithsonian Institution launched its first online exhibition, Ocean Planet, which examines the importance of oceans in our lives and which urges visitors to treat this resource with care. Based on an installation developed by the Institution's Traveling Exhibition Service, Ocean Planet is already scheduled to visit eleven cities by the year 2000. Even so, most Americans will probably never have the chance to see it.

Ocean Planet Online

The Web-based version of Ocean Planet, in contrast, can make the exhibition available to millions of Americans who will never be able to visit the traveling installation in any museum. The online version grew out of a voluntary effort by Gene Feldman, a satellite oceanographer who works at the Goddard Space Flight Center and who served on the exhibition's advisory board. Gene's enthusiasm for sharing Ocean Planet electronically was contagious. He described the online version as "one of the most comprehensive and advanced exhibitions available through the Internet via the World Wide Web. This Web site has capabilities that will amaze even the tekkies." For the first time, people anywhere can visit a Smithsonian exhibition whenever they want, moving through it in whatever order they like — imagining to some degree the feeling of wandering through the real installation, even while they sit far away in a library or office.

In developing Ocean Planet Online, its designer followed three guiding principles. First, information makes sense only in a context. A Web site that doesn't create a context for the information it provides becomes no more than a list, an unsorted collection. Second, the site must require visitors to learn actively. The best way to do this is by making people direct their own learning. Third, the site has to be fun — even enticing — if it is going to work. As Gene Feldman notes, lots of Web sites are "information rich but fun poor." A site that lacks fun doesn't engage its visitors. It doesn't keep them, bring them back, or excite them about bringing their friends to it either.

Working from these premises, Gene quickly realized that giving online visitors just text and images would not suffice. They would want as much as possible the experience of being in the museum. That meant including an interactive floor plan of the exhibition, so visitors could navigate through the installation, picking and choosing their route however they might wish. It meant creating a message board, so visitors can post notes about ocean conservation, and it meant incorporating the motion pictures shown in the exhibition. It even meant providing Ocean Planet's sounds, because children often learn through hearing.

The online Ocean Planet, however, goes even beyond the museum's installation by offering hypertext links to related sites. For example, an online visitor can connect transparently to several aquarium on the Web, located from Monterey, California, to Camden, New Jersey, and Clearwater, Florida.¹ Through links like these, an online version can go beyond the real installation, providing connections to related information without increasing costs or taking up space in a gallery.

While the online Ocean Planet is an exciting development for us at the Smithsonian, it raises issues that merit discussion. These issues have special interest for me since I work in the museum education office that is developing teacher materials based on Ocean Planet. Since my office's materials are aimed at a national audience, we typically create publications that do not require a visit to a particular Smithsonian exhibition. Potential online access to this exhibition, however, has changed our thinking about this and future projects. How can the classroom materials based on Ocean Planet take advantage of the online exhibition that teachers and students could access at school or even at home?

Like everyone else, my colleagues build on past experience. Our experience in developing print publications for teachers has led us to identify several criteria for successful materials:

- They must be curriculum-relevant. Teachers consider materials useful only if they clearly answer the question "What can I do tomorrow in class?"
- Materials must be appealing. They must look not just accessible but inviting, if they are to attract and keep the teachers' attention.
- Materials must follow a linear, step-by-step progression, so that teachers can follow them comfortably.

We assume that electronic materials for teachers must meet the same criteria. That means that while glitz may attract attention, the materials still have to give teachers curriculum-relevant, step-by-step

1 To visit "Ocean Planes," use http://seawifs.gsfc.nasa.gov/ocean_planet.html.

lessons that will work in their own classrooms. Otherwise teachers will have every good reason to avoid our materials and spend their time on ones that do meet these criteria.

But will online materials have to meet other criteria as well? Will they have to work in ways that print materials don't have to? And what about devising materials keyed to online exhibitions — how will such materials not only engage students but ensure that visits to the virtual exhibition teach and motivate students? And how will we find out the answers to these questions?

To answer these questions we are beginning a set of experiments. Ocean Planet is an especially good place to start for several reasons. The electronic Ocean Planet is visually exciting and mentally stimulating. It deals with topics that likely will catch students' interest. In addition, the school materials based on the exhibition are designed to engage teachers and their students:

- The materials will focus on the weather, explain how oceans affect weather, and address issues of conservation and ecology. These are hot topics among many students and thus may capture their interest, especially since young people quickly understand how weather affects their lives.
- The materials will provide activities to help students learn about the world through hands-on projects. Teachers prefer materials that include student activities, always a major strength point of our publications according to our teacher advisory board.
- The materials will show teachers how to introduce one important science topic. Elementary and middle school teachers often feel out of their depth in dealing with science. They are likely to embrace materials that provide easy, step-by-step science lessons.
- The materials will stress interdisciplinary approaches to the subject. Many school systems — and therefore many teachers — are particularly excited about lessons that draw upon several disciplines.

At this point (August 1, 1995), we have drafted the print materials and have begun designing the electronic version of Art to Zoo, the officer's electronic quarterly for teachers. This version will be a first step, incorporating some hyperlinks to related sites and materials. Future electronic issues of Art to Zoo will take fuller advantage of Web capabilities.

