VOL. 1 NO. 1 SUMMER 2005

i.e. interactive educator

GETTING TO YES
Good grantsmanship in today's schools

RIDING THE WIRELESS WAVE
Redefining where and how learning occurs

LEVELING THE FIELD
Technology benefits special needs students

FINDING FUNDING
Getting creative with fundraising

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Welcome

Welcome to the inaugural issue of *i.e. interactive educator*. As a publication of SMART Technologies Inc., *i.e.* magazine brings you up-to-date and relevant information about interactive technology for the classroom. But it also recognizes the importance of discussing the complex issues that surround technology use in education today. In that regard, *i.e.* magazine covers not just technology use, but technology planning, integration, support and training, i.e., the whole spectrum of issues related to this wonderful new world that is positively changing the way students learn.

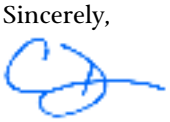
As a company committed to education, SMART has never created and promoted technology for technology's sake. We believe strongly that, as the world leader in interactive whiteboards, we must develop interactive technologies that enhance teachers' efforts in the classroom and that do contribute to student achievement.

As an organization whose people are also parents, students, lifelong learners, educators, community volunteers and technology enthusiasts, SMART views its commitment to students and learning as an essential part of its DNA. That commitment represents not only who we are to the world, but who we are to ourselves. Come to SMART's headquarters and you will see all manner of people teaching, learning, collaborating, visiting schools, talking to teachers, reviewing the latest research on technology in education and, often as a result of these activities, leading the advancements made in interactive technology.

So it is with that background and intention that we bring you *i.e.* magazine. We are obviously biased in favor of our own technologies, but we are committed to being and developing the best. And so, we believe, are you.

We also hope that you will see this magazine as an opportunity to send us your ideas, experiences and thoughts. Ultimately, we strive to provide you with high-quality, up-to-date information from our experts, who work every day at the forefront of technology innovation, and from others who have a vested interest in helping our children learn and succeed.

Sincerely,



Carolyn Dearden
Editor-in-Chief

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Photo courtesy of Jennifer Natsu

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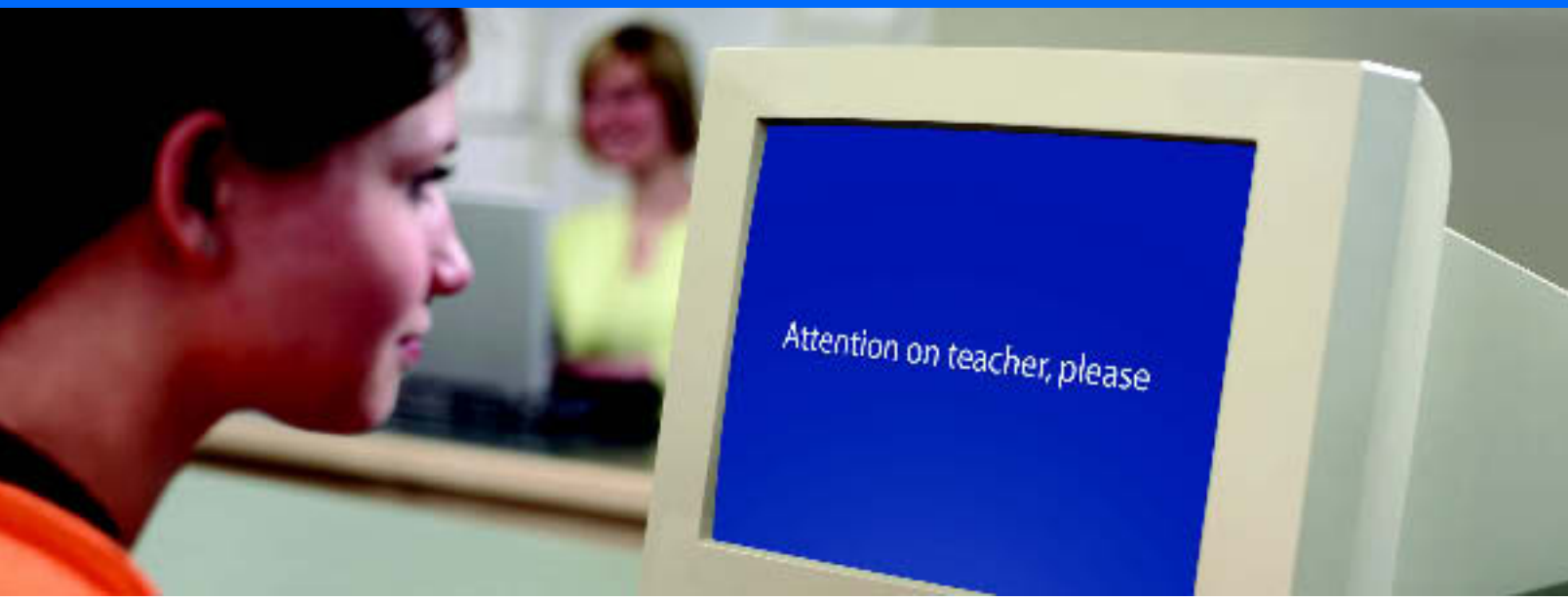
Photo courtesy of Philip Dykes

Lee Shenkman has more than 25 years of writing and publishing experience. A managing editor for college, school and trade publishers in the U.S. and Japan, he has also written extensively on a wide variety of topics, including technology and telecommunications. In addition, he has published occasional humorous Op-Ed articles in U.S. newspapers. He received his undergraduate degree from the University of California at Berkeley and his Master's from the University of California at Los Angeles.

Nancy Knowlton has a bachelor's degree (honors) in business administration from Bishop's University in Quebec and an MBA in marketing and finance from Saint Mary's University in Nova Scotia. A member of Alberta's Commission on Learning, Nancy has instructed at two Canadian universities, teaching accounting and computer science. She is the co-founder, co-CEO and president of SMART Technologies Inc. and the executive director of the SMARTer Kids Foundation of Canada.

Get the computer games out of the computer lab



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SMART Technologies

NCLB opposition mounts

– President Bush's landmark education law, the No Child Left Behind (NCLB) Act, is being tested in court and in state legislatures. The challenges are coming from several directions.

The National Education Association (NEA), eight school districts and teacher organizations in 10 states on April 20 filed suit in federal district court accusing the Bush administration of failing to meet the provision of the No Child Left Behind Act (NCLB) that requires federal funding sufficient to meet the demands of the law.

Just one day earlier, the Republican-led Utah Legislature voted to put its educational goals ahead of the federal law despite the possible loss of $76 million. Connecticut was planning its own lawsuit, and other states were balking over money. Even the president's home state of Texas was locked in a dispute with the U.S. Department of Education (ED) over the testing of special education students.

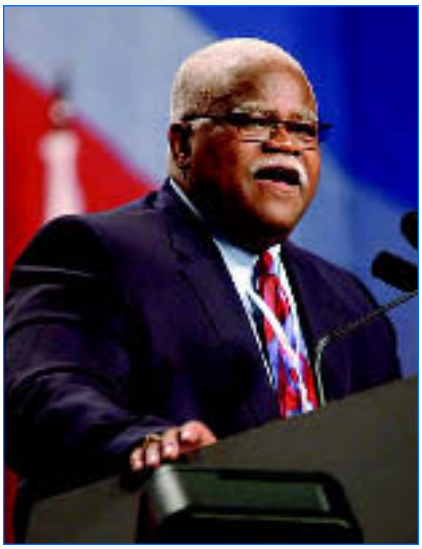
But even as the opposition mounted, President Bush defended the law at a White House ceremony honoring the national teacher of the year. "I love the spirit of the No Child Left Behind Act," the president said. "I suspect the teachers love the spirit of challenging the soft bigotry of low expectations."

The suit, Pontiac School District v. Spellings, was filed in the United States District Court for the Eastern District of Michigan.

National Education Association
www.nea.org

White House focus on education
www.whitehouse.gov/infocus/education/

U.S. Department of Education
www.ed.gov



Critics of NCLB funding will have their day in court.

SciGuides point to richer science classes

– The National Science Teachers Association (NSTA), the world's largest association of science educators, has unveiled a new Web resource, SciGuides.

NSTA describes SciGuides as an online "science toolbox" for science educators. It features specially developed guides to quickly locate science content information on the web. Each subject-specific SciGuide includes teaching resources from NSTA-reviewed science websites. NSTA says teachers can use SciGuides to transform content offered on the site into effective classroom resources by locating and incorporating online lesson plans, tips for teaching the subject matter and effective student assessments.

SciGuides are organized by major science topics, such as genetics or matter. Teachers can link to approximately 100 websites on each topic. The sites are also organized by grade level and are continually updated by educators and pedagogical experts working with NSTA. All SciGuides content is aligned to the National Science Education Standards (NSES).

Eleven SciGuides now are available to NSTA members and school districts for $4.95 per unit. Nonmembers can purchase SciGuides for $5.95 per unit. Bulk rates can be negotiated with NSTA. Units can be found for K–12 students on topics such as the properties of objects and materials, life cycles and inherited traits, organisms, atomic structure and chemical bonding, genetics and more.

SciGuides
http://sciguides.nsta.org

Online field trips boost reading scores

– A free collection of online field trips and other Web-based learning materials has been shown to boost reading levels and help improve test scores among middle-school students, according to the results of a scientifically based research study from Maryland Public Television (MPT).

Approximately 400 seventh and eighth graders from two Maryland public middle schools – one urban, one rural – participated in the study, which took place during the 2003–04 school year and was released in late April 2005. The study showed that seventh and eighth graders who used three online field trips – each specifically developed by MPT for social studies and language arts – scored higher on a national standardized reading comprehension test than those who used traditional learning methods alone.

Though relatively small in size and scope, the study's findings could have national implications for educators who embrace the Internet as a tool for learning, executives at the nonprofit television station believe. Every teacher across the country, they say, can access these same resources at no cost by logging on to MPT's educational website, www.thinkport.org.

"The study shows that some of the

new ways we are teaching with technology are helping our students to succeed," noted Cathy Townsend, principal of Salisbury Middle School, one of the study's participants.

The control-based experiment showed that use of the online field trips in classroom instruction improved students' reading performance on the Gates-MacGinitie Standardized Reading Test – a popular K–12 assessment used in several states.

"Students who used the [electronic field trips] performed better on the unit tests than the students using only traditional methods," researchers found. Results also showed improved reading comprehension among poor and economically disadvantaged students.

Maryland Public Television
www.mpt.org

Thinkport.org
www.thinkport.org

$20M multimedia initiative to enrich history education

– The Corporation for Public Broadcasting (CPB) has launched a $20 million initiative to fund multimedia projects that improve the understanding of American history and civics by middle and high school students.

According to CPB, the three-year, multiphase effort will help fund partnerships among broadcast and content developers, the education community, the technology sector and others to design multimedia projects that can measurably improve the teaching and learning of American history and enhance civic activity among students.

Several recent studies have discovered a disconcerting decline in student knowledge of American history and civics. One of the most oft-quoted studies, released in 2000 by the American Council of Trustees and Alumni, found that while 99 percent of seniors at the top 55 U.S. colleges and universities could correctly identify the title characters of the MTV cartoon *Beavis and Butthead*, only 23 percent could identify James Madison, a substantial contributor to the United States constitution and the nation's fourth president.

> *"We're trying to catalyze something quite new and, I think it's fair to say, revolutionary in the way that content, broadcast and interactivity can be joined together to teach young people."*
>
> — Jim Denton, consultant for the CPB initiative

The CPB initiative aims to reverse that trend.

CPB has mandated that at least one public television program be a part of all proposed projects, but proposals also must incorporate other high-tech media elements—such as the Internet, cell phones and video games.

"We're trying to catalyze something quite new and, I think it's fair to say, revolutionary in the way that content, broadcast and interactivity can be joined together to teach young people," said Jim Denton, a consultant for the CPB initiative.

CPB's History and Civics Initiative
www.cpb.org/grants/historyandcivics

Court red-flags anti-piracy technology

– A U.S. appeals court has thrown out new federal rules requiring anti-piracy technology that would have limited how educators and other consumers could record and play their favorite television programs in the future.

The three-judge panel for the U.S. Circuit Court of Appeals for the District of Columbia determined that the Federal Communications Commission (FCC) had exceeded its authority when it announced it would require such technology in digital televisions and other consumer electronic devices sold after July 1.

The controversial rules were challenged by consumer groups, including education and library associations. Their lawyers complained the requirement would drive up the prices of digital television devices and prevent consumers from recording or distributing programs in ways permitted under copyright laws. For example, under the rules, educators might be prohibited from recording certain digital TV shows for viewing in their classrooms – or from rebroadcasting them online in distance-education classes.

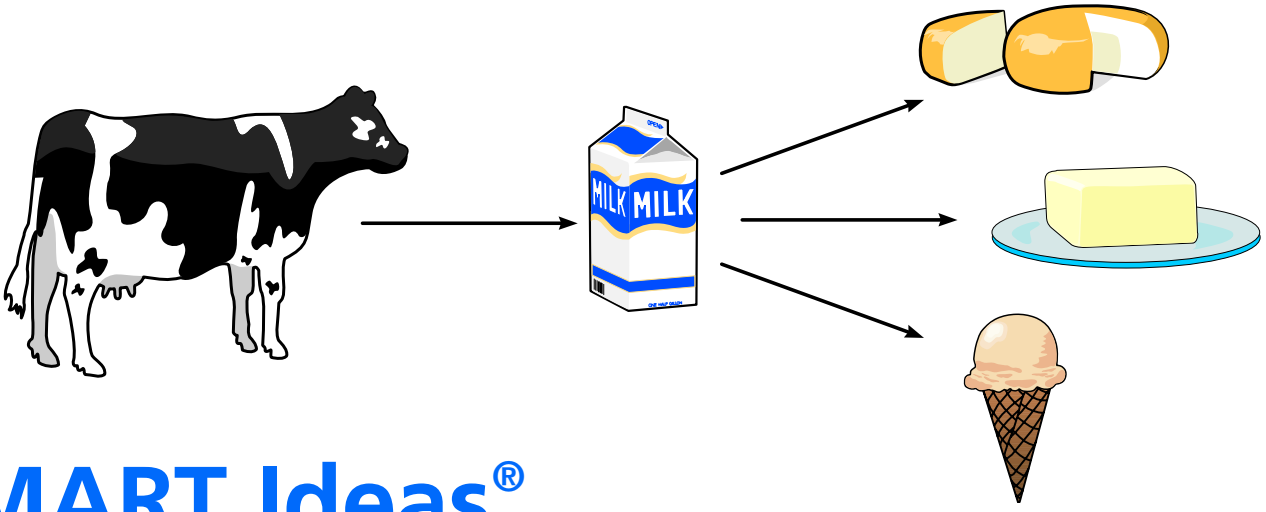
Emily Sheketoff, executive director of the American Library Association's Washington, D.C., office, called the ruling "a big victory" for schools, libraries and consumers.

"The broadcast flag seriously undermined the rights allowed nonprofit educational institutions under the TEACH Act to distribute digital content over the Internet for distance-learning purposes," Sheketoff said. "It even imposed restrictions on how consumers are able to use digital content in their own homes. We are happy the court has restored the rights of libraries and consumers by ruling that the FCC does not have the right to mandate technological copy protections."

Federal Communications Commission
www.fcc.gov

American Library Association
www.ala.org

How can kids connect Bessie to butterscotch?



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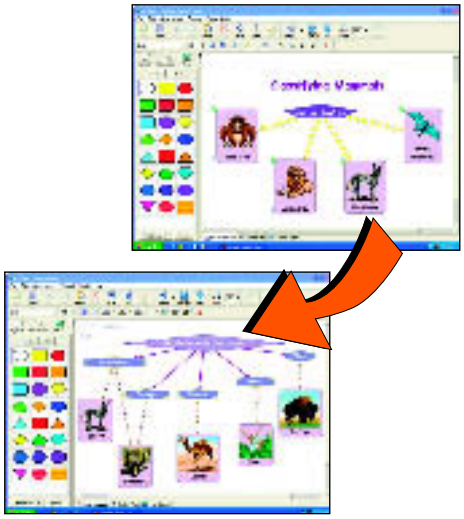

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SMART Technologies

by Sharon Oosthoek

Finding Funding

Cash-strapped schools get creative with fundraising

Creative fundraising is clearly not the cure for all your technology funding shortfalls, but it can definitely address some gaps.

In a perfect world, schools would have unlimited funds to invest in technology so students would never be denied the vast and powerful learning opportunities technology can provide. But the world is far from perfect, especially when it comes to funding education technology.

"Budgets are continually being cut. We're going to lose more every year. With the budgets we have, we can try some technology, but we can't have wireless laptops or whiteboards. That's something we'd like to have," says Amy Uelmen, who teaches a technology course at Pulaski Community Middle School in Pulaski, Wisconsin.

Necessity being the mother of invention, Uelmen, who is also the school librarian, has taken matters into her own hands. While surfing other schools' websites for fundraising ideas, she found one site with a link to an organization called FundingFactory (www.fundingfactory.com), which offers free technology, sports and recreation equipment, and even cash, in exchange for empty inkjet and laser printer cartridges and used cell phones.

She and her technology students canvass families and local businesses for the used items and set up drop-off boxes around the community – at libraries, banks and recreation centers. They then arrange to pick up the items and ship them to FundingFactory using postage-paid boxes, which the company provides for free. The school also asks some local businesses to ship the boxes on its behalf.

"I sent out 500 letters to businesses in our area. I got the list through the Chamber of Commerce, and I got 14 sponsors out of it," says Uelmen. "We have some large corporations that send in cartridges on our behalf weekly. Our largest is Wisconsin Public Service. It's the largest utility company here."

FundingFactory recycles the items and awards the school points or cash toward computers, printers, digital cameras and software. Over the past five years, Uelmen has used her school's points to buy four digital cameras and two digital video cameras. She's now saving points for wireless laptops.

In Orange County, California, the Capistrano Unified School District Foundation came up with funds through a direct mail campaign, raising more than $100,000 in two months – with a chunk of that going toward technology purchases for the school district. A company called Melissa Data ran the program for the foundation.

"We have been lucky," says foundation executive director Nick Alivojvodic. "We used direct mailing to reach out to more than 10,000 members of the community. Now we're going to direct mailing and fundraising from national foundations and corporations and to businesses."

Both Alivojvodic and Uelmen say there's too much at stake for schools not to come up with creative fundraising solutions. "It's the age of information, and it's so important we give students access to that information and teach them to be critical evaluators of it," says Uelmen.

Sharon Oosthoek is a Toronto, Ontario-based journalist. She has worked as an education reporter for the Hamilton Spectator *and as a freelance writer for various technology publications, including* Microsoft Home *and* HUB.

Getting Grants

Turn ED's new tech priorities into dollars for your district

If you plan to write a federal or state grant application for school technology, I would recommend that you read the new National Education Technology Plan released earlier this year by the U.S. Department of Education.

The plan includes seven recommendations for policy makers and school leaders, as well as case studies and an array of online resources. District grant writers should take the time to review this document and consider five of the seven recommendations in particular.

With some creative thinking, you can include information in your proposal about how your proposed project would meet these priorities.

Here are the five recommendations, along with my thoughts about how each can be applied to the grants process to boost your funding chances:

1. Strengthen leadership

Develop partnerships among schools, higher-education institutions and the community: Look to colleges, universities, local business and industry leaders, museums, libraries, nonprofit and for-profit groups, and community-based organizations as potential project partners. Consider using them for training, mentoring, services, technical assistance and additional resources to augment your proposed project.

Encourage creative technology partnerships with the business community: Consider asking businesses for training, technical assistance, hands-on learning and additional resources.

Empower students' participation in the planning process: Invite a few articulate students to take part in project planning, and solicit their feedback about the types of technology they find interesting to use, the technology they would like to learn more about, and what styles of teaching keep them engaged. Take students' suggestions into account when designing technology projects — and note this in your grant application.

2. Consider innovative budgeting

Consider leasing equipment with a three- to five-year refresh cycle: A common problem for those who purchase equipment with grant funds is that the equipment can become obsolete in a short period, or there were no funds dedicated to upkeep and maintenance. Look for leasing options, and explain the benefits in your budget narrative.

Create a technology innovation fund to carry funds over yearly budget cycles: Ask the community for additional support for this fund through cash or in-kind donations. You can mention this additional support as a means of sustaining your proposed project.

3. Improve teacher training

Improve the preparation of new teachers in the use of technology: Make sure you include a training component in all of your projects, if applicable, and consider having all of your teachers participate in the training.

Ensure that every teacher has the opportunity to take online learning courses: Find out if the training associated with a proposed project is available in an online format. If not, consider applying for grant funds to purchase online professional development opportunities for teachers.

Improve the quality and consistency of teacher education through measurement, accountability, and increased technology resources: In the evaluation section of your proposal, address these issues and discuss the methods you will use to evaluate teacher education.

4. Support eLearning and virtual schools

Provide every student with access to eLearning, and enable every teacher to participate in eLearning training: If it makes sense to use eLearning in your project, include it, and include the training component for teachers.

Explore creative ways to fund eLearning opportunities: Look to partners to fund these types of opportunities through cash or in-kind contributions.

5. Embrace digital content

Consider costs and benefits of online content, aligned with rigorous state academic standards, as part of a systemic approach to creating resources for students to customize learning to their individual needs: In the methodology section of your proposal, include information about the solution you are proposing (i.e., online content) and how this solution will meet students' individual needs.

Deborah Ward, CFRE, is an independent grant writing consultant. She welcomes questions at (717) 295-9437 or debor21727 @aol.com.

by Jessica Werb

Leveling the Field

New technologies help special needs students succeed

Photo courtesy the FSDB

The Florida Public Residential School for the Deaf and Blind boasts a graduation rate higher than the state average and says technology integration plays a crucial role in this success.

At the Florida Public Residential School for the Deaf and Blind (FSDB), students are anything but disadvantaged. They may have disabilities, but that isn't stopping them from learning essential curriculum in order to go on to postsecondary education – which three-quarters of its 750 students do.

Boasting a graduation rate higher than the 71.6 percent state average, these students' disabilities clearly don't hinder their academic progress. The secret to their success? It is, in large part, due to the implementation of a wide range of computer-based technologies, which allows them to compete on a level playing field with other, nondisabled students.

"We're using a lot of interactive whiteboards, and the [Mac] iMovie and iLife series [software]," explains Joan Bannon, curriculum/technology integration specialist at the school. "Teachers are very active and very involved with technology. In fact, we just had a department of education visit, and they were astounded with our use of technology.... You see kids participating. They're paying attention. They're actively learning. It's real exciting."

Current research supports the view that technology can improve learning for students with disabilities. At the Research Center for Educational Technology, located on the Kent State University campus in Ohio, a study by Mark van't Hooft on the use of a portable computing device (the Dana by AlphaSmart) upholds this view.

After analyzing student writing samples for evidence of conceptual understanding, the researchers found that special needs and low-performing students achieved on-par results with average students when using the devices. They also reported that teachers perceived increased productivity and motivation to learn among students. The students said the technology made writing assignments easier and more fun. The technology was also found to be particularly useful for organizational types of school-related activities.

"When technology's used well and in an appropriate manner, then it can have a positive effect on learning.... You can demonstrate instances where it does make a tremendous difference for kids."

— Dr. Ted Hasselbring, William T. Bryan Professor, Endowed Chair in Special Education Technology, University of Kentucky

At FSDB, students are given handheld Palm computers in middle school, progressing to laptops and tablet PCs in grade nine. The school has also just received a grant to purchase a class set of laptops to be shared throughout the elementary school.

Dr. Ted Hasselbring, a William T. Bryan professor and endowed chair in special education technology at the University of Kentucky, has, for the past 20 years, conducted research on the use of technology for enhancing learning in students with disabilities and students at risk for school failure. When students are properly instructed in using technology,

and programs are implemented according to their specifications, Hasselbring says technology can drastically improve learning outcomes of those with disabilities.

"When technology's used well and in an appropriate manner, then it can have a positive effect on learning.... You can demonstrate instances where it does make a tremendous difference for kids."

He notes that education technology can be divided into two categories – assistive and instructional, the former referring to aids that help students with interaction and communication that would otherwise be impossible (such as those at FSDB) and the latter referring to tools designed specifically to intervene, remediate or teach skills.

Hasselbring himself has developed an instructional computer program called Read 180, which adjusts itself to the needs of the student. A pilot study of the program in 2002 at Wright Middle School showed improved reading abilities of students by up to three grades in one year, demonstrating yet again that technology can significantly enhance learning.

At FSDB, technology is simply second nature for students and teachers alike. "Computer technology is our students' medium," says Bannon. "They've grown up with it, so they're very in tune with everything, technologically speaking.... And we've been very fortunate in that our teachers, for the most part, are very avid users."

Jessica Werb is an internationally published writer based in Vancouver, British Columbia. In addition to freelance writing, she has developed content for The Knowledge Network and works at an educational publishing company.

RESOURCES

A more inclusive approach to instruction

Count Susan Cooper as a believer in the ability of technology in general – and interactive whiteboards in particular – to foster a more inclusive approach to instruction that can benefit all students, including those with disabilities.

Cooper teaches eighth-grade language arts in the hearing-impaired department of the Florida Public Residential School for the Deaf and the Blind. The school's student population exhibits a wide range of special needs, which poses a significant challenge to instruction.

"Using the SMART Board interactive whiteboard is a very inclusive experience for our students," noted Cooper. "The interactivity keeps students focused on learning and motivates them. Students who might not have the best ability to explain their thoughts can easily interact with the interactive whiteboard and become really involved with materials they're presenting as they explain things in sign or speech. It benefits the whole educational process."

She added: "Because we have to rely on sign language to communicate with our students, they have to see us at all times. With an interactive whiteboard, I'm standing right next to the text, so if I want to change something or if I want to scroll down the page, I don't have to move. Students can see the text and they can see me. Having the option to use my finger instead of a pen also frees up my hands for sign language."

Besides equipping the deaf and special-needs departments, a few boards also appear in classrooms for blind students, to help those who have only partial blindness see the material more clearly.

"If you ask any teacher on campus, you'll get a resounding 'yes' that it's improving their teaching," Cooper said of the technology.

A key reason for this is the ability for students to interact with the material. In her language classes, for example, Cooper projects the words of a sentence up on the board in random order. Students are called up to the board and are asked to put the words in the correct order, which they can do simply by touching a word and moving it into place on the screen with their finger. This type of instructional approach works well for students who are kinesthetic learners as well as for those who are visual learners, she said.

The reading textbook that Cooper uses has an accompanying CD-ROM containing all the content in digital format. This saves Cooper a great deal of time – she can simply pop the CD into her computer, fire up her whiteboard, and the text she is discussing appears on the screen for the whole class to see. Cooper or her students then can annotate the text as they discuss it and can save their notes for future reference.

A side benefit of the technology is that it has increased the motivation of teachers, too. Using the interactive whiteboards has encouraged the school's teachers to share their ideas as their excitement about the technology has grown.

by Alex Rettie

Tailor-Made Training

Homemade PD could make the most of your technology

Travel around the nation's classrooms and you'll see a lot of good technology going to waste. "I can't tell you how many times I've seen interactive whiteboards gathering dust in storage closets," says Jeff Schultz, senior certification trainer with SMART Technologies Inc. The key to successfully integrating technology in the classroom, says Schultz, is to design and maintain a professional development (PD) program focused on teachers and their individual needs. In many cases, the most effective way for schools to meet their particular needs is to design their own programs. Successful technology PD programs have a number of common elements:

- Individualized assessment of training needs
- Motivation for teachers to participate
- Flexible delivery methods that allow for ongoing skill development

Demetria White, a field coordinator with CREATE for Mississippi, an extension service of Mississippi State University in Starkville, relies on teachers' online self-assessment of skills to tailor training programs for the schools she works with. "Once we see what skills the teachers need, our technology facilitators can concentrate on those targeted skills." Generally, the facilitators start with the basics of how to use a laptop computer.

David Walker, a technology integration teacher at Wappingers Central School District in Wappingers Falls, New York, concurs. "We always start technology integration with short, one-on-one sessions with the teachers who are actually going to be using the equipment," says Walker. "Once they understand the basics, they can start forming a plan for using the technology to meet their instructional goals."

Ensuring that new technology gets used means planning for adequate and appropriate training.

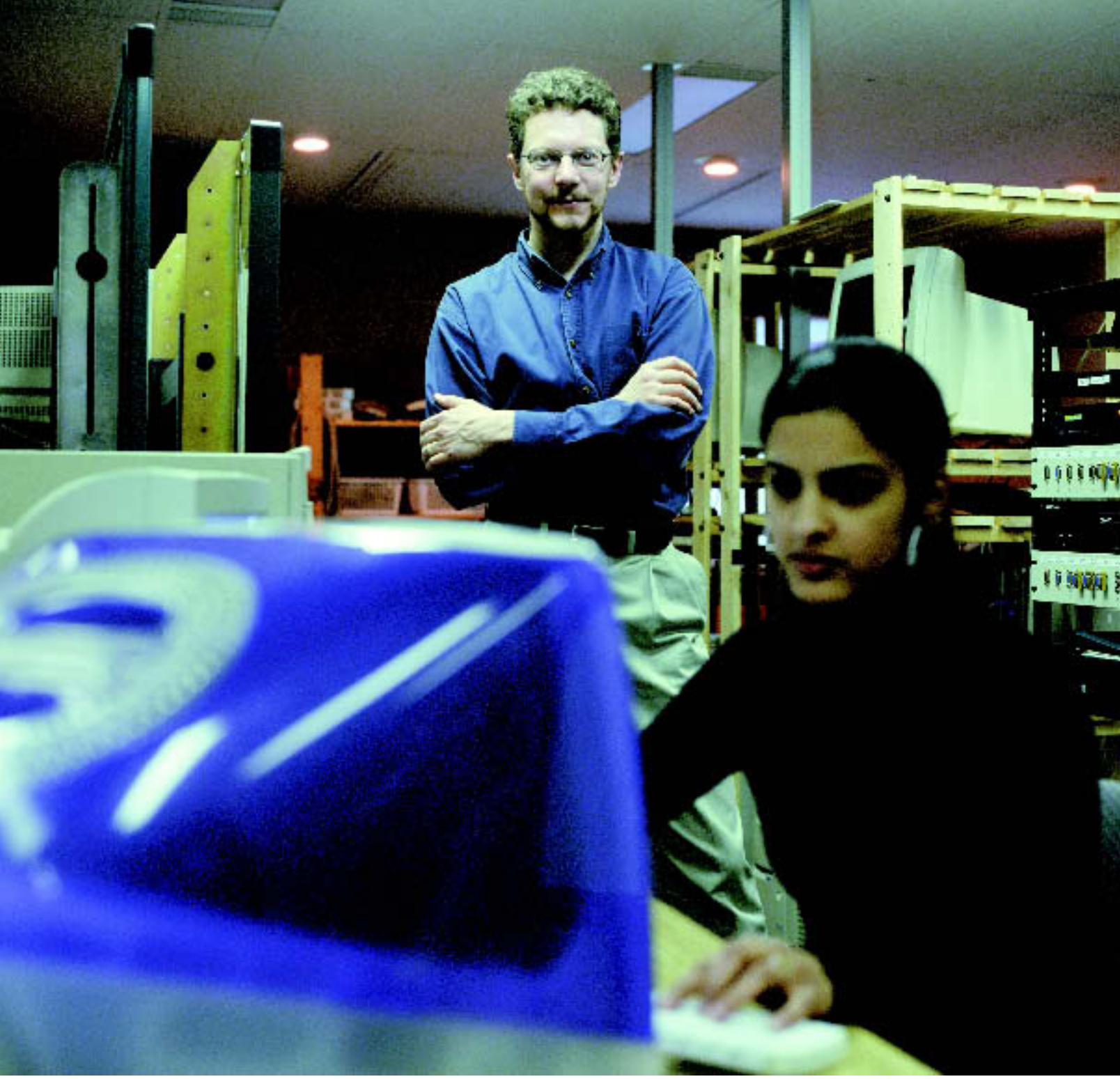
Focusing on the instructional goals of individual teachers is crucial to motivating them to actively participate in technology training, says Peggy Steffen, technology coordinator at Amphitheater School District in Tucson, Arizona. "We start with highly motivated teachers who've gone through 45 hours of training as part of a Title II, Part D grant. As we buy more equipment, we encourage teachers to buy into the technology by holding curriculum-focused workshops, where they learn how to use educational technology to more effectively teach their individual subjects."

Walker holds monthly interactive-whiteboard training workshops featuring breakout sessions on topics suggested by teachers in his district. "You can't just give teachers technology and expect them to use it," he says. "You really have to sell them on it."

Continuing to build skills is as important as initial training and requires a mix of delivery methods in order to reach all targeted teachers. White relies on a combination of in-school experts and self-study modules available through CREATE Mississippi's website. "We have lead teachers in each school who can help their colleagues develop best practices for their subject area. For those who prefer to learn by themselves, we have self-study modules posted on our website, but the lead teachers and technology facilitators are always available as a resource." CREATE Mississippi also has an e-mail discussion group for questions.

Developing an effective professional program for education technology isn't a small task, but the payoffs are enormous. "Our initial technology implementation involved a lot of training," says Steffen. "As a result, all the teachers in our schools saw the equipment being put to good use. That created a groundswell – everyone wanted the technology and wanted to use it as well as their colleagues did. Our teachers have benefited from the enthusiasm and so have our students."

Alex Rettie is a Calgary, Alberta-based online technology trainer and freelance writer. He has written on technology issues for various publications and has designed and delivered end-user training for a variety of classroom software and hardware products.



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SMART™ Technologies

by Rich Kaestner

Best Budgeting

Making the case for education technology spending

"Would you tell me, please, which way I ought to go from here?'

'That depends a good deal on where you want to get to,' said the Cat."

For Alice in Lewis Carroll's *Alice in Wonderland*, it doesn't matter which way she goes since she doesn't much care where she wants to get to. Such willy-nilly planning may work for Alice, but it's a luxury that schools and districts can ill afford when choosing the direction of their technology integration strategy. The fact is, if you don't know where you are, it's difficult to determine where you're going. When you don't understand your current costs, how do you make informed decisions, determine directions and develop budgets?

Total cost of ownership (TCO) is a methodology for determining the costs of implementing and maintaining computers and networks. These costs include hardware and software, direct labor needed to support your network infrastructure and the more elusive soft costs incurred by time spent in training and dealing with system issues, downtime and other technology overhead issues.

TCO analyses should be an important part of ongoing technology and budget planning. Determining overall technology costs can help you conduct a comprehensive assessment of how well you manage your technology infrastructure. It can also help you understand how to budget more wisely to manage your networks over the long term.

Additionally, the No Child Left Behind Act means that school districts are now in the process of reviewing their technology plans with an eye to demonstrating the impact that technology improvements have on academic achievement. A TCO tool can help school leaders make the case that the dollars they are spending on education technology are well spent. This kind of analysis is likely to gain credence with education policy makers, whether they are members of local school boards or of legislative bodies.

While gathering and analyzing computer, network and other cost elements may seem straightforward to the casual observer, technology industry research and advisory firm Gartner, Inc. has identified about 1,900 cost elements throughout an enterprise. Fortunately, there is some relief when it comes to collecting and analyzing all of this data.

The Consortium for School Networking (CoSN) and Gartner, supported by funding from the U.S. Department of Education, have developed a Web-based TCO tool, specifically for K–12, in which the number of data elements has been consolidated into approximately 150 input data

RESOURCES

School and district purchasing guidelines typically call for a relevant, detailed examination of both the short- and long-term costs associated with a purchase. However, total cost of ownership (TCO) experts suggest that a common mistake made by buyers of education technology is to overestimate the initial purchase price while underestimating administrative and other costs. A study by the Consortium for School Networking offers school administrators a budget checklist to help avoid this pitfall. The checklist includes consideration of the following:

- Retrofitting
- Professional development
- Software
- Technical support
- Replacement cost

For detailed information on TCO analyses, go to http://classroomtco.cosn.org/gartner_intro.html.

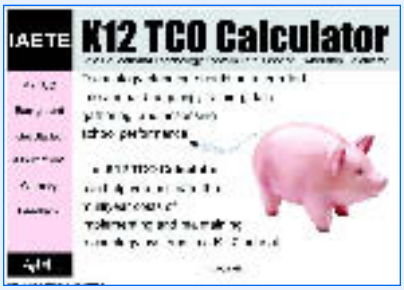
fields. While the data collection still requires a focused effort, most users feel that the learning and discovery is well worth it. This online TCO tool is a vendor-neutral, free resource available to help schools and districts manage their computer networks in a cost-effective way. When school leaders input their data, the TCO tool automatically calculates metrics that can then be evaluated in comparison to the high and low numbers that were calculated for eight case-study districts. The tool, along with full documentation and eight TCO case studies, is available online at www.classroomtco.org.

Rich Kaestner is the TCO project director for the Consortium for School Networking (CoSN) and provides management, support and training for the CoSN-Gartner TCO tool. Prior to this, Rich was a consultant with Gartner, providing strategic planning services to technology clients.

Budgeting for a truly interactive school means carefully assessing current costs, understanding ongoing costs – including those for maintenance, downtime and networks – and making technology planning a permanent part of your process.

RESOURCES

Another free internet tool helps schools calculate TCO



CoSN isn't the only organization that offers a free, web-based template for helping schools calculate their total cost of ownership (TCO) for technology. The West Virginia-based Appalachia Educational Laboratory (AEL) and Integration Technology Education Group recently unveiled an enhanced version of AEL's "K12 TCO Calculator," which helps K–12 school leaders estimate the multiyear costs of implementing and maintaining technology systems.

"Since its release in 2002, the K12 TCO Calculator has helped school leaders make critical decisions about technology purchases and estimate the long-range impact of these purchases on their budgets," said John Ross, director of AEL's Institute for the Advancement of Emerging Technologies in Education. "Based on input from users, we've revised the calculator so that users can now generate a district summary report for all schools in a district."

Other revisions to the K12 TCO Calculator include the ability to incorporate estimated professional development costs, as well as revised calculations for school building construction costs, based on updated regional profiles. The upgraded TCO Calculator also makes allowances for inputting the length of planning periods and the costs for disposal of hardware. In addition, in response to high levels of Internet connectivity and greater use of wireless technologies, the calculator has revised configurations for school networking.

Development of the K12 TCO Calculator was funded by the U.S. Department of Education.

Go to
www.iaete.org/tco

by Sharon Oosthoek

Myrtle Reed's Miracle

High expectations for at-risk school yield big results

The children who attend St. Louis, Missouri's Peabody Elementary do not have the best that life has to offer. They live in public housing projects where their families struggle every day to make ends meet.

It is, as the *St. Louis Post-Dispatch* wrote, "a neighborhood where virtually every child is poor, a fact that too often translates into low expectations and rock-bottom test scores."

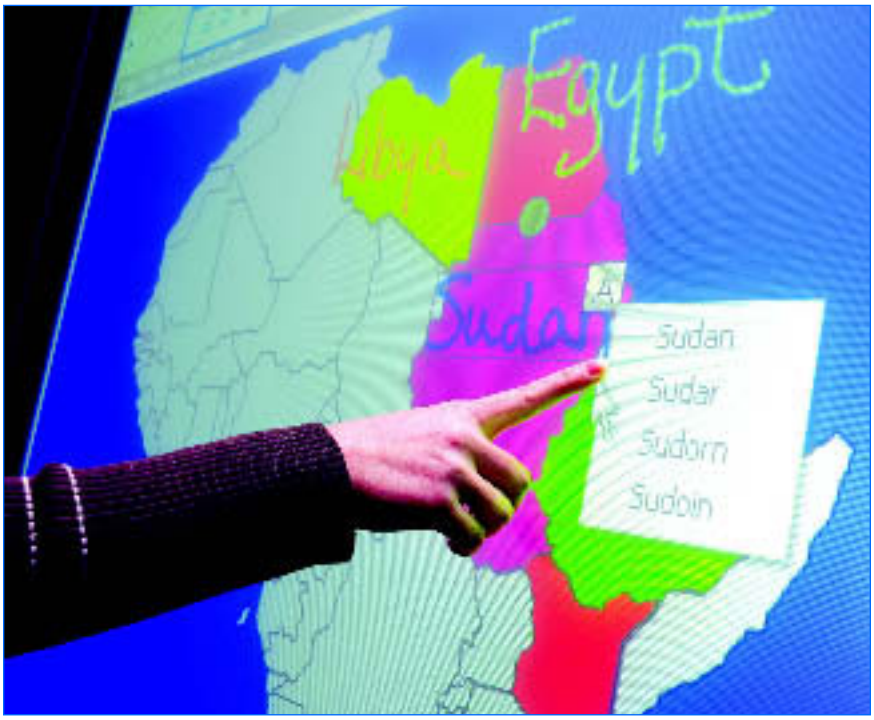
So when Myrtle Reed arrived to take over as principal in 1999, she knew she was being handed an academically troubled school. But she wasn't about to allow teachers or students to use poverty as an excuse for low standards. So she got busy.

"I made sure I had a really good staff, which meant I had to empty out my building and get new staff. I told them, 'This is what I want to do for this school, and if you don't want to do it, you can't work here,'" recalls Reed.

What Reed wanted to do was use technology – computers, interactive whiteboards, the Internet, digital cameras – to create a new way of teaching and learning.

She enrolled her teachers in a program called eMINTS, short for enhancing Missouri's Instructional Networked Teaching Strategies. eMINTS provides teachers with 200 hours of professional development, coaching and technical support as they use multimedia tools to promote critical-thinking and problem-solving techniques in their students.

The results at Peabody were dramatic. In 2001, only seven percent of third graders could read at grade level. A year later, the number improved to 25 percent. In 2003, 80 percent of third graders were reading at grade level. Similar results occurred in math, science and social studies.



Peabody Elementary principal, Myrtle Reed, introduced new technology and enrolled her teachers in a program called enhancing Missouri's Instructional Networked Teaching Strategies (eMINTS) to improve student achievement.

The aim of the program is to teach teachers to use technology to help students help themselves.

"Instead of standing at the front of the room lecturing and telling children what to do, the teacher says, 'We've got to talk about the letter E. What's its origin? Where did it come from?' Well then the children go to the Web to get the answer," explains Reed, who was recently promoted to assistant superintendent for eMINTS schools in St. Louis.

Reed says this method gives students more control over their learning, teaching them to own the final product and giving them a sense of confidence to figure out their answers. Teachers are the facilitators who guide the students along the way.

Students use the technology tools that make the most sense for the task at hand. For example, biology students can use digital cameras to take pictures of the different stages of plant growth. They can go to the Internet to research how plants grow and then put the information and pictures together for an electronic presentation. The teacher is always there to guide them, but

students are responsible for thinking through the inquiry-based process and how best to use the appropriate technology.

Interactive whiteboards are another particularly useful tool, says Reed, especially for students with different learning styles. The whiteboards are like large, touch-screen monitors synchronized to the teacher's computer. Students interact with the display and visit websites directly from the whiteboard.

Particularly effective is the combination of carefully chosen learning software and an interactive whiteboard's ability to stimulate students' sense of sight.

"When teachers teach the sound for E, they'll have a child point to the interactive whiteboard and the letter jumps out. They can see it. They can hear it. They can touch it. They'll absorb it. That reinforces your lesson," affirms Reed.

Third-grade teacher Christy Luppens loves how technology helps motivate her students. "The technology in my classroom is a great tool and allows me to be more creative with my lessons and involve my students more. The technology gets my students interested in what they're doing and makes them want to learn," she says. Reed says it has also resulted in a remarkable sense of pride among Peabody students. "My kids know how to use every piece of equipment. In the four years the equipment has been in that room, nothing has been broken. It's about expectations. I expect them to learn to use it. I expect them to keep it safe," she says.

Given the results of Myrtle Reed's efforts at Peabody Elementary, it's clear that low income doesn't have to mean low performance or low technology. By providing kids with positive learning experiences, schools can show students that what they're handed in life doesn't necessarily dictate what they can get out of it.

Sharon Oosthoek is a Toronto, Ontario-based journalist. She has worked as an education reporter for the Hamilton Spectator *and as a freelance writer for various technology publications, including* Microsoft Home *and* HUB.

RESOURCES

Shared technology fortifies rural education

Often mired in poverty and persistently understaffed, rural school systems across the nation increasingly are turning to distance education to provide more opportunities for more students. Now, a new report from the nonprofit Rural School and Community Trust (RSCT) suggests distance education is at its best when clusters of small schools pool their resources in efforts to bolster staff, procure funding and create more choices for learners.

More than one-fourth of U.S. public school students attend schools in rural areas, and nearly one-fifth – about 8.8 million – attend schools in the smallest communities with fewer than 2,500 residents, according to "Why Rural Matters 2005," the third in a series of recent reports from RSCT confronting the challenges of small-town education.

To overcome these barriers and help rural schools achieve, researchers make several suggestions within the report – one of which is the use of distance education as an instructional equalizer.

"Distance learning is one strategy that has proven to be effective in ensuring that schools and districts are able to provide rich curricula without restructuring and uprooting students and communities," researchers wrote.

But that doesn't mean technology in itself is the answer, cautioned RSCT policy director Marty Strange. When it comes to leveling the playing field in rural America, Strange said, schools also must explore how technology investments can bring a community together to address its needs.

While conducting research for this report, Strange found many rural schools across the country are advocates of distance education. Unfortunately, he said, not all schools are using the technology effectively.

When developing a distance-education program for a rural institution, Strange said, the most successful schools are the ones that work together and combine their resources, expanding course offerings for students and filling gaps in terms of learning resources, personal relationships and staffing needs.

A Spanish teacher in a North Dakota school district, for example, might use distance-education technologies to teach courses to students in three or four surrounding schools via a virtual connection. But even for all the good distance education can do in rural schools, "we don't think it's the silver bullet," cautioned Strange. "Schools need to be real places, not [entirely] virtual places."

Rural School and Community Trust
www.ruraledu.org

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SMART™ Technologies

by Paul Nastu

getting to yes

Good grantsmanship takes planning, perseverance and a strong team effort

Every few months, it seems, some new technology appears that makes teaching, administration or testing easier for schools. Student laptops, VoIP, interoperable systems, interactive whiteboards – I'm sure you have your own wish list of technology you'd like to implement. Finding funding to do it all is practically impossible, but there are ways to make sure you're staking claim to all the funding available to you.

No Child Left Behind (NCLB) and Enhancing Education Through Technology (EETT)

NCLB continues to be a driving force in bringing technology to classrooms. Federal and state accountability requirements make it necessary for schools to test students, and collect and report on the student performance data. But the lack of sufficient budgets makes it difficult for schools to meet the requirements. It's the same story we've been hearing for years, and, thanks to new budget cuts, it's showing less and less likelihood of producing a happy ending.

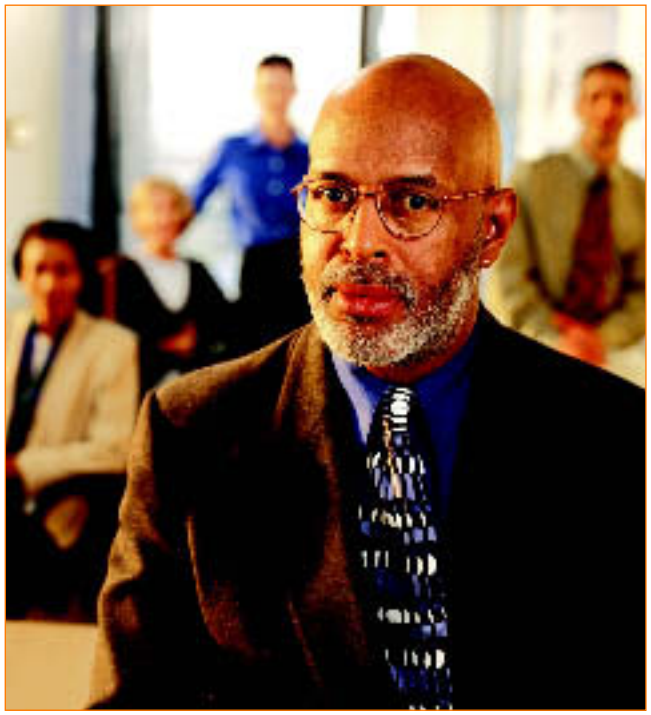
At the forefront of the cuts is the proposed elimination of the $500 million EETT state block-grant program in President Bush's FY2006 Department of Education budget.

"EETT is the only federal grant program that provides K–12 schools with critical technology funding," says Mark Schneiderman, the Software & Information Industry Association's director of education policy. "It gives schools wide latitude to spend funds on eLearning tools and training, but eliminating the program would deprive teachers and students of the learning technologies needed to address NCLB."

What's most alarming is that in several states, EETT is the only program to offer funding for developing the infrastructure and data systems needed to implement NCLB accountability goals. "For 25 percent of states, the federal EETT Grant is the sole source of funding to support technology in schools," says Anita Givens, chair of the board of the state Educational Technology Directors Association.

While funding news has focused on the demise of the EETT block grants, Keith Krueger, CEO of the Consortium for School Networking (CoSN), a national nonprofit organization that focuses on education technology issues, urges schools to keep in mind that many states forward funds a year or more in advance. So it's likely that money will be there for at least two years. Check with your state education technology department to see what's available.

"There are ways to make sure you're staking claim to all the funding available to you."



The National Education Technology Plan urges school districts to put tech-savvy leaders in place at every level.

To increase the likelihood of receiving these funds, work collaboratively with school and district colleagues who fall under Title I or who have students with special needs. If the technology plan adds to the education of such a student need, it has a greater chance of attaining funding. For instance, voice recognition software might be needed for blind students, but it could also be beneficial for ESL students or for kids who learn better by listening. "Think about an enterprise solution rather than solutions for small populations," Krueger says.

How do you find colleagues to work with? Krueger recommends that you think of your technology team as a strategic resource that operates horizontally across a school district. Involve people from all key education and administrative departments.

eRate and Leadership

In addition to EETT, the eRate program continues to be critical for schools that need to invest in technology. The program provides discounts on key technology services for schools. While the neediest schools receive the bulk of the $2.25 billion budget, all schools are eligible to receive some discount and need to make sure they're getting the most they can. The problem, according to Krueger, is that many districts aren't doing all they can.

Digital Leadership Divide, a CoSN survey of key decision makers in K–12 public schools, found that 62 percent of school districts said they have flat or declining technology budgets.

So what are the other 38 percent doing? "The difference between decreasing budgets and those on the increase centered on leadership and vision," Krueger says. Having a strong technology advisory group is absolutely key.

The idea that strong leadership marks the difference between schools that find funding for technology and those that don't was also highlighted in the Department of Education's National Education Technology Plan released earlier this year. The plan finds that leaders at every level – school, district and state – need to provide informed, creative and ultimately transformative leadership for fundamental change. The report urges school districts to invest in leadership development programs to develop a new generation of tech-savvy leaders at every level.

"We are pleased to see the Department of Education's recommendation to strengthen leadership as one of the seven major action steps," says National School Boards Association executive director Anne Bryant. "Without strong district leadership and support from the school board, the technology investments will fail to have the impact necessary to create sustainable, systemic change that improves student achievement."

The report also discusses the importance of integrating technology into everyday learning. While early technology forays centered on shuttling students back and forth between traditional classrooms and technology centers such as computer labs, the new move is toward bringing technology to all aspects of school. The access point for technology use, particularly for older students, is home-focused, not school-focused. That's what needs to change.

Federal Grant Proposals Take Time

Many schools underestimate how arduous the grant process is. "Some schools are unsuccessful because they wait until the last minute to pull proposals together," says Deborah Ward, founder of Lancaster, Pennsylvania-based Ward and Associates, a company that provides a variety of services to help schools acquire and manage grants.

You can avoid this problem by hiring dedicated staff who work only on acquiring grants, but usually only larger districts can afford a grant writer on staff or a federal programs person responsible for grant writing.

What's the result? "Some school districts don't go after federal grants because it takes too long," Ward says. And when you figure that schools can expect to

spend two to three months to put together a federal grant, you begin to understand that, realistically, "federal grant proposals are not something schools can usually fit in during regular hours."

Another consideration is whether or not a school can manage a grant once it's received. "Some people think managing a federal grant is more difficult than getting one," Ward says. "Reporting on grant projects is time-intensive."

Create Relationships within Your Community

Other funding is not as time-intensive as going after federal money. One neglected area tends to be private funds in the community: Who are the top employers? How can you involve them in your technology program? Finding these technology partners takes hands-on research – and a bit of creativity, but can result in big payoffs.

For example, look for grant partners from the chamber of commerce, higher education and museums, to name a few. According to Ward, if the grant you're applying for has a matching fund requirement, you might be able to convince a professor from a nearby college to donate time to a project and then count the salary the professor would earn for that time as a matching fund.

"There are good programs out there like the SMARTer Kids Foundation," Krueger says. "The foundation partners with companies like Intel, and grant recipients get funding and cool technology products." But schools need a plan that outlines how to fund a technology program in its entirety.

Start by examining the Total Cost of Ownership (TCO) of your technology needs. TCO takes into account the ongoing, recurring costs of owning technology and will help you pinpoint your overall funding needs. The CoSN website provides a free TCO tool sponsored by Gartner, one of the leading authorities on business TCO.

Funding in Action

The National Education Technology Plan calls for integrating technology into the classroom. Many schools are turning to laptops to do it. In addition to using federal funds, schools are also looking in more creative directions.

By the winter of 2002, all high school and middle school students and faculty, as well as all elementary faculty, in Henrico County, Virginia, a suburban and rural district with 43,000 students and 3,000 teachers in 64 schools, had laptop computers. How'd they do it?

> "Oregon's Springfield Middle School is participating in a program with Apple that gives students and teachers at the school access to personal laptops."

Also, look for businesses in your community that use the kind of technology you'd like to implement. You can often convince a business to support your project if it will help educate a future generation of employees. Businesses get a big PR bump for helping schools, so if you highlight this factor, the business might just give you the technology you need or assist with staff training.

Strong ties with local businesses are also invaluable. "It's important to make the case to local employers about the need to prepare kids for the workforce of tomorrow," Krueger says. These businesses need skilled workforces and can articulate the need for technology investment to government legislators and representatives.

Private Grants and Understanding Your Needs

While the panoply of small, competitive grants is certainly a great way to get supplemental funds, Krueger says it's important to "move past the bake sale mentality" and create a long-term technology plan.

Henrico County paid for this laptop program by repurposing existing funds, as well as using lease agreements. Currently, 28,000 laptops are deployed in Henrico County, which has $500 less than the state average annual per-pupil expenditure and $611 less than the national average.

