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Feature



Online to Learn or In Line with Standards? An Illusory Dilemma

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An exceptionally creative and talented elementary school teacher told me a story recently that saddened but did not surprise me. This teacher has been helping her students use computers as learning tools in many ways and for many years. In particular, her students have been doing rich, multidisciplinary, curriculum-based telecollaborative and teleresearch projects for more than six years. Yet in May, this talented teacher's principal told her that the students in their school would "not be using the Internet" during the 2000–01 school year because their low achievement test scores required more "concentrating on the basics."

Perhaps you, like me, are shaking your head now, perplexed by this all-too-familiar misconception that in-school use of the Internet (and even computers in general) by students is somehow an "add-on," an "extra," or even a "new curriculum." Combined with increasing pressure in many places for higher scores on standardized tests, we can understand why Internet-based work in the classroom can be seen as dispensable. Love & McVey (2000) described this tension as:

additional demands associated with current standardized testing practices. Clearly, there is a need to document student learning and to hold schools

accountable. However, the often unreasonable pressure of preparing children for statewide tests has led to some instructional choices that may be of questionable worth in terms of the children's long-term educational attainment. (p. 2)

Though it's true that some Internet-enriched learning activities seem disassociated from curriculum standards, we must remember that tools don't constitute curriculum. Rather, tools should be used in service of students' learning needs.

Telecollaboration and Teleresearch

Internet-supported, curriculum-based learning can take many forms, but essentially it is either online collaboration, also called "telecollaboration," or online research, also called "teleresearch." Telecollaborative learning activities are those in which students communicate electronically with others. Teleresearch learning activities are those in which students locate and use online information. Online collaboration and research are frequently combined in larger-scale educational projects. Both can use text, still or animated images, and sound. Both can be synchronous or asynchronous. Both can reproduce what students already do when they collaborate and do research using more traditional learning approaches. Yet to make these new opportunities worth the time, effort, and other resources necessary to bring them into the classroom, it is important to use the new tools in new and powerful ways.

Collaborative online learning activities can offer many educational benefits to their participants. The nature of these benefits depends, in large part, on the specifics of each activity's design and how well what the activity makes possible educationally matches the needs and preferences of participating students. In general, telecollaboration is most appropriate when students can be well served by:

- being exposed to multiple points of view, perspectives, beliefs, interpretations, and/or experiences
- comparing, contrasting, and/or combining similar information collected in dissimilar locations
- communicating with a real audience using written language
- expanding their global awareness

Online research can offer an ever-expanding wealth and variety of current information to learners. Whether this abundance helps or hinders students' subject-area learning depends, like online collaboration, on the activity's design and students' information-seeking and appraising skills. In general, teleresearch is most appropriate when students can be well served by:

- accessing information not available locally
- viewing information in multiple formats (e.g., text, graphics, video)
- comparing and contrasting differing information on the same topic
- considering emerging and very recent information (e.g., interim reports of research studies in progress)

- delving deeply into a particular area of inquiry

What kinds of learning activities can help students meet curriculum standards while incorporating telecollaboration and teleresearch in powerful ways? The scope and variety of curriculum-based telecomputing activities can be understood according to their structures and purposes.

Activity Structures and Purposes

Activity structures are flexible frameworks that help teachers efficiently and effectively create curriculum-based telecollaboration. They are a special type of thinking tool for teachers—a form of design assistance. They help us capture what is essential about the structure of a learning activity and communicate that in such a way as to encourage the creation—not replication—of context-appropriate environments for learning.

I have identified 18 telecollaborative activity structures to date, and I have grouped them into three categories.

- *Interpersonal Exchanges* are activities in which individuals talk electronically with other individuals or groups, or in which groups talk with other groups.
- *Information Collection and Analysis* activities involve students collecting, compiling, and comparing different types of interesting information.
- *Problem Solving* activities promote critical thinking, collaboration, and problem-based learning.

Curriculum-based teleresearch activities are categorized differently, according to their apparent learning purposes rather than their structures. The purposes include:

- practicing information-seeking and evaluating skills
- exploring a topic of inquiry or finding answers to a particular question
- reviewing multiple perspectives on a topic
- collecting data
- assisting in authentic problem solving
- publishing information syntheses or critiques for others to use in teleresearch

More information about each of these structures and purposes, along with examples of classroom-tested, curriculum-based activities that illustrate them, can be found at Virtual Architecture's (Harris, 1998) Web home: <http://ccwf.cc.utexas.edu/~jbharris/Virtual-Architecture/>. Please see the articles describing telecollaboration and teleresearch in terms of structures and purposes at <http://ccwf.cc.utexas.edu/~jbharris/Virtual-Architecture/Foundation/index.html>.

