## ENVIRONMENTAL EDUCATION GOES HIGH-TECH

Rocky Rohwedder

From virtual field trips to simulation of complex ecosystems, computer-aided education offers the environmental educator a whole new world of extremely powerful tools. Although still in the exploratory phase, two basic technologies—*interactive multimedia* and *on-line learning*—show tremendous promise for enhancing the effectiveness of both environmental education and communication.

First, some definitions. "Interactive" refers to the user's ability to select multiple choices or scenarios. As the program unfolds, the user chooses which subjects to explore, in which sequence. The presentation "interacts" with the viewer by responding to these choices. A "multimedia" program or presentation uses graphics, text, music, sound effects, narration, video, animation, and/or maps, in any combination.

For instance, **The Digital Field Trip to the Rainforest** takes you to a rainforest in Belize. When you point at a plant or animal in a picture of the forest, up pops information about that species and how it fits into the ecosystem. You can select levels of forest and types of human-made disturbance to explore. Multi-media elements include rainforest animations and 360 degree virtual reality panoramas. (http://www.digitalfrog.com, fax: 519/767-9994)

DIGITAL FROG INTERNATIONAL
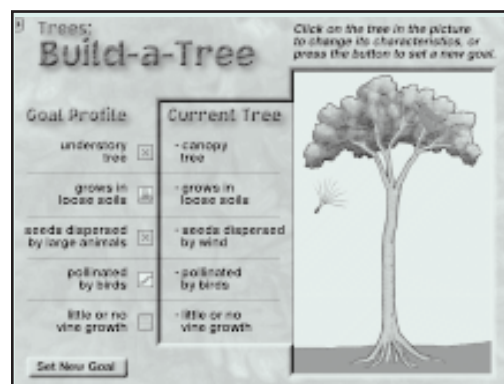
On a digital trip to the rainforest.

Interactive multimedia include simulations in which you can literally see complex interactions of ecosystems and human activity. Entropy, rates of growth, and feedback loops leap from abstraction to visual reality.

For instance, teams of students become fishing-fleet managers in the simulation game **Fish Banks, Ltd**.

DIGITAL FROG INTERNATIONAL

The computer program calculates all their financial transactions and tracks the status of the fish population based on catch, births, and deaths. The players contend with ecological, economic, and psychological forces—negotiating as resource levels reach a crisis point. (http://www.unh.edu/ipssr/Lab/FishBank.html, fax: 603/862-4140)

Interactive multimedia—once limited to videodiscs and CD-ROM—are now rapidly expanding into "on-line learning" through the World Wide Web. On-line learning enables students and educators across a region or around the world to communicate and share discoveries via computer networks. In a matter of seconds we can send and receive messages, images, and sounds— shrinking the planet in time and space.

Whether based on text email, on-line conferences, or multimedia websites, on-line learning projects already touch millions. One example is an electronic conference slated for December 9- 10,1999. **The Millennium Conference on Environmental Education and Communication** will feature presentations over the 'net, as well as electronic discussion. (http://www.crossroad.de/millennium/)

The JASON Project, which focuses on a different scientific theme each year, helps students investigate their own back yards and compare findings on-line.

The annual program highlight is a week-long expedition broadcast live at satellite download sites in the Caribbean, Mexico, the U.S., and the UK. JASON has taken its audience to coral reefs, sunken ships, undersea hydrothermal vents, the Amazon and volcanoes. The website contains video and sound clips, interactive exercises, and on-line chat sessions with scientists. Hundreds of thousands of students

Become a Cyber Activist

Instant news flashes; on-line recruiting of citizen activists around the world; alerts to current threats; messages and petitions emailed straight to policy makers —these are some of the tools environmental communicators now possess for getting their word out.

The new technology is making it easier than ever for communicators to reach the public, and for the public to reach decision makers who affect the environment. Visitors to numerous environmental websites can sign up to receive regular "Action Alerts" on legislation, court cases, and immediate eco-threats. The alerts come instantly through email

regulators, heads of state, and corporate CEOs around the globe with just a couple of keystrokes.

You simply go to the environmental organization's website and download a sample letter on, say, why a legislator should endorse a bill to protect sea turtles. Or select a note to the CEO of a logging or mining company requesting that the company pull out of the Amazon. One recent option was to write a congratulatory letter to the President of Ecuador, who had just issued a decree protecting national forests.

You personalize the message right on the screen. Then press a button and whoosh! our appeal is routed

CEO, or president.

