

## A Test for Internet Activities in the Classroom

Is it  
**UNIQUE &  
COMPELLING**  
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Elisabeth McGrath

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lmost eight years ago, our group at Stevens Institute of Technology received a grant to promote the use of Internet in K-12 science and mathematics education. Back then (1994), most pioneering teachers who were experimenting with this untested resource in the classroom were using a slow, dial-up connection to the Internet

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and a text-based format to receive information. It was painful, indeed, and the benefits to learning were unclear. Could teachers and students risk spending precious class time sifting through volumes of text to find the “golden nuggets” that would help meet their learning objectives? Could the information culled from this “Information Superhighway” be trusted? And how, logistically and pedagogically, would teachers make use of this resource—assuming they determined it to be valuable—with Internet connectivity often slow, unreliable and at a distant location in their school building?

As one of the first groups to experiment with the use of Internet in K-12 education, we sought to position this technology in a way that would justify the challenges teachers would face in order to use the technology at all. Why use search engines to find 1,000 answers to “What’s the capital of Bolivia?” when the *Encyclopedia Britannica* could provide this information quickly and reliably? Why wait endlessly for a picture and sound-clip of a whale to download over a slow telephone connection when a CD-ROM could bring this mammal to life immediately? To justify the effort required to arrange for and access the Internet in the classroom, we looked for applications of the Internet and enhancements to student learning that could not be accomplished through books or any other means.

## Unique and Compelling

In refining our position, we judged potential applications by the criteria of “unique and compelling applications of the Internet.” In considering whether an Internet-based classroom activity met these criteria, we asked

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**Elisabeth McGrath** is deputy director for the Center for Improved Engineering and Science Education (CIESE) at Stevens Institute of Technology ([bmcgrath@stevens-tech.edu](mailto:bmcgrath@stevens-tech.edu)).

two questions: (1) Can these learning activities be accomplished in any other way (Are they unique?) and, (2), do the educational outcomes justify the still-considerable effort teachers must invest to use the Internet effectively in the classroom? (Are they compelling?)

During the last eight years, we identified four unique and compelling applications of the Internet for K-12 education:

- Use of “real-time” data from government and commercial databases;
- Telecollaborative projects using “pooled” data from shared, Web-based databases;
- Student publishing on the Web; and
- Access to unique and primary-source information.

Let’s look at what we mean by these four “U&C” applications:

### Using “Real-Time” Data

The study of the earth’s crust and seismic phenomena are common middle-school topics. Until the classroom availability of the Internet, students had to use limited or old data to learn about earthquakes and the concepts of magnitude, epicenter and plate tectonics. For years, talented teachers have used “event-based” activities, focused around a recent seismic event, to interest students in some of these science topics. Now, in addition to these approaches, teachers can access a U.S. Geological Survey Web site and award-winning curriculum materials to see the location and magnitude of earthquakes that have happened within the last few hours! Using this real-time data, they can plot the latitude and longitude of the quakes’ epicenters on a world map and observe that they do not happen randomly throughout the world, but, rather, occur in regular geographic patterns, which they discover are the plate boundaries.

More advanced students can go on to analyze the depth of the epicenter and explore how the plates are mov-

ing against each other to determine the kind of earthquake that has occurred. This real-time data from the Internet provides students with an authenticity and investment in the concepts being explored that no book or historical data ever could. It also engages them in the scientific process and in using technology in the exact ways that researchers do: analyzing real data, formulating and testing their hypotheses and refining their ideas to account for the evidence they’ve collected.

As part of this series of activities, known as “Musical Plates” ([www.k12science.org/curriculum/musicalplates/](http://www.k12science.org/curriculum/musicalplates/)), students can ask questions of a geologist or any number of validated experts who work with students via email exchanges.

### Using Live Databases

Other “U&C” lessons we promote include using a “live” graphical database of planes flying over U.S. skies to study vectors in high school physics and a dynamic database of ships in the world’s oceans to study algebra and geometry concepts. These real-time data projects and others can be seen at [www.k12science.org/currichome.html](http://www.k12science.org/currichome.html).

“The Human Genetics Project” illustrates the compelling nature of engaging students in a telecollaborative project to collect and share data, analyze it for patterns and differences and test their hypotheses. Students may know that their physical characteristics are inherited and, by gathering information about easily observed human features, they can make hypotheses about which are the dominant and recessive genes for such characteristics as attached/unattached earlobes, dimples, white forelock, color blindness and others.

Students often hypothesize that the dominant trait will be the one most frequently observed in the population. By sampling large numbers of people, students can test their hypothesis against real data that have



## A Unique and Compelling Website

The “unique and compelling” curriculum projects mentioned in this article, and others, can be explored at the CIESE Web site at [www.k12science.org](http://www.k12science.org) by clicking on “Classroom Projects.” CIESE maintains five real-time data and eight telecollaborative projects that are free and available to educators. Visit the Web site or contact Ms. McGrath at [bmcgrath@stevens-tech.ed](mailto:bmcgrath@stevens-tech.ed)

been collected. During the spring 2001 collaboration, 200 classrooms collected data from 20,000 individuals from countries including the U.S., Canada, Guyana, New Zealand, Australia, India, Trinidad, Chile, Taiwan, South Korea and Argentina. Students often were surprised to find that the dominant trait was not the most pervasive one in the general population. (*Did you know that a white forelock, found in only about two percent of the population, is the dominant trait?*)

### Student Publishing

Schools have long used the recognition that comes along with displaying students’ work as a vehicle to motivate students. Posting exceptional assignments on school bulletin boards, art exhibits in nearby malls and showcasing winning science-fair projects are all ways of rewarding exemplary work. Now teachers and students can publish essays, artwork and other student-created products on the Internet for the world to see, both on schools’ official Web sites as well as on sites maintained by educational, literary and other organizations. Teachers often report that students take greater care in composing, editing and polishing written materials when they know they will be published on the Internet. Sites that post students’ work can be found at: [www.k12science.org/k12partner00/k-8ss\\_and\\_la.html](http://www.k12science.org/k12partner00/k-8ss_and_la.html).

### Access to Unique Information

“Dear Mrs. Roosevelt,” ([www.newdeal.feri.org/eleanor/index.htm](http://www.newdeal.feri.org/eleanor/index.htm)) is a site containing letters children wrote to Eleanor Roosevelt during the Depression years. By reading a young girl’s plea for \$6 to buy a new Easter dress or requests for money to buy food, students begin to understand the impact of the Depression from a unique perspective.

Sacred Heart Academy in Honolulu, Hawaii, used this site to inspire 96 11th-grade young women to consider Mrs. Roosevelt’s ideas in Facing the Problems of Youth and to write and publish a reflective essay. Such primary sources now available on the Internet provide unprecedented opportunities for students to explore history through personal perspectives, which greatly augment their understanding of the period or event.

Teachers are exposing their students to these “unique and compelling” Internet-based lessons as a way to bring the world—past and present—into their classrooms and to engage their students in authentic science investigations, inter-cultural exchanges and to accomplish many other educational objectives.

### Teacher Training

Schools in the Diocese of Cleveland and in the Archdiocese of Miami are training teachers through a program known as the Alliance Initiative, a U.S. Department of Education Technology Innovation Challenge Grant, to use these Web-based resources in their classrooms. The Diocese of Cleveland’s Director of Educational Technology, Catherine Collins, is part of a team leading an effort to train 250 teachers in use of the Alliance Savvy Cyber Teacher® 30-hour professional development program by 2003. “People always ask why teachers need computers in their classrooms,” Ms. Collins said. “Yes, our teachers can send their students to the library for research, but the Internet provides the most current information and the additional ability to actually see data come alive.”

“Last year, we did a collaborative project with the San Diego Zoo and followed the growth of some bears and salamanders,” said Regina Bender of Cleveland’s St. Vincent dePaul school. “We also learned the latest

treatments for 20 different diseases by contacting experts at the Center for Disease Control in Atlanta. This has been the most practical and helpful of any Internet integration class I’ve taken.”

Today more than 95 percent of schools have at least one Internet connection in the building; approximately 70 percent are part of a high-speed network. Browsers like Netscape and Internet Explorer provide access not only to text, but also to pictures, movie clips, animation, sound and a host of other bells and whistles to hook students into learning. We no longer have to convince educators that using technology in the classroom is a valuable activity. It seems clear that in this Information Age the Internet and all its accoutrements must be an integral part of teaching and learning. Most students in the U.S. live and thrive in an environment rich with sensory stimulation—from Nintendo and MP3 to plain old MTV. Can a classroom devoid of such stimuli compete for students’ attention?

The answer lies in the creativity that talented teachers bring to the classroom to engage students in learning. The Internet is one important tool that teachers are using. The Internet is best used for those activities that promote student involvement in authentic, collaborative, multi-disciplinary problem-solving and critical thinking activities that provide opportunities to access, analyze and synthesize data and information to build new learning; and that enable students to pursue their curiosity and lifelong learning using the tools of information technology. These student outcomes represent the unique and compelling benefits the Internet brings to education. They demonstrate why the Internet is worth the effort for schools and teachers. ■