In South Carolina's Kershaw County School District, ninth-grade students and all high school teachers will receive laptop computers this year. In four years, all high school students will have a laptop. The computers will be paid for through an $8 million technology lease plan, which includes four overlapping lease agreements. The lease payments will be paid from the general operating budget and built into the regular spending plan during each budget cycle. As each new ninth grade is added, the lease payments will increase up until year four, when the payments will level off and become part of the annual spending plan, funded like utilities.

The Pascack Valley Regional Board of Education in

New Jersey is working with Sony Electronics Inc. in a statewide first to provide all of the district's public high school students and teachers with state-of-the-art notebook computers. Students and teachers from Pascack Valley and Pascack Hills High Schools have received 1,915 Sony VAIO notebook computers – 165 of them going to faculty and the remainder to students – in a lease arrangement that extends through 2008 at a cost of $2.4 million. According to *District Administration* magazine, the majority of 800 leased desktops were returned to help fund the project.

Oregon's Springfield Middle School is participating in a program with Apple that gives students and teachers at the school access to personal laptops. According to the *Springfield News*, the laptop initiative will cost approximately $300,000 annually and the school district has made a four-year commitment to the program. Most of the funding will come through Title I dollars, but lottery, technology and textbook dollars will also go toward the program.

Research and Plan

To be successful, schools need to become proficient at the grantsmanship game. Actively go after grants and make sure you look at copies of funded proposals to see what a winner looks like. The Department of Education makes funded proposals available. For other grants, look at lists of those who received funds, pick up the phone and call the person who prepared it to request to see a copy.

Create a grants calendar that looks one year in advance so you're never caught off guard and so that educators with common needs can collaborate. "The funds are out there and most deadlines remain the same from year to year," Ward says. The Department of Education lists the grant programs that they anticipate in the next 12 months.

Considering how much attention is paid to the dwindling budgets and stretched-to-the-max resources of schools, it's easy to get discouraged about the feasibility of funding new education technology initiatives. But there is money out there. Finding it may take some digging, planning and creativity, but the payoff – helping students learn better – is substantial and well worth the effort.

RESOURCES

Technology Funding Resources

Department of Education
www.ed.gov

NCLB
www.nclb.gov

President's FY2006
Department of Education budget
www.whitehouse.gov/omb/budget/fy2006/education.html

Software & Information
Industry Association
www.siia.net

State Educational Technology
Directors Association
www.setda.org

Consortium for
School Networking
www.cosn.org

State Education
Technology Department
www.ed.gov/about/contacts/state/technology.html

National Education
Technology Plan
http://nationaledtechplan.org/docs_and_pdf/National_Education_Technology_Plan_2004.pdf

National School
Board's Association
www.nsba.org

SMARTer Kids Foundation
www.smarterkids.org

The Department of Education's
12-month list of grant programs
www.ed.gov/fund/grant/find/edlite-forecast.html

eSchool News
Grants & Funding Center
www.eschoolnews.com/erc/funding

School Funding Services
(membership needed)
www.schoolfundingservices.org

eRate Central
www.e-ratecentral.com

The Foundation Center
(subscription service)
www.fdncenter.org

Net Day
www.netday.org/

ED***Compass*** Online Community
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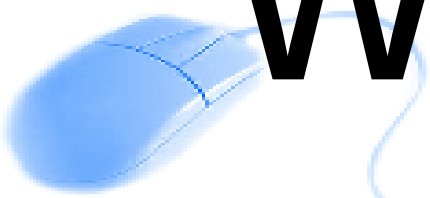
SMART Technologies

by Lee Shenkman

riding the wireless wave



Welcome to the classroom of the future, where the only apple a teacher is likely to see is a Macintosh, where blackboards are now interactive whiteboards and where virtually all the knowledge of the world is only a click away. Welcome to the world of wireless technology, where laptops, combined with networks, connect students to one another, their teachers and the world via the Internet. The technology has the potential to revolutionize the way teachers teach and students learn, but are educators up to learning how to take advantage of it?

Until a few years ago, the most advanced technologies were found in offices and homes. Technology in classrooms lagged, mired in mobility problems. Middle school and high school students moved from subject to subject and from classroom to classroom during the school day. They took notes and did work in class that they had to bring home. A fixed computer installation, whether in a computer lab or in a specialized classroom, could not always respond to the practical needs of students. The situation called for a new approach that would help students keep up with a world that is being rapidly transformed by technology.

At least two private schools have answered the call: Packer Collegiate Institute in Brooklyn, New York, and the Strathcona-Tweedsmuir School in Calgary, Alberta. Each school is small – Strathcona-Tweedsmuir has about 720 students and Packer has about 950 students in grades one through twelve. Both schools undertook bold initiatives that transformed them into networked, wireless, Internet-access zones.

Starting in 2000 for Strathcona-Tweedsmuir and 2001 for Packer, the schools began doing most of their work electronically. Assignments, handouts, work sheets, notes and reference materials are distributed electronically. Students hand much of their homework and papers in digitally by dropping them into folders for teachers to retrieve. The students are connected to one another, enabling them to share files and notes, and to collaborate effectively from different locations. The traditional classroom has become a thing of the past. Learning flows seamlessly from the school out into the student community and then back into the school, often in new and highly original ways, as students interact and collaborate on projects.

Although the two schools have adopted slightly differing approaches to some basic issues – Strathcona-Tweedsmuir, for example, owns the laptops and assigns them to students for the school year; Packer requires that each student buy a computer – the programs have achieved remarkable results. Students and teachers work with technology one-to-one. The

Students at Strathcona-Tweedsmuir in Calgary connect to their work, teachers and peers from anywhere in the school, including the rotunda.

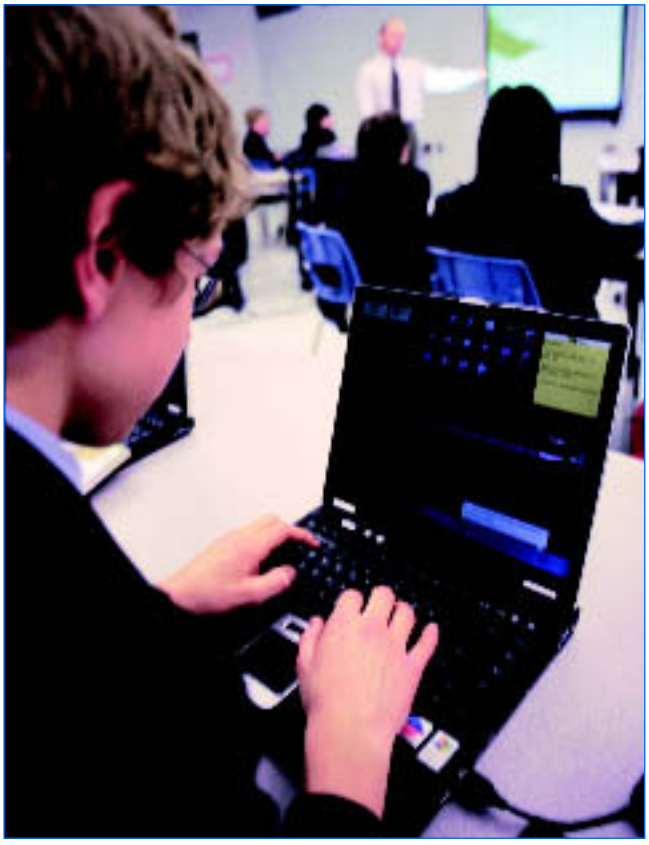
learning process has been radically transformed and instilled with a new dynamism and enthusiasm. Teachers, even ones who were initially leery about the new program, are now ardent supporters. They recognize that they have become more effective teachers. Students say they cannot imagine any better way to learn.

However, technological pioneering is not just for relatively small private schools. The state of Maine has undertaken an ambitious program to join the wireless revolution. In 2001, Maine launched its Learning Technology Initiative. In partnership with Apple Corporation, the state provided Apple iBooks to all 38,000 of the state's seventh and eighth graders and their teachers. The ultimate goal is to expand the program to encompass the other grades.

Clearly, the publicly funded Maine program differs in significant ways from the Strathcona-Tweedsmuir and Packer programs in terms of size, geographic spread, budgetary and support needs, and number of students. At the same time, the results – tremendous enthusiasm from both teachers and students, and a new sense of educational dynamism and constructive interactions – have been equally impressive. In all three programs, the wireless learning environment was a catalyst for deep-seated, transformational change.

Whether in New York, Alberta or Maine, the programs share many elements that have contributed to their success. They can also provide useful guidance for schools thinking of implementing a wireless learning environment. In particular, they all approached the transition to their technological initiatives similarly.

> "The goal is not to install technology in the classroom but to determine what you want to achieve and then obtain the best technology to attain the goal."



Seventh-grade students in Calgary follow a digital lesson while accessing supplementary information on their wireless-enabled laptops.

The starting point, points out Bill Knauer, Packer's director of technology, is recognizing that "it is not about technology but what you do with technology."

That view is shared by Jeff Mao, coordinator of educational technology for Maine's Department of Education. "The goal is not to install technology in the classroom but to determine what you want to achieve and then obtain the best technology to attain the goal."

"Defining 'best practices' was the way we approached it," says Joan Sveen, technology director at Strathcona-Tweedsmuir. "We got the teachers together and identified what worked best pedagogically and then talked about how technology could help us achieve those ideals."

Knauer agrees. "It all comes back to good teaching," he says.

After the goals were defined, then came the technology – hardware and software. Using the power of mass purchasing, Strathcona-Tweedsmuir, Packer and the Maine Department of Education developed relationships with hardware and software manufacturers. This not only helped them obtain good prices but also assured the schools that their students would have exactly the same equipment with identical configurations, as well as the necessary support.

Teacher training is also vital to the success of the project.

According to Sveen, "Professional development is a key component of success. We made certain that we allowed adequate time for the teachers to learn the new technology."

"We wanted the teachers to feel comfortable," notes Knauer. For both Strathcona-Tweedsmuir and Packer, the relatively small sizes of the schools and the near unanimous buy-in on the part of the teaching staffs made the training both welcome and eagerly anticipated.

For Maine, training presented different issues. "Most teachers and school administrations welcomed the upcoming transition," recalls Mao. "However, some teachers felt threatened by the change, and some even thought that the technology introduction was a sign that they were not doing a good job. That wasn't true, but we did have to reassure them that that wasn't the case and the technology could help them."

Yet, initial training is only the start. Ongoing training and updates are essential. And new ideas come from everywhere – from teachers at the school, from other schools, from hardware and software manufacturers, and sometimes even from students.

Equally important to the success of the wireless initiative is the need for quick responses to problems. Strathcona-Tweedsmuir and Packer both have loaner programs to provide substitutes to students whose laptops experience problems. They also have dedicated on-site technical support. Maine offers roving technical support to the school districts around the state. In addition, Apple provides a good deal of technical help.

The results of the thorough planning, training and enthusiasm on the part of the schools and faculties have been remarkable. They have reinvigorated the process of learning. They have remained student-centered. They have opened up new and exciting educational vistas to students and teachers.

Students install a new printer driver while their teacher uses an interactive whiteboard to show them how.

And most noteworthy, they have functioned as living laboratories for the future of education. They have provided models that have not only helped their students and teachers but that can also serve as a roadmap for schools everywhere.

Understanding the language of wireless

access point—Wirelessly networked devices typically connect to a wired LAN through a hardware device called an access point (AP). Multiple APs, set up in various locations around a school building, enable users to roam from room to room while staying connected to the network.

hot spot—In wireless networking, a hot spot is a specific part of an access point's range in which the general public can walk up and use the network. The service might be available only for a fee, and the hot spot's range is usually short to control the physical proximity of the user.

NIC—Network Interface Card. An adapter inside a computer that lets the computer connect to a network via a wired or wireless transmission medium.

throughput—A general term used when defining how much data are moving (and how quickly) over a particular transport medium, such as a wireless network or a phone line.

Wi-Fi—Wireless Fidelity. Wi-Fi originally referred to the 802.11b specification for wireless LANs, but it is now used to describe any of the 802.11 wireless networking specifications.

802.11—A set of standards from the Institute for Electronics and Electrical Engineering (IEEE) for data transmission over wireless LANs, or local-area networks. The specs include 802.11, 802.11a, 802.11b and 802.11g. All of the specifications use the Ethernet protocol.

(Source: CNET's Wireless World, http://wireless.cnet.com)

by Nancy Knowlton

interactive whole-class learning

Getting the most from interactive whiteboards

Nancy Knowlton is the President and co-CEO of SMART Technologies Inc., the company whose name has become synonymous with interactive whiteboards. Ms. Knowlton now travels the world speaking with educators about integrating and using this new technology. We, at the magazine, asked her to provide you with her insights into how educators are adopting and getting the most from their interactive whiteboards. Here's what she had to say.

It has often been said that if someone had fallen asleep 100 years ago and awoke today, the only thing that he or she might recognize is what takes place in a classroom. While this might be true in some locales, a quiet transformation is taking place in hundreds of thousands of classrooms around the world.

Over the last fourteen years, I've had the privilege of working with educators worldwide to introduce interactive whiteboards into classrooms. In fact, when our company brought the world's first interactive whiteboard to market in 1991, high-tech gurus and leading-edge business people were not the first to step forward and champion this new technology. The first were curious educators who believed the technology had the

Get Focused: Motivation and Attendance

Motivation is best described as a student's drive to participate in the learning process. Although students may be equally motivated to perform a task, the sources of their motivation may differ. Some students are intrinsically motivated to learn; others require extrinsic motivation, such as enticements, rewards or educator-defined goals.

Greater classroom enjoyment and motivation can lead to fewer student absences. Interactive whiteboards are captivating enough to successfully compete with a student's favorite consumer technologies (e.g., game devices, cell phones and MP3 players), focusing students on task, garnering enthusiasm and providing additional motivation to attend class.

(Source: education.smarttech.com/research "Interactive Whiteboards and Learning: A Review of Classroom Case Studies and Research Literature," 2004)

potential to transform teaching and learning. Today they clamor for it, and a large body of research supports what they suspected all along: interactive whiteboards can have a positive effect on student achievement.

While I'm glad to say the early years are behind us, what we gained from those years is not. We've learned a lot from both exemplary and weak implementations. Understanding a few key ideas will help ensure you get the most from this exciting tool.

A Whiteboard in Every Classroom

For teachers to commit to technology, it needs to be consistently available. Permanently mounting the interactive whiteboard on the wall ensures that it is there and ready to be used for every class. While it might be tempting to think that education technology can be shared among classrooms, time and again the best implementations around the world point to consistent availability as the single greatest determinant of success.

In a 2002 developmental study conducted by the University of Sheffield's Department of Information Studies, researchers confirmed that teachers needed sufficient access to whiteboards in order to gain confidence and embed their use in their teaching.

Adventuresome Teachers First

When funds are limited and not every teacher can have all of the technology tools, put the products in the hands of teachers who like to experiment and explore. Not only will they delight in the opportunity, but their colleagues will be eager to have the same opportunity when they see the success of the technology adventurers.

While it is often difficult to choose who shall receive interactive whiteboards first, many head teachers and principals have relied on an application process whereby teachers express their plans and intent around the integration of an interactive whiteboard in their everyday teaching.

Interactive whiteboards help teachers and students present Web-based and other multimedia materials more effectively.

Every Subject, Every Grade

According to "Quality at the Dockside" in the *Times Educational Supplement,* January 2003, interactive whiteboards help teachers to present Web-based and other resources more efficiently. As a result, students are able to cope with more complex concepts because of clearer, more efficient and more dynamic instruction. The ability to show visuals along with auditory instruction also helps meet the needs of different learning styles, so literally every subject at every grade level can benefit. Interactive whiteboards provide the focal point for those parts of the class that involve whole-class teaching and learning.

Making the Grade: Review and Retention

A student's ability to retain and recall information relates to student engagement and motivation during the class itself. A student's success is also greatly aided by the availability of accurate notes after class for review.

Interactive whiteboards enable effective student retention and review in the following ways:

- Lessons are more memorable because students are more engaged and motivated. Students are able to focus more on the learning moment rather than on worrying about capturing everything through note-taking.
- Several learning styles are accommodated, improving chances of student retention during class.
- Notes generated on an interactive whiteboard can be printed or e-mailed for distribution after class, ensuring the student has good review material to support retention.

(Source: education.smarttech.com/research "Interactive Whiteboards and Learning: A Review of Classroom Case Studies and Research Literature," 2004)

"Interactive whiteboards provide the focal point for those parts of the class that involve whole-class teaching and learning."

Many educators believe students should spend as much time using interactive whiteboards as teachers.

For Teachers and Students

Interactive whiteboards encourage a very participatory model of instruction. In fact, many educators would argue that students should use the interactive whiteboards more than the teacher, particularly in the lower grade levels.

Supporting that belief, the 2002 University of Sheffield study found that interactive whiteboards provide greater opportunities for participation and collaboration, which in turn developed students' personal and social skills. More varied and dynamic use of resources also led to greater enjoyment of lessons, with associated gains in student (and teacher) motivation.

Just-in-Time Training

Ensuring that teachers know just enough about their new interactive whiteboard when they need to know it can really make a difference. Start with the simplest functions first (the write, save and print features, for example). Then move on to the more elaborate functions available within the whiteboarding software.

Time for Reflection

Teachers learn and grow when they can spend time with their colleagues, sharing their ideas about what works and what doesn't. Where interactive whiteboards have been placed in an entire department or in every classroom, teachers begin naturally to exchange ideas and best practices, which leads to increased skill levels for everyone.

Infrastructure and Content

Having a connection to the Internet in the classroom and digital content for each subject are often-cited basics that make for successful implementation. Whether you

Interactive Whiteboards and Learning

Interactive whiteboards are an effective way to interact with digital content and multimedia in a multi-person learning environment. Learning activities with an interactive whiteboard may include the following:

- Manipulating text and images
- Taking notes in digital ink
- Saving notes for review via e-mail, the Web or print
- Viewing websites as a group
- Demonstrating or using software at the front of a room without being locked behind a computer
- Creating digital lesson activities with templates and images
- Showing and writing notes over educational video clips
- Using presentation tools built into the interactive whiteboard software to enhance learning materials
- Showcasing student presentations

have interactive whiteboards or not, teacher preparation and licensure programs, as well as current pedagogy and legislation, are progressively insisting on technological literacy. That means knowing how to use technology is not enough: you must also have digital materials that work on the technology.

Increased Interaction for Teachers and Students

Letting students participate and use the interactive whiteboard themselves is a great way to get them excited and to feel more in charge of their own learning. Ways to get kids involved include

- Having pupils take charge of getting the interactive whiteboard, projector and computer up and running each morning and shutting them down each evening. It will save teachers time and involve the children.
- Letting pupils navigate websites from the interactive whiteboard. Like driving a car, they'll remember more when they are in control.
- Allowing backseat driving. When other pupils are engaged enough to help, they are switched on to learning.
- Including some students in training on the whiteboard software so they can support the teacher if needed
- Incorporating as many opportunities as possible for students to show what they know through classroom presentations

Change Management

With many children having access to cell phones, iPods, computers, e-mail and Instant Messenger, and seeing the latest special effects in movies, their expectation is that technology is simply part of life. For many teachers this expectation is intimidating when translated to the classroom.

Today, interactive whiteboards are proving to be a comfortable transition from blackboards to the digital age. The mode of teaching is similar. Standing at the front of the class is familiar. The reason is very simple and part of human nature – the change is evolutionary, not revolutionary.

Like no other technology, interactive whiteboards have the power to transform teaching and learning. Guiding pupils to take charge of their own learning through greater in-class participation is just the start. Opening the universe of learning to pupils and making them eager to reach out and grab it are just two benefits of using an interactive whiteboard in a 21st-century classroom.

Research on interactive whiteboards in the classroom can be found at education.smarttech.com/research.

Interactive whiteboards provide a focal point for students and create an environment that more closely resembles their lives outside of school.

Reaching Out: Learning Styles and Special Needs

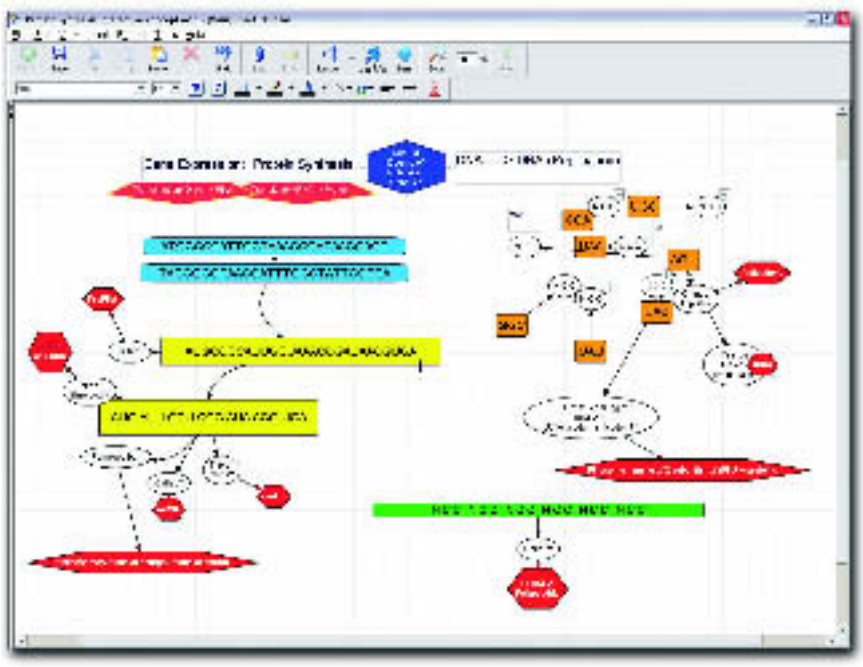
Many learning styles — even the requirements of visual, hearing-impaired and other special-needs students — can be addressed when lesson delivery and learning activities incorporate use of an interactive whiteboard:

- Visual learners benefit from note taking, diagramming and manipulating objects or symbols.
- Kinesthetic or tactile learners, can take part in activities involving touch, movement and space.
- Interactive whiteboards facilitate both the presentation of visual material and the use of sign language simultaneously in front of students.
- Visually impaired students with some vision ability can manipulate objects and use text and participate in computer-based learning in ways that would not be possible on a smaller computer screen.
- Other special-needs students with individual learning requirements ranging from physical ability needs to behavioral issues, such as Attention Deficit Disorder (ADD), also find the large, interactive surface valuable. Its large size and touch sensitivity facilitates ICT learning beyond the standard keyboard-and-mouse type of computer interaction.

by Colleen Seto

Classroom Tested

Tech tools make for stimulating teaching



High school teacher Dawn Norton uses SMART Ideas concept-mapping software to map out protein synthesis and the genetics of cancer.

Dawn Norton teaches eleventh- and twelfth-grade biology at Minnetonka High School in Minnetonka, Minnesota, integrating presentation software, concept-mapping software and online resources into her teaching of protein synthesis and the genetics of cancer. In her lessons, Norton incorporates learning activities into a planning schedule that predominantly follows a tech-based learning format. All portions of her lesson plan include the use of PowerPoint presentation notes and visuals, online tutorials and animations, and SMART Ideas concept-mapping software to demonstrate various concepts.

The initial activities in her lesson plan provide for the instruction of protein synthesis (transcription and translation). For instance, she uses an animation about DNA transcription that walks through the process of DNA transcription to Heteronuclear (preRNA) in a step-by-step format. All of the activities and presentations are done with a SMART Board interactive whiteboard, affording the ability to modify, edit, highlight and save the presentation materials.

Next, she introduces mutations on the interactive whiteboard as they relate to the genetics of cancer. Several short presentations and interactive activity options pertaining to gene mutations are included. With SMART Ideas software, Norton's students can participate in an interactive review of the steps of protein genesis including the "construction" of point and frame-shift mutations.

The final portion focuses on the development of cancer. Here, Norton provides a personal interest activity (*Nova Online*, "The Cancer Warrior") that explores contemporary work and advances in the field of cancer research.

Students are assigned online homework through a free (individualized) homework service provided by the University of Texas. Additionally, students complete review tutorials and practice tests using online text services and resources in the textbook, *Mader: Inquiry Into Life Lab Manual 9e*.

Go to www.edcompass.com/ec/en-US/Good+Practices/Science/Dawn+Norton.htm.

RESOURCES

Dawn's software recommendations

- SMART Notebook software
- SMART Ideas concept-mapping software
- PowerPoint presentation graphics program
- Macromedia Flash player
- Adobe Reader
- Real Player
- QuickTime player

Dawn's complete lesson outline

www.edcompass.com/ec/en-US/Good+Practices/Science/Dawn+Norton.htm

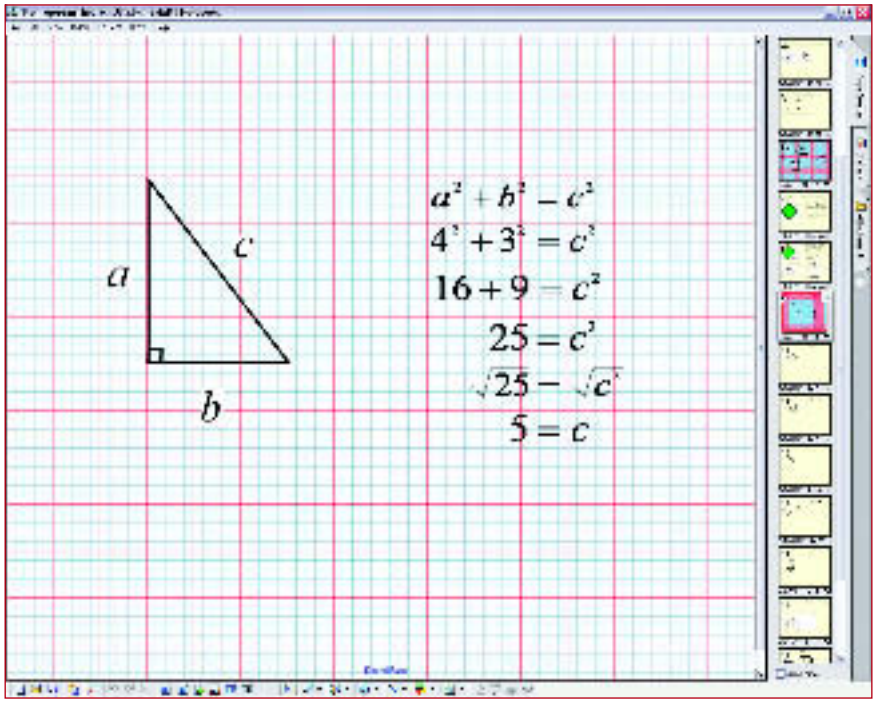
SMART Ideas software lesson activities

www.edcompass.com

by Colleen Seto

SMART Board Software 9.0

New version chock full of friendly features



SMART Board software 9.0 gives you more space, a movable toolbar, the ability to open Flash files from within the whiteboarding application and a wireless option that makes it easy to share any student's desktop with the entire class.

What's new with SMART Board Software 9.0 for Windows? Plenty. The first difference you'll notice is the flexible, easy-to-use interface with drop-down menus, a tab view and more space to write. There's also more room for your annotations, images, Flash files and other files. A simplified, movable toolbar makes it easier for all students to access and use the interface because the toolbar can be placed on the side, at the top or the bottom of the screen, depending on a student's size and need.