Appeals can generate thousands of emails or faxes. After the fact, you can check back and see what results the campaign achieved.

For ideas, here are a few of the more active activist websites:

World Wildlife Fund, "Conservation Action Network" (CAN), http://takeaction.worldwildlife.org/action.htm

Rainforest Action Network, "Action Alert", http://www.ran.org

Greenpeace International, "Cyber-Activist"

Human Nature **looks at ways that environmental education and communication (EE&C) affect the people who affect the earth. We hope to share innovative, practical ideas from around the world, link resources with those who can use them, and consider the education and communication implications of larger political, scientific, social, and cultural events.**

Nature

participate directly; millions more visit the website. (http://www.jasonproject.org, fax: 781/487-9999)

On-line learning shatters the boundaries of what we once labeled "school." Suddenly it's no longer a four-walled building, but a "global electronic village." Students can communicate and interact with peers and experts in other regions and nations without leaving their classrooms.

In **Journey North** and the **Shorebird Sister**

Heather Johnson-Schultz

Third graders at Tres Zapotes school in Veracruz, Mexico, display the shorebird puppets that are ready to migrate.

Schools Program, children from North and South America track migrations, "talking" with each other and with field biologists about the progress of sandpipers and monarchs, whales, and even earthworms. (http://www.learner.org/jnorth; http://www.fws.gov/r7enved/sssp.html)

The **Sea Turtle Migration-Tracking Education Program** allows students to "adopt" Bob, Flora, or any of the dozen sea turtles fitted with electronic monitors. They can then map "their" turtle's long-distance roving as data arrives via satellite and is posted on the website. (http://www.cccturtle.org, tel: 352/373-6441)

A number of projects enable scientists, teachers, and school children to share field research about environmental quality. Students participating in **The GLOBE Program**, for instance, collect local environmental data that contribute to wide-ranging research projects run

by international experts on climate change and biodiversity. (http://www.globe.gov)

On-line learning can also provide a catalyst for collaborative action on environmental problems. For example, the **International Brant Monitoring Project** tracks the small Black Brant geese that fly between the Arctic and wintering grounds in Baja, Mexico. As Baja school children checked on the Brants' progress through the Internet, they learned of a proposed expansion of a salt plant that threatened vital Black Brant habitat. Students told their parents, and community groups formed to organize against the salt plant. (http://www.cicese.mx/~proester, in Spanish, fax: 001-52-61-786050)

A Few Caveats

While these examples may capture our imagination, the reality of technological change is that early praises are usually sung too loudly. I see four major potential problems:
* misapplication of the technology
* inequity of access
* environmental substitution
* environmental impact of computers.

Technological misapplication is the tendency to assume that because we have a new hammer, everything now looks like a nail. Whether we choose to use educational technology, how we use it, and when, are critical decisions. How can we prevent the misapplication of technology from compromising what we know about how people learn best?

The cost of initial investment in equipment, infrastructure, training, and technical support for these tools is often extremely high. While access to new educational technologies is increasing rapidly in many parts of the world, this is certainly not true for everyone. So who gets the greatest access? How can we ensure that high-tech education won't widen the gap in the quality of education accessible to students in different economies or countries?

The danger of environmental substitution comes from the attractiveness of the new tools. Why take a field trip to the wetlands when you can plug in a CD-ROM program on wetlands? Why gather first-hand data on

water quality when you can just download it from an on-line database or website? In fact, the more time we spend at a computer, the less time we may spend interacting with the environment (and each other). How can we be sure that computer-aided EE is used primarily as a catalyst, not a substitute, for field-based exploration?

Finally, while computers are often touted as a "clean" industry, manufacturing of high technology components involves toxic gases, solvents, chlorofluorocarbons, heavy metals, and volatile organic compounds that can adversely affect workers, communities, and the environment. Add to this the increased electrical demand from computers, printers, and monitors as well as the reams of paper used by computing, and you've got a considerable set of waste and pollution problems associated. Fortunately, recent years have seen significant progress, mostly because both vendors and consumers are finding that environmentally sound production is good for the economy.

A Look to the Future

We are only beginning to understand the potential synergy between computers and environmental education. Yet computer-aided EE offers the opportunity to link, interact, experiment, and learn as never before.

It is in the interest of all of us to make sure these technologies are used responsibly and as an inducement, rather than a substitute, for real field work. It is in the interest of all of us to work for equity of access and to mitigate negative environmental impacts of computers. After all, interactive multimedia and on-line learning provide new promises and capabilities at the time in our planet's history when we may need them the most.

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