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Laptop Learning

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Technological Evolution
Tips from technology trailblazers

Tech Trends –
Chris Dede
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education.smarttech.com

In the early 1980s, Thomas J. Peters and Robert H. Waterman Jr. popularized the term *best practices* in their book *In Search of Excellence: Lessons from America's Best-Run Companies*. Examining 43 successful corporations, Peters and Waterman identified several basic characteristics of success that each of the companies shared, and the book became an overnight sensation.

Here at SMART, we promote best practices and are fortunate to have Nancy Knowlton, one of the world's leading experts on technology integration, as our president and co-CEO. Every year, she travels extensively, speaking with thousands of educators about implementing and integrating collaborative learning technologies, including the SMART Board interactive whiteboard.

She's met with Local Authorities in the UK about technology adoption in education, spoken with the Mexican government's Secretariat of Public Education on a countrywide adoption of interactive whiteboards and guided individual teachers through the entire purchasing process. She's been in demand in places as far from home (in Calgary, Alberta, Canada) as Mumbai, Hong Kong, Milan, Sydney and Paris – not to mention back and forth across the United States and Canada.

Through it all, she has examined what makes integrating technology in education easier or harder, and she's identified a number of best practices, and some of these are covered in this spring 2006 issue of *i.e.* magazine, including strong leadership and a clear vision about the role of technology in education.

In this issue you'll find stories of educators who stand as shining examples of how to introduce and implement technology successfully. You'll read about Toni Heinowski and Rachel Yurk, who took on the challenge of becoming teacher-trainers – with not much technology experience (Real Teachers, Best Practices, p. 24). You'll learn how a technology straggler became a technology leader (Initiating a Technological Evolution, p. 30) and how the Floydada Independent School District is introducing one-to-one learning (Laptop Learning, p. 34). You'll find out, too, how schools that don't qualify for grants are fundraising for technology (Foundations for Fundraising, p. 12).

We hope that through our celebration of successful educators and initiatives, you may identify the traits that they have in common and incorporate them into your implementation plans. Or perhaps you'll simply be inspired to celebrate your own best practices and praise deserving colleagues for theirs. Either way, the celebration's afoot.

Sincerely,

Carolyn Dearden
Editor-in-Chief

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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*. She has also written for *Today's Parent*, *Canadian Family*, *Canadian Geographic* and *ON Nature*. As the mother of two young boys, Sharon is intrigued by technology's potential in the classroom.

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Wesley Fryer is an educator, author, digital storyteller, technology integration pioneer, husband and father. He is a national and international presenter and speaker, addressing a range of topics related to education, technology integration, distance learning and 21st-century literacy.

Lee Shenkman has more than 25 years of writing and publishing experience. A managing editor for college, school and trade publishers in the United States 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.

DON'T TRY THIS AT HOME

AFTERSCHOOLSCENE.COM
AFTERSCHOOL PROGRAMS ARE A WAY BETTER PLACE

Tech helps ratchet up math instruction

– With President Bush making math and science instruction a point of emphasis in his State of the Union address in January and Education Secretary Margaret Spellings calling on schools to "raise the bar" on math instruction, K–12 institutions are looking for ways to help students understand – and even appreciate – tough math concepts.

And it's technology, not textbooks, many experts say, that will make much of this transformation possible – along with a shift in teaching strategies and an emphasis on professional development.

"Used well, technology can open the door to mathematics for more students than it ever has in the past," said Cathy Seeley, president of the National Council of Teachers of Mathematics (NCTM).

For example, NCTM recently teamed up with executives at Texas Instruments (TI) and producers for the hit CBS television drama NUMB3RS to launch a new classroom website based on topics discussed during the show, which features a mathematician who employs complex theories to help the FBI solve crimes.

The idea, according to TI's Linda Beheler, is to take what students often see as abstract mathematical concepts and make them more relevant to their daily lives. The TV show, she said, serves as an example of how math is used every day to solve real-world problems.

Mathematicians and educators are working with the show's writers and producers to develop lesson plans and activities centered on the different mathematical concepts encountered during each episode. Before each episode airs, teachers and students can go the NUMB3RS website and download the correspon-
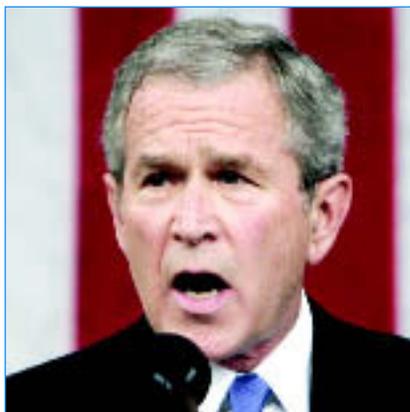

PHOTO COURTESY OF THE ASSOCIATED PRESS

ding activities, giving them an opportunity to play along with investigators as the characters try each week to solve a new crime.

National Council of Teachers of Mathematics
www.nctm.org

NUMB3RS educational website
www.cbs.com/primetime/
numb3rs/ti/activities.shtml

Survey: Students want interactive environments

New research on truancy in UK schools reveals that absenteeism is bred by lessons that don't engage students. The survey, "Truancy in the UK," was commissioned by SMART Technologies Inc. in response to recent government measures to tackle truancy.

The survey found that one in five secondary school students confessed to playing truant, and a quarter of female pupils admitted to having skipped school at some time. The survey also found that more than one in five students had missed classes without their parents' knowledge. Of these students, 52 percent said they played truant because they didn't like a particular subject or lesson. Seventy percent of parents cited uninteresting lessons as a main cause for students absenteeism.

Of the 914 school children (ages 11–16) who were polled, 66 percent

called for the introduction of a more interactive learning environment, and 64 percent believed that an interactive whiteboard is the best teaching method. Research studies conducted in many countries, including the UK, have found SMART Board interactive whiteboards boost student engagement and motivation and improve learning outcomes.

"This latest research identifies that one of the first stages of addressing truancy issues is understanding how to engage children in the classroom better," says Nancy Knowlton, SMART's president and co-CEO. "SMART has always sought input from teachers to build the right solutions for their classrooms. This research has given us the opportunity to understand the students' viewpoint and assists us in further developing suitable classroom solutions."

SMART Technologies Inc.
www.smartboard.co.uk/company/media
center/press/releases/feb7_06.asp

Missouri launches IPTV for schools

– Looking to take the use of video in the classroom and the community to new heights, a group of forward-thinking educators in Missouri is launching a new Internet-based television network – one that might transform how education and training is delivered in schools throughout the state, and beyond.

Imagine being a high school football coach and having the capacity to screen the last 10 years of game films simply by logging on to the Internet; or a rural high school student who, thanks to a unique television program, now can enroll in classes previously unavailable at his or her school. How about a teacher looking for instructional videos to supplement a difficult biology or history lesson or a school administrator attempting to wedge important

continuing education courses into an already bloated schedule?

These are just some of the benefits the Missouri School Boards Association (MSBA) says will be possible through its latest foray into the evolving world of online video instruction, or Internet Protocol Television (IPTV).

The ambitious project was scheduled to kick off March 3 with a live broadcast from the Wonders of Wildlife Museum and Zooquarium in Springfield, Missouri. It aims to marry all of the benefits of streaming video with the ubiquity of the Internet, providing a completely interactive learning experience.

"When we integrate video material into core lessons . . . