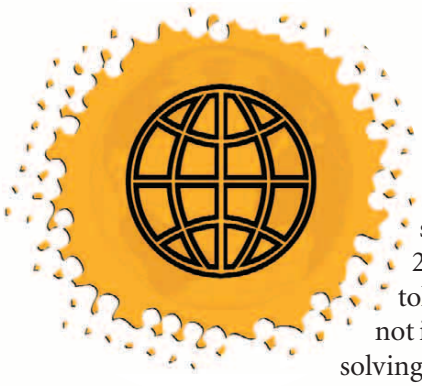
21st Century Teaching

Mapping the connections between ICT literacy skills, technology tools, and the learning goals of core subject areas.

BY ED HAZELL



IN MANY SCHOOLS, THERE'S A DISCONNECT between the content taught, the technology tools used, and the 21st century skills needed to apply the content and tools effectively. "I met with a group in Tucson that wants to create a 21st century high school," says Ken Kay, president of the Partnership for 21st Century Skills. "The administrators at this school told me that the core curriculum people say to them, 'I'm not in the business to teach analytic thinking and problem-solving. I went to school to teach a subject.'"

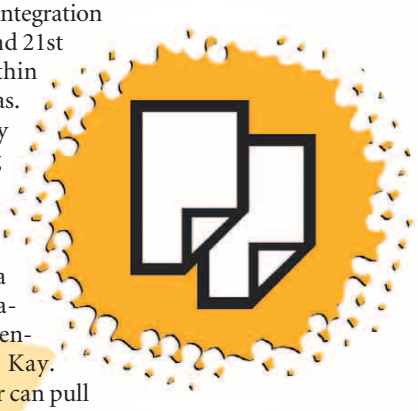
But these are exactly the skills that are necessary for every student's success in the 21st century, according to the partnership, a nonprofit alliance of education, business, and government leaders (of which Cable in the Classroom is a member). Further, they believe that these skills can and should be integral to teaching core curriculum. To show these connections, the partnership, in collaboration with major associations representing core subject areas, has developed a series of ICT Literacy Maps that illustrate the intersection between academic subjects and information and communication technology (ICT) literacy skills.

The maps show "a real, three-dimensional texture to 21st century learning," Kay says. "The difference between these skills and 20th century learning is that in the 21st century, you can't separate your learning skills, your knowledge of the core content, and your technology skills. I think the maps have been very successful in helping people see how technology, learning skills, and core content work to reinforce each other when they intersect."

From Skills to Tools to Outcomes

Each ICT Literacy Map is a chart with three columns that connects a 21st century skill to technology tools and student outcomes. Skills include information and media literacy, communication, critical thinking and systems thinking, and several others. These are matched with technology tools appropriate for applying the skill within the subject area at various grade levels. For instance, the English/Language Arts ICT Literacy Map lists historical fiction, photos, Internet, and TV as tools that fourth-graders can use to analyze, access, manage, integrate, evaluate, and create information. The outcomes are things students will be able to do using the tools in the process of attaining the skills. For example, one fourth-grade student outcome for Communication Skills: Reading suggests using pre-selected magazines, books, and newspapers to gather information on local or regional authors and then generate a list of keywords for an online search about the author and his or her works.

In addition to the English/Language Arts map, the partnership has unveiled subject-specific ICT Literacy Maps in math, geography, and science, which they hope will help guide educators toward meaningful integration of technologies and 21st century skills within these subject areas. "It will also be very useful in bridging the gap between the core subject folks and the people having a broader conversation about 21st century skills," says Kay. "An administrator can pull out a map and say, 'Hey, teachers in your discipline have looked at this. It shows what it's like when you include these learning skills and these technologies in your subject area.'"



21st Century English/ Language Arts

"English teachers should be aware of the map as a generative tool," says Dale Allender, associate executive director of the National Council of Teachers of English (NCTE), who collaborated with NCTE members to develop the English ICT Literacy Map. "Teachers sometimes need all this information in one place to see how it fits into their existing curriculum. They can see loosely, 'this is what I'm teaching, and I can locate the different skill sets in the local, state, or national standards.'"

By looking at the 21st century learning skills and the ways in which technology is used to both

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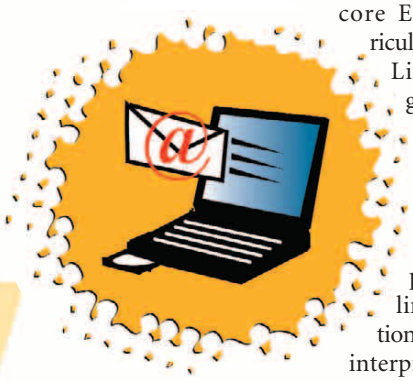
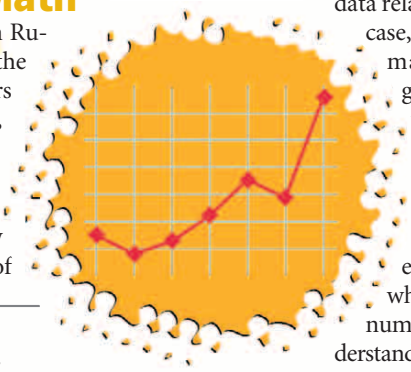
acquire the skills and learn content, teachers can adapt the outcomes presented to fit state and local learning-process and content standards, Allender thinks. For instance, reading and writing skills are part of every core English curriculum. The ICT Literacy Map gives examples of how fourth-graders can read both traditional print and online information sources, and interpret non-text sources like sound files and images, to create a report. For a writing project, seniors can write one book report in the form of a brochure and another using multimedia resources such as video and audio, then compare media. In all these examples, core curriculum is wedded to 21st century skills and technology. According to Allender, the maps can help teachers see "what they are already using, but could be using differently, or get ideas for using new technologies and techniques."



21st Century Math

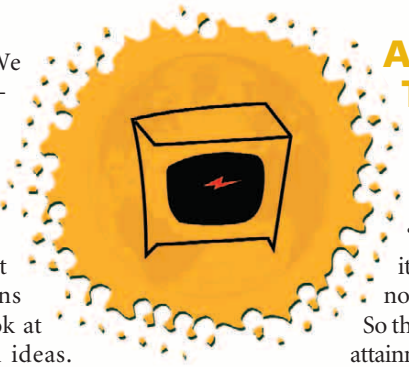
For math teachers, says Jim Rubillo, executive director of the National Council of Teachers of Mathematics (NCTM), "the key is to use this map to see how important the technology and the 21st century learning skills are and how they advance the learning of mathematics. We must demonstrate this directly. The ICT map helps us see that the technology offers us different representations or ways to look at mathematical ideas. We must help students master the the basic skills and then learn the *meaning* of the calculations in a life-related context."



For example, Rubillo recently used a lesson plan from the Math Forum Web site and a graphic calculator to simulate an epidemic with a class in Connecticut. The exercise accomplished several goals: using the technology, students not only applied basic math skills, but also developed the sense of social responsibility that is part of the 21st century learning skills. "They learned graphing, limits, and rates of change—that is, the increase or decrease of new cases from one week to the next and their relationship to graphical interpretation," says Rubillo. "But what I really wanted to do was show them how mathematics can inform public-health policy decisions and why we take action when an epidemic is coming along."

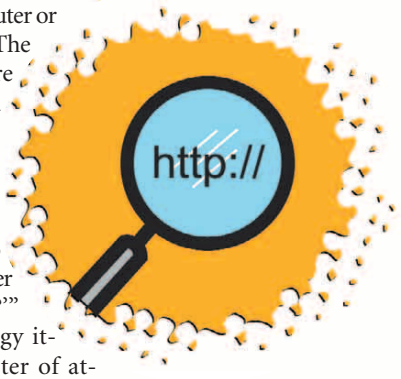
The ability to understand and analyze data relating to a social issue (in this case, public health) and use that mathematical data to help guide responsible, ethical actions in a community context (e.g., providing free flu shots) is an important 21st century skill. "They could see why the Centers for Disease Control collects data, and what they're looking for in the numbers. The students could understand how the center knows when the flu has peaked out, when it's on the rise, and the maximum number of people affected," Rubillo says. Because the graphing calculator allowed them to change variables and quickly see results, students got a sense of the math behind an important public-health concern.

"Most importantly, they didn't even notice that I was using the technology," Rubillo says. "It was just the natural thing. I was using it because we were interested in what was going on. I wasn't standing there saying, 'Hey look everybody, I'm using technology.' It's just part of the tool set."



A New Definition of Technology Literacy

"ICT literacy is such an important concept and a departure from the way people have been thinking about technology," says Kay. "We shouldn't be teaching technology for it's own sake, we should be teaching technology to accomplish critical learning skills. So the definition of ICT literacy skills is not the attainment of technology skills, it's the attainment of learning skills through the use of technology. That's an important distinction. Under our current definition of technology competency, we ask people if they know how to turn on a computer or use PowerPoint. The right questions are more like, 'Do you know how to be an effective communicator using technology? Do you know how to be a problem-solver using technology?'"



"The technology itself isn't the center of attention," agrees Rubillo. "The ultimate goal is to make the tool so integral to learning that it becomes just another resource to help students explore their ideas." <

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Related Resources

ICT Literacy Maps
www.21stcenturyskills.org/matrices
Downloadable documents illustrating the connection between ICT literacy skills and geography, math, English, and science.

Illuminations
www.illuminations.nctm.org
Interactive applets for math instruction from NCTM and Marco Polo.

Math Forum @ Drexel
www.mathforum.org
Lessons and interaction for math instruction.

National Council of Teachers of Mathematics
www.nctm.org
Professional development, teaching ideas, standards, and more for math teachers.

National Council of Teachers of English
www.ncte.org
Site includes Teaching Resource Collections, including Literacy in the Ways of the Web.