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Chapter XIX

Virtual Science Centers: Web-Based Environments for Promotion of Nonformal Science Education

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ABSTRACT

The opening of a virtual annex by science centers has given rise to a new genre of learning in Web-based education. Seeking to enhance the outreach effectiveness of nonformal science education initiatives among students and the public, these virtual science centers fulfill a useful role in promoting the public understanding of science. The example of the Singapore Science Center is used as a case study to explore the topic in significant depth. A commentary is also presented on some of the issues, controversies, and problems encountered in this new learning environment. Some possible solutions and recommendations are suggested in light of our experiences.

INTRODUCTION

The advent of the Internet has made a profound impact in the field of education. By promoting a novel setting for the creation of new learning experiences, it is impinging on

various aspects of traditional education structures. For example, the Internet has impacted on distance learning (Lupo & Erlich, 2000), student assignments (Collis, de Boer, & Slotman, 2001), online learning (Benigno & Trenton, 2001; Sanders & Morrison-Shetlar, 2001), group learning (Chen et al., 2001), e-experiments (Givens & McShea, 2000), and e-universities (Maes, 2001). Many of these are still evolving, and it is unlikely that any have reached maturation.

The ubiquity of the personal computer, the nature of the client–server architecture on the Internet, the low cost of logging onto the Internet, and the scope for simultaneous access are all factors that have helped to fuel the evolution of various genres of learning on the Internet platform. Most universities and schools, at least in the developed world, have a Web presence, and their portals feature a wealth of information and other resources for learning.

One aspect of Web-based education that has not received much attention in the science literature is that of virtual science centers. It is the cyberspace analogue of traditional science centers, institutions that popularize science and technology to students and the public. Providing distributed learning beyond the confines of their traditional infrastructure, virtual science centers have engendered a unique genre of offerings that opens up another tributary for promoting the public understanding of science.

The popularity of virtual science centers can be gauged from the fact that the website of the Association of Science-Technology Centers (ASTC) has links to over 200 science centers, museums, and other nonformal institutions of learning. Visits to virtual science centers have been increasing over the past few years—for example, The Exploratorium, which is considered to be the pioneer of the science center movement, attracted 132,585,374 visits from 1993 to 1998 (Orfinger, 1998). Among ASTC members, 70% have websites: 34% of these sites are hosted by donors, 23% are hosted by Web-hosting services, and 41% are hosted by the institutions themselves. During 1997, a total of 195.3 million hits were recorded by 77 science centers and museums. Though this figure does not capture the unique number of separate visitors, a point to note is that 38 of these institutions reported that the number of distinct hosts served in December 1997 alone was a staggering 896,362 (Association of Science-Technology Centers, 1998).

Published studies on virtual science centers are rather sparse in the primary science literature. Commentaries on the Web offerings of a few science centers have appeared in newsletters (Orfinger, 1998; Honeyman, 1998) as well as were presented at conferences (Jackson, 1996). Studies of museum portals have, however, been quite extensive (Donovan, 1997; Milekic, 1997; Tinkler & Friedman, 1998; Beauchamp, 1998; Bowen, Bennett, & Johnson, 1998; Gaia, 1999; Keene, 2000; Sumpton, 2001; Crowley, Leinhardt, & Chang, 2001).

The purpose of this chapter is fourfold:

1. To briefly review the science center movement and its migration onto the Internet platform
2. To share the experiences of the virtual science center on the website of the Singapore Science Center; this website is the largest among all science centers in the world
3. To comment on the unique features of science centers on the Web, and the technologies that make their range of offerings possible
4. To comment on the issues, controversies, and problems facing virtual science centers, and suggest possible solutions and recommendations in light of our experiences in the science center movement

Through this, we wish to accord further recognition to an educational genre that has tremendous potential for the nonformal science education of students and the public.