Version 9.0 is also all about creating a seamless experience. This version integrates more content, new kinds of content and new tools to manage content, including the option to open and save Flash files within Notebook™ software, SMART Board software's whiteboarding application. This innovation eliminates the need to leave the whiteboarding application to access an increasing variety of educational Flash content and makes it possible to save Flash files for easy access within the application's library of education-related materials. Version 9.0 resulted from extensive customer input and beta testing.

Thousands of free images, backgrounds and Flash interactivities in the Gallery feature make customizing and managing lesson content easier. You can, for instance, add your own image files from other applications; you aren't restricted to using only the images included with the software. New drawing tools, connectors, dotted lines and creative pen styles all add to the creative experience students can have with this version.

A significant new feature within version 9.0 is LinQ™ (pronounced "Link") software, which connects any networked computer, such as a wireless laptop, to a SMART Board interactive whiteboard, making it easy to share any student's desktop with the entire class. LinQ software helps educators create a truly collaborative learning environment using existing PCs in the classroom.

Other features include new drawing, highlighting and text-formatting tools. And no more late nights at school trying to finish your lessons for the next day. Version 9.0 provides take-home privileges, enabling all teachers and students to work on and view SMART Board software files outside the classroom.

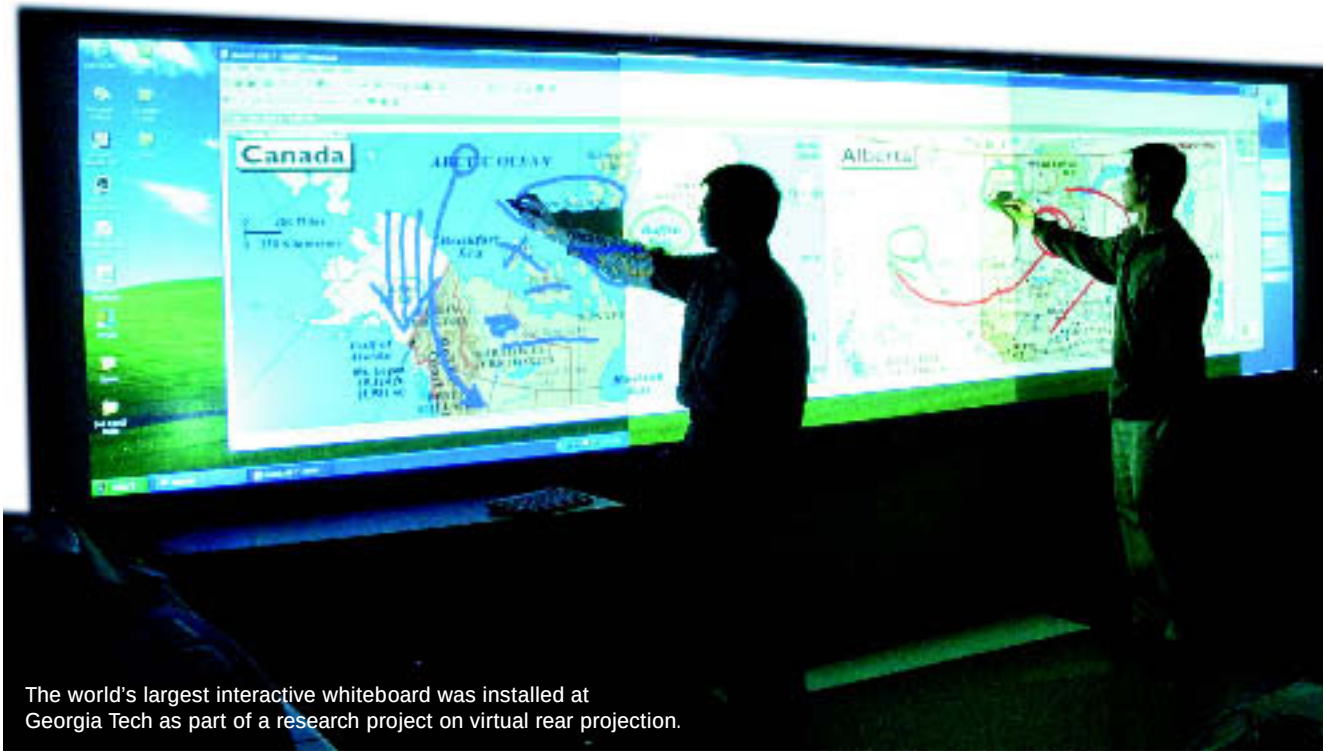
"We've been receiving rave reviews from our customers," says Nancy Knowlton, co-CEO of SMART Technologies Inc. "When we demonstrate the new Flash object capabilities in Notebook software, teachers' responses are nothing but positive. The wealth of new teaching resources embedded within Notebook software (and to be regularly available from our website), means that teachers can be more productive and effective in the classroom."

For full details or free download, visit www.smarttech.com/support/software.

by Niel Beckie and Jennifer Hamilton

The Future of Touch

DViT technology makes interactive whiteboards "see"



The world's largest interactive whiteboard was installed at Georgia Tech as part of a research project on virtual rear projection.

Most of us can recall classroom exercises that had multiple students collaborating on a wall-sized chalkboard to solve problems, explore topics and brainstorm ideas. The goal was, and still is, active exploration, construction and learning rather than passive lecture attendance and textbook reading. The rationale is that students learn best when engrossed in the topic, motivated to seek out new knowledge and skills because they need them in order to solve the problem at hand.

The idea isn't new, but the tools that enable teachers to guide such learning have certainly come a long way. Nowadays, interactive whiteboards make it possible for teachers and students to collaborate like they used to on chalkboards, but with interactivity and multimedia tools making the learning process much more constructive, dynamic and exciting. With abundant research supporting the positive effects of interactive whiteboard use on student achievement, schools have been enthusiastically adopting this technology.

At the forefront of this new learning and technology model is SMART Technologies Inc., the company that introduced the world's first interactive whiteboard in 1991. For almost fifteen years, it has been working closely with educators to develop and refine a technology that is fundamentally changing the way learning occurs in the classroom.

For a behind-the-scenes peek at one way the company works with educators to lead the way with interactive technologies, all you have to do is watch them at work with researchers at the Georgia Institute of Technology (Georgia Tech).

Last year, SMART custom designed and installed the world's largest interactive whiteboard at Georgia Tech. The interactive whiteboard is more than 17' (5.2 m) wide and almost 5' (1.5 m) high. It incorporates DViT™ (digital vision touch) technology, a proprietary camera-based touch technology, which is not an easy feat – producing large interactive displays is relatively expensive and poses considerable technical challenges. And it's a product that's a

long way from commercial availability. But SMART is committed to its development.

With DViT technology, digital cameras are mounted in the corners of the display to activate the surface for touch interaction. The cameras constantly scan the surface to detect a target object. When an object is detected, each camera identifies and calculates the angle of its position relative to a coordinate system. Algorithms automatically record the distance between cameras and their viewing angles relative to each other. With this information, the technology can triangulate the location of the contact point with high accuracy and speed.

The Georgia Tech installation demonstrated the potential of this new technology. But further development was required. In early implementations, SMART found that changing lighting conditions, such as a sunlit room suddenly darkened by a passing cloud, could interfere with touch accuracy. Lighting the display area by mounting a ring of infrared illuminators in the bezel solved the problem.

As commercial touch displays increase in size, even to the size of the one at Georgia Tech, several users at once will be able to interact with the display at the same time. Students could conveniently collaborate on a project, for instance, or game players could challenge each other by interacting with the display simultaneously. The tracking and processing of inputs from multiple users are features that DViT technology can implement efficiently because the data of two simultaneous pointers can be processed from a single camera image.

At SMART, DViT technology and multiple-user input have been implemented in the SMART Board 2000i interactive whiteboard, a rear-projection system that permanently mounts the projector in a casing at the back of the display.

SMART takes its responsibility for continuing to lead advances in touch technology seriously. It works closely with educators and educational institutions around the world to ensure that touch technology makes learning and collaborating more meaningful for increasingly diverse groups of students who learn better in environments that account for multiple learning styles.

RESOURCES

Twelve more 'must-have' technologies for schools

DViT technology isn't the only new technology making a splash in education today. Datacasting, radio frequency identification (RFID) chips, student web logs (blogs) and intelligent essay graders are among a dozen technologies likely to emerge as must-have solutions in the nation's schools, according to a recent report by the Washington, D.C.-based Consortium for School Networking (CoSN).

The third in a series of CoSN-sponsored reports dedicated to emerging technologies, "Hot Technologies for K–12 Schools" examines the usefulness of such heretofore little-known technologies in schools and begins to explore how such innovations might be used to transform learning in the 21st century.

"Most schools embracing technology today have primarily focused on its deployment for administrative purposes or for the back office," said Keith Krueger, CoSN's chief executive officer, in a statement. "Our hope is that this guide will provide technology leaders with a strategic understanding of technologies that can truly transform their schools over the next three to five years."

On the instructional front, one technology that is just beginning to crop up in schools is datacasting. A descendant of streaming video, which enables students to view snippets of teacher-selected educational videos from their desktops, datacasting provides similar capabilities, but with higher-quality results, says Gene Broderson, director of education for the nonprofit Corporation for Public Broadcasting.

Also highlighted in the report: a concept known as RFID. Darrell Walery, director of technology for Consolidated High School District 230 in Orland Park, Illinois, projects the use of RFID chips — tiny microprocessors capable of holding and storing all types of student information, from lunch accounts to daily student schedules — eventually will help administrators keep better attendance records and more accurately track inventory of library books and supplies.

Walery reports that the attendance-taking capabilities of RFID chips alone have saved some early adopters up to 90 hours of instructional time per day district-wide.

Other technologies covered in the report include highly portable large storage devices; digital assessments; sound-field amplification; multisensory, customized learning tools; and advanced learning management systems.

Consortium for School Networking
www.cosn.org

by Colleen Seto

The New Math

New tools help solve old problems in teaching and learning

Tony Trongone is the district-wide math facilitator for the Gloucester City Schools in New Jersey, and a secondary math teacher for Northern Burlington High School. He is actively involved in developing the New Jersey Department of Education's Collaborative Assessment for Planning Achievement (CAPA) process and works to help improve student outcomes in math. In this inaugural edition of a teacher's perspective about technology, we asked Trongone how technology helps facilitate effective teaching and learning.

Using technology to add visual prompts to math lessons keeps students guided, engaged and on task.

Q: What types of technology does your school have?

A: Our resources include such tools as Geometer's Sketchpad, TI Interactive!, TI-Presenter, TI-Navigator, SMART Board interactive whiteboards and SMART software. Each school has at least one wireless lab. All our staff share information on a common server. Lessons, curriculum, pacing and interactive manipulatives are accessible so teachers can retrieve whatever they want, whenever they want.

Q: How is the technology used in your schools?

A: As far as integrating technology into math lessons, we use the graphing calculator intensively. When I was a student, there was significant downtime spent constructing graphs and plotting points, learning to draw straight lines rather than focusing on more high-level skills like slope, y-intercept, linear regression, maximum or minimum points. Now, when I instruct a math class, I can eliminate that downtime by graphing electronically using math software to demonstrate to students symbolic equations. Graphs can also be changed to other formats such as a table or text if students can grasp them better in those layouts.

Q: What effect has the technology had on your students?

A: I remember when I was a student, many times I was lost during a lesson. I needed a visual to know what the teacher was referring to – what does an aardvark look like or what is a transformation? Now, as a teacher, with the help of SMART Board interactive whiteboards, we can provide those visual prompts. When you have that visual, it keeps the student abreast of what is going on. It keeps them guided, engaged and on task. With just auditory mode, if the teacher says something and a student doesn't hear what's said, it's gone. More often than not, the conduit of reaching mathematical understanding between teachers and students was auditory. Now, math teachers use technology and digital resources such as manipulatives to provide learners with a strong kinesthetic medium as well as visual representation.

Q: What advice would you offer to other educators using technology in the classroom?

A: I would say to collaborate with other educators and talk about what works and what doesn't. Our teachers meet once a month to share our experiences.

AFtErSCHOOLSCENE.COM

AFTERSCHOOL PROGRAMS ARE A WAY BETTER PLACE

Readers' Choice Award

Best interactive whiteboard system for education

As technology becomes ever more engrained into the fabric of daily learning, few tools are as important as the ones educators rely on in their classrooms to present concepts to their students. From interactive whiteboards equipped with cutting-edge handwriting recognition software to portable projectors that can be tucked under your arm and carried from class to class, or larger devices that can be mounted to the ceiling or pushed around on a cart, today's tech-savvy teachers have at their disposal a dizzying array of innovative solutions for capturing their students' attention – and keeping it.

In February, *eSchool News Online* asked its readers to vote for what they consider the best presentation solutions for education. In their most popular Readers' Choice Awards program ever, nearly 1,000 educators responded to the online survey. Below, you'll find what *eSchool News* readers think are the best and most popular interactive whiteboard systems being used in classrooms today, as well as a brief analysis of the findings and some feedback from readers.

Though many educators who responded to the online survey voiced a strong commitment to a single brand or manufacturer, others admitted they knew very little about the vast array of options on the market today. For the most part, educators said, they use whatever technology is purchased by the district – no questions asked. If that's truly the case, there's a good chance your school might not be getting the most out of its investment. Take some time to read what products are having the greatest impact in schools, and use the information below to help make the right choice for your students. With any luck, you might help your school or district get a little more bang for its buck.

Best Interactive Whiteboard System for Education

Maybe it's because, as the original electronic whiteboard for education, the SMART Board interactive whiteboard from Canadian company SMART Technologies Inc. has become synonymous with this product category. Or maybe it's because the SMART Board interactive whiteboard really is considered superior to the competition. Whatever the case, SMART was a runaway winner in this category, securing more than three-fourths (75.8 percent) of the vote.