While we believe in the power of online networks as educational tools, the results of a Department of Education study, published last February, give us a better sense of the reality in schools across the country. That reality must guide us as we decide how exactly we can best use online networks to deliver our materials to schools and to foster online communities that involve museums in teachers' daily work.

In short, the study reveals that the much ballyhooed connectivity of schools to the Internet or other wide area networks may not reflect the reality of daily life in schools. The Department of Education researchers found that 35 percent of all public schools report access to the Internet and another 15 percent report access via some other gateway (e.g., AOL, CompuServe, Delphi, et al.) That means that half of this nation's public schools have some kind of connectivity, a level that merits at least a limited celebration.

Other parts of the report, however, are less heartening. For example, 78 percent of the connected computers are concentrated in one to three instructional rooms — 51 percent of the public schools place them in one room, another 27 percent place them in two or three rooms.²

The report also concludes that of the 49 percent of public schools having access to any network connection, only 2 percent report teachers using networked computers to a large extent — in contrast to the 3 percent of students and 11 percent of administrators who do so.³ Further, 97 percent of networked schools rely on modems for their connections. Only 21 percent of these schools (or 11 percent of all public schools in the country) have any kind of graphical user interface, like MOSAIC. Conventional wisdom holds that teachers are not going to lead us into the computer age. But if the Department of Education's study is correct, students who rely solely upon public school computers may not either.

The Department of Education study, however, neglected to ask how many computers the school actually owns, what their power is, and how many are networked. Just how much access do teachers and students really have? What does it mean in practical terms to have, say, all the networked computers located in one to three rooms in a school? Think about yourself and your colleagues — how would you react if only one room in your museum held all of the networked computers — especially if that room was up two flights of stairs from your office and down a corridor — and was available only by appointment? What in practice does such limited access to networked computers mean for their educational use?⁴

2 Instructional room includes classrooms, labs, libraries, and media centers.

3 The survey instrument does not define what it means by "to a large extent," encouraging interpretive responses that lack helpful contexts. The same answer may mean very different amounts of use.

4 Charts published by QED, a nationally known database firm, provide additional insights into schools' use of technology. QED finds that 98 percent of all schools have computers; of these schools, 84 percent have more than eleven computers, and 65 percent have more than twenty-one computers. Only 27 percent own more than fifty computers. The ratio of students per computer has been declining from 75 students per computer in 1985 to 12 in the last academic year; QED projects that school year 1995-96 will see the ratio descend to 9 students per computer. Finally, QED reports that 36 percent of the schools have at least one modem. QED's report, however, does not distinguish between computers in instructional rooms and those found elsewhere in the school. Like the Department of Education report, it does not discuss the age, speed or memory of the

Clearly, it seems to me, this study reveals another challenge we must meet: We cannot wait for people to happen upon our materials or services. We cannot wait for them to get the kind of high speed access that we know they should have. And we cannot act as if just launching online exhibitions and educational materials is enough. We have to find ways to encourage teachers and students to access our materials via computer networks. We need to tell them what we offer and to make those materials or services as easy to use and as practical as possible.

Complicating the problem for us is that museums are not appropriate organizations to devise global solutions to teachers' lack of access. Museum people are, however, well placed to develop model materials that put the power and relevance of object-based learning at teachers' and students' fingertips. Such materials may entice teachers and their students to use online networks not just to get what we are offering but in the process to discover other valuable online resources.

To capture our audience's interest, we must promise them the pay-offs that they want. The Ocean Planet materials, for example, will offer two important pay-offs for our audience, one for students (it's fun), and one for teachers (it's practical).

The Department of Education study also reveals that we had better offer all these materials in various formats. The key is to serve users however they can get to our materials, encouraging them to return when they gain more powerful access to take advantage of even stronger, more exciting versions. For teachers with high end access and more powerful computers, we had better offer Web materials that include lots of hypertext links, sound, and motion video. Ideally, these sites should incorporate some kinds of interactivity as well. Teachers and their students expect — perhaps even demand — no less. For teachers with slower access or with computers with less power, we must offer appropriate variations. Adobe Acrobat, with its free reader, enables us to provide — both over the Web and via ftp — graphically structured pages that reproduce the look of the hard copy version. Text-only versions with attached libraries of images are less exciting, but they require the fewest technological capabilities and therefore may be the only format through which many teachers can use these materials.

Thus the educational materials based on Ocean Planet will range from the high end electronic version (which provides hotlinks to other exciting Web sites) to low end versions that teachers can download to disk. Someday no teacher will want or use a low-end version. But until that day — which we can hope will arrive in the next few years — we must serve teachers and students in the ways that they can get to our materials and services.

computers.

Creating Ocean Planet materials is our first experiment in taking advantage of the Web's capabilities. Unlike other teacher materials that we have published online, this version will not just replicate the hard copy versions but will actually add new features. It is the first of many experiments that we look forward to conducting, which will teach us how to use this new medium to serve teachers and students across the country and even across the world.