Time and Space

Have you noticed that the only time there seems to be a profusion of space in a house (or apartment, or classroom, or office) is when we first move in? Somehow, as time passes, our

roommates and possessions—or, perhaps, our expectations—multiply in such a way so that soon we feel we need more space. As teachers, we face a similar situation with the biggest challenge to powerful educational use of the Internet: time. Somehow, as the years pass, we realize that we must add more to what our students experience in our classrooms. Fortunately, Internet tools and resources are not (or, shall I say: should not be) additions to our curricula; rather, they can be used as “instruments of construction.” So, at least theoretically, once we have developed the skills prerequisite to using Internet tools and resources effectively within the curriculum, adding online components shouldn’t take additional time or space.

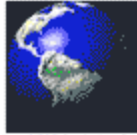
Are some of you starting to smell snake oil? If you have used online facilities as part of your teaching already, does it seem that doing so took more, rather than less, time and energy? Part of this expenditure of precious resources may have to do with developing technical expertise, arranging network access, and so on. Yet beyond that, it does seem that curriculum-based telecomputing projects take longer, doesn’t it?

The reasons behind this relationship probably have more to do with the types of telecomputing projects that we see as worthwhile in terms of time, effort, and resources needed. Although I know of no research results that have reported this discovery, from talking with many telecomputing teachers and from being involved in many curriculum-based projects myself, I suspect that what we see as worthy projects are student-centered, active, problem-based, multi-modal, and interdisciplinary. Planning for and implementing such rich educational experiences requires more time, energy, and resources than traditional, didactic, unimodal teaching. Use of the Internet isn’t really what occupies more time and space in our schedules; teaching well does.

But the very real limitations of curricular crowding and time shortage still need to be addressed. Unfortunately, unlike a family that may be able to move to a larger house when its members perceive a need for additional space, there’s not much hope of any of us getting more space in our students’ schedules. Might it be possible, then, for each project to effectively combine curricular goals, telecollaborative activity structures, and teleresearch purposes? Let’s take a look at some example projects to see how it is done.

Musical Plates

The Musical Plates project (<http://k12science.ati.stevens-tech.edu/curriculum/musicalplates/>, Figure 1) is a multidisciplinary exploration of earthquakes and plate tectonics that helps secondary students learn actively in science, mathematics, language arts, and instructional technology. Students are introduced to this problem-based project by reading a scenario about a geologist’s work assignment (Figure 2). They use real-time earthquake and volcano data, accessed using the Internet, to respond to the situation. In addition, they assert data-based hypotheses about how earthquakes and volcanic eruptions affect the plants and animals in differing natural habitats and how local, national, and global human communities respond to such natural events. Participants are encouraged to publish their work online at the site for others to use.



Another CIESE Curriculum Project

Musical Plates



A Study of Earthquakes and Plate Tectonics

PROJECT OVERVIEW

- Read the Story!
- Real Time Data Links
- Real Time Data Activities
- Language Arts Activities
- Student Area
- Teacher Area
- Reference Materials
- Online Help

Musical Plates is an Internet-based multidisciplinary project which will enrich a student's learning experience through "unique and compelling" applications of instructional technology. In particular, this project taps into some of the exciting new applications of the Internet in education by having students access real time earthquake data, interact with experts online, and publish their own work to the project web site. Students will tap into these fantastic resources all in the context of an authentic real world problem which they will need to solve using science and mathematics.

This project is developed and managed by the Center for Improved Engineering and Science Education (CIESE) which is located at Stevens Institute of Technology in Hoboken, New Jersey. You can learn more about this project and many other CIESE sponsored Internet-based educational activities by visiting <http://www.k12science.org>

The language arts component of this project was developed by the Bank Street College of Education working in collaboration with CIESE staff.

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Figure 1. Graphic courtesy of The Center for Improved Engineering and Science Education, Stevens Institute of Technology. Copyright © 2000, Stevens Institute of Technology.

Musical Plates

Project Story

You are the lead scientist in the United States Geological Survey (USGS) investigating earthquakes. You are currently sunning yourself on the shores of a remote Pacific island and enjoying the last few days of your first vacation in five years. Just as you to drift off in a pleasant daydream, you are rudely awakened by your cellular phone which is ringing loudly next to you on your beach towel. You pick up the phone and are shocked to hear the frantic voice of your secretary. Ah, yelling that you must return as soon as possible. He explains that the earthquake project that you have been working on has been accelerated by the President of the United States and that you need to begin your analysis immediately. The President wants to know where these "nasty little quakey things" are occurring and if there is any way to determine what parts of the world are most prone to them. If at all possible the President would also like to know what is causing the earthquakes and why. Unfortunately for you and your research team the President needs to have this information by the end of the week or he will cut all of your funding.