"I absolutely love it," wrote one educator. "The SMART Board interactive whiteboard enhances all of my lessons and my students' presentations."

Another wrote, "It's been the best thing that's ever happened to my kids."

So what makes the SMART Board interactive whiteboard such a hot commodity in schools? According to our readers, the technology is readily available through a wide range of educational grants, not to mention compatible with a variety of interactive software programs designed to enhance student participation.

"It's great for integrating technology into the curriculum," wrote one satisfied customer. Another praised the SMART Board interactive whiteboard for its touch-screen functionality, calling it "fun" and "easy to use in the classroom."

The SMART Board interactive whiteboard is SMART's most popular option for educators.

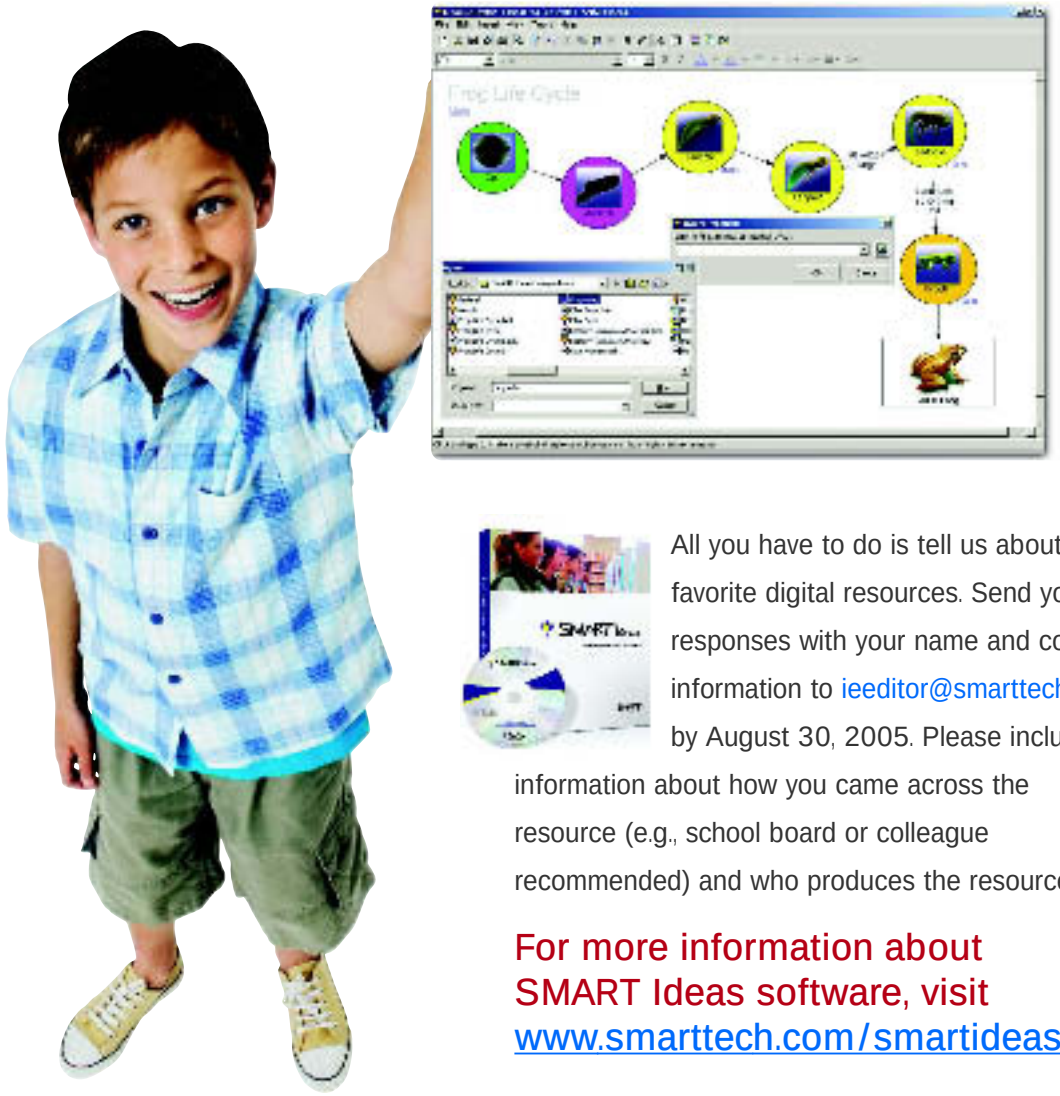
Despite a distant second-place finish, Promethean's ActivBOARD also received a fair share of accolades from voters.

"ActivBOARD was created for the educational environment," wrote one survey respondent, who said its usefulness in the classroom is evident to even the most casual of observers. Its "integration is seamless," another reader wrote.

Also receiving votes in this category: Mimio Corp.'s MimioBoard and Xi (2.3 percent), which was praised by one voter for its "portability and flexibility"; Numonics Corp.'s DPA and IPM systems (1.1 percent); and PolyVision's Walk-and-Talk product (also 1.1 percent).

Adapted, with permission, from the March 2005 issue of eSchool News

Win a copy of SMART Ideas™ concept-mapping software!



All you have to do is tell us about your favorite digital resources. Send your responses with your name and contact information to ieeditor@smarttech.com by August 30, 2005. Please include information about how you came across the resource (e.g., school board or colleague recommended) and who produces the resource.

For more information about SMART Ideas software, visit www.smarttech.com/smartideas

Five lucky entrants will receive their own copy of SMART Ideas software.

In 250 words or less, describe your favorite website, CD-ROM, software or other digital resource, and explain why you like it. Does it provide you with the latest information about education technology? Does it model best practices? Does it enhance your teaching so you can be more effective in the classroom? What do your students say about it?

Send your favorites to ieeditor@smarttech.com by August 30, 2005. One entry per person please.

About SMART Ideas software

SMART Ideas software helps students brainstorm, think visually and turn ideas into colorful, easy-to-understand concept maps. Students can explore a topic by adding multiple levels to a map and selecting images to illustrate them.

by Colleen Seto

Tools for Schools

Digital resources for the interactive classroom

Classrooms Go to the Movies

BrainPOP offers a wealth of online, animated movie resources in math, science, English, social studies and more. It uses animation to explain concepts in ways that kids can understand and will want to watch. BrainPOP, a subscription-based website, is the leading producer of standards-based, animated, educational movies for grades K–8. The visual appeal of movies played at full screen on an interactive whiteboard will be sure to grab the attention of your students. Each movie is accompanied by a 10-question interactive quiz, perfect for encouraging students to take turns answering. Plus, an experiment, comic strip, timeline and printable activity page are included. You can also access lesson plans and standards correlations for every movie.

Go to www.brainpop.com

Where in the World?

Smudge Discovers the World software helps students in grades two to five identify major geographical features by placing the names of countries, cities, rivers, mountains and seas on the correct parts of a map, and learn about the effects of weather by dressing Smudge, a cute cartoon dog, for different types of weather. Using the software on an interactive whiteboard lets students explore digital maps in a large format and work with them hands-on. They can design maps by dragging and dropping map symbols, choosing line styles and drawing with their fingers or filling in maps with various colors. They can even move Smudge using coordinates on a grid or working with compass directions.

Go to www.toolfactory.com

The Big Picture

You've likely used reference software on your computer before, but have you thought about using it on your interactive whiteboard? Microsoft Encarta Reference Library Premium 2005, the top-selling digital encyclopedia, is a comprehensive learning resource that's a great starting point for students performing information searches. Displayed on a large, interactive screen, the material is that much more compelling. Students can use it to search the Internet safely and effectively as well as access more than 63,000 articles. Topics can be vividly demonstrated through 3-D virtual tours that students can navigate with their fingers. A wealth of animation, audio and Discovery Channel video clips is also available. Such dynamic multimedia content will help increase student interest and aid learning retention.

Go to www.microsoft.com/products/encarta

Online Library

Web resources for the interactive educator

Science

TryScience
www.tryscience.org/
Discover a wide variety of experiments, most of which use animation for explanation.
Ages 5–11

Achaeology.info
www.archaeologyinfo.com/index.html
Take a journey back in time and learn about our hominid ancestors.
Ages 11–18+

Magnet Man – Cool Experiments with Magnets
www.my.execpc.com/~rhoadley/magindex.htm
Focus on magnetism and try out the many experiments.
Ages 5–17

Pieces of Science
www.sln.org/pieces
Check out this online gallery of 16 educational resources related to a collection of historical science objects. Interactive activities and curriculum resources are included.
Ages 5–17

PBS – A Science Odyssey
www.pbs.org/wgbh/aso
Try out their interactive activities, science and social studies resources, educational videos and much more.
Ages 5–11

Language Arts

Candlelight Stories
www.candlelightstories.com/kidsMemA.asp
Practice spelling with games, listen to stories with audio playback and experience much more on this kid-friendly site.
Ages 5–11

Language Arts con't...

Gameaqaurium.com
www.gamaquarium.com/index.htm
This fun, interactive Website has a unique underwater theme. Learning activities are categorized according to age and cover a variety of subjects including music, science and social studies. There are also 20 student-created games and brainteasers to choose from.
Ages 5–12

Dositey.com
www.dositey.com/index.html
Enjoy free interactive lessons, exercises and worksheets, educational games, open-ended questions in math and language arts, and more.
All ages

Math

Learning to Use Money
www.arcytech.org/java/money
Learn the value of each coin and bill and how you can combine them in different ways.
Ages 7–10

Project Interactivate–Shodor Education Foundation Inc.
www.shodor.org/interactivate/index.html
Access more than 100 Java-based interactive activities, exploring many areas of mathematics. Activities can also be used to view and analyze data for scientific applications.
Ages 9–14

MathMastery.com
www.mathmastery.com/index.cfm?CFID=655083&CFTOKEN=68667074
Learn fractions, decimals, tables, graphs and statistics with MathMastery's award-winning subscription website.
Ages 9–14

Clip Art

Teachnet.com
www.teachnet.com/how-to/clipart/
Explore several categories of clip art, including animals, food, holidays, school mascots and recreation.

Cross-Curricular

Virtual Field Trips
www.uen.org/utahlink/tours
Take a virtual field trip and visit fun and interesting places, or create your own virtual field trip with the provided tool kit.
Ages 5–17

Professional Development

Intel.com's Teach to the Future
www.intel.com/education/sections/section2/
Find out how Intel is helping teachers enhance student learning. Participating teachers receive extensive training and resources to promote effective technology use in the classroom.

North Central Regional Educational Laboratory
www.ncrel.org/sdrs/areas/issues/educatrs/profdevl/pd300.htm
Delve into the issue of teachers finding time for professional development. This Website gives an in-depth overview of the issues, goals, action options and other resources available to educators.

International Society for Technology in Education
www.iste.org/profdev/
Read about high-quality professional development and organizational development services that seek to improve teaching and learning in K–12 education and higher education.

EDUCATION BY THE NUMBERS

by Colleen Seto

Percentage of U.S. schools with Internet access in 2002: 99

Percentage of U.S. schools with Internet access in 1994: 35

Ratio of students to computers with Internet access in U.S. public schools in 2003: 4.4 to 1

Ratio of students to computers with Internet access in U.S. public schools in 1998: 12.1 to 1

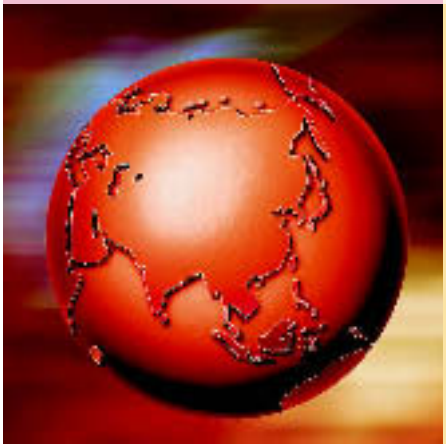
Percentage of U.S. public schools using wireless Internet connections in 2003: 32

Percentage of U.S. public schools using wireless Internet connections in 2002: 23

Percentage of U.S. public schools offering teachers professional development programs to integrate use of the Internet into curriculums in the past year: 82

Percentage of U.S. public schools that provided hand-held computers to students or teachers for instructional purposes in 2003: 10

Percentage of U.S. public schools with access to the Internet that had a website in 2003: 88



Percentage of U.S. public expenditure on education: 5.6 percent of the GDP and 17.1 percent of the total government expenditure

Percentage of China's public expenditure on education: 2.1 percent of the GDP and 13 percent of the total government expenditure

Percentage of Ethiopia's public expenditure on education: 4.8 percent of the GDP and 13.8 percent of the total government expenditure

(Sources: Internet Access in U.S. Public Schools and Classrooms: 1994–2003 by the National Center for Education Statistics (NCES) and UNESCO Institute for Statistics, 2000/01 assessment)

Get the easily digestible cure for technology headaches

Tight budgets and a confusing array of options can make choosing the right mix of technologies for the classroom time consuming and stressful. *i.e.* magazine is here to help by providing reliable information on a range of issues – from assessment and funding through to implementation, support and training. And it does so with understandable articles from credible experts and leading thinkers in the field.

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Yes ☐ No ☐

SMART Technologies

Thanks

Thanks a bunch!

Thanks!

Merci!

Thank you!

Thanks

Gracias

Thanks so much!

Thank you!

Thanks

THANK YOU

Thankseversol

Thanx.

Thanks

THANX

DANKE

धन्यवाद

Thank you!

thanks

Thank You

Gracias

Thank you

Merci

THANK YOU

Thankyou!

Vielen Dank!

Thank You

From all of us at SMART, many thanks. Nearly 1,000 readers responded to a recent *eSchool News* Online technology survey, and more than three-quarters of them chose our product as the Best Interactive Whiteboard. The support of educators like you has helped put SMART Board™ interactive whiteboards in more than 150,000 classrooms across North America and in 75 countries around the world.

education.smarttech.com

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