Realizing that your vacation has come to an end you jump up and quickly return to your oceanside hut. Your first instinct is to return to your office on the first plane leaving the island, but your hopes are quickly dashed after speaking to your husband. He informs you that the next plane isn't due to leave for another three days. At first you think all is lost until you remember that you have your laptop, cellular phone and modem with you! With these tools you can dial-up and begin your investigation from your beach side residence.

Your Assignment:

1. Pinpoint the exact locations of where recent earthquakes are occurring
2. Determine if certain parts of the world tend to experience more earthquakes than others
3. Determine what is causing the earthquakes

Figure 2. Graphic courtesy of The Center for Improved Engineering and Science Education, Stevens Institute of Technology. Copyright © 2000, Stevens Institute of Technology.

Seen from a design standpoint, this rich project offers students engaging telereasearch opportunities to accomplish all six purposes listed previously. More importantly, students

satisfy multiple requirements in each of four curriculum areas. The project's creators have cited these specifically according to two national, five state, and one local sets of standards (<http://k12science.ati.stevens-tech.edu/curriculum/musicalplates/standards.html>). For example, the New Jersey Core Curriculum Content Standards that students satisfy by participating fully in the Musical Plates project include:

3.2: All students will actively listen in a variety of situations in order to receive, interpret, evaluate, and respond to information obtained from a variety of sources.

3.3: All students will compose texts that are diverse in content and form for different audiences for real and varied purposes.

3.5: All students will view, understand, and use nontextual visual information and representations for critical comparison, analysis, and evaluation.

Advocates for the Millennium

This imaginative five-week project (www.angelfire.com/mi/mllennium3/, Figure 3) from Alberta, Canada, helps students in Grades 3–9 explore ideas related to millennia through work in language arts, social studies, and information and communication technology. Much of this project is telecollaborative; students engage in activities structured as global classrooms, keypal exchanges, telementoring, information exchanges, and electronic publishing. Telereasearch is used to help students explore millennium-related topics from multiple points of view; for example, students can make predictions, create inventions, or research important people from the past 1,000 years.



Figure 3. Graphic courtesy of Advocates for the Millennium.

The project, now in its third year, adopts a new theme annually but is scheduled similarly each time. During the spring of 2000, for example, the project commemorated the International Year of the Older Person with weekly activities including the following:

Week Two: The Past

Research an important person of the last 1,000 years.

Research is placed on a circle that will go on a 1,000-year timeline.

Week Three: The Present

Students record the stories of their own grandparents or a grandparent they have adopted.

Students complete PowerPoint presentations on the millennium.

Week Four: The Future

Futuristic poetry, predictions, stories, and descriptive writing. What will the future look like? Where will you be? What does a car or a house of the future look like? Be creative!

Curriculum standards that the project satisfies are listed by grade level and discipline (www.angelfire.com/mi/millennium3/lacurobj.html). For eighth graders, for example, 14 language arts, 19 information and communication technology, and more than 50 social studies standards are addressed in the context of just this one project.

Fairy Tale Cyber Dictionary

In this simple yet powerful project for very young students (www.op97.k12.il.us/instruct/ftcyber/index.html, Figure 4), each participating teacher chooses a familiar fairy tale to read aloud to his or her class. As a group, students then retell the story in their own words and with their own artwork, either writing or dictating their version of the tale. There's a clever challenge in this particular project's design: In retelling the fairy tale, students are asked to choose and include words beginning with each letter of the alphabet that communicate important aspects of the story.



Figure 4. Graphic from the Fairy Tale Cyber Dictionary. Reprinted with permission.

For example, when kindergarten students in Kapa'a Elementary School in Kapa'a, Kauai,

What Dilemma?

The point, I hope, is clear: Participating in one well-designed project can help students address many content and process standards at the same time and in engaging, pedagogically sound ways. Although there is yet no generalizable evidence that doing so will help improve standardized test scores, it would stand to reason that if the testing instruments are reliable, valid, and matched to relevant curriculum standards, the benefits of such project-based learning should also be reflected in higher test scores. If they aren't, perhaps we should question the tests before we question the ways in which creative teachers are helping their students learn. Use of Internet tools and resources in curriculum-based ways not only directly addresses curriculum standards but can also do so in a time-efficient and learner-centered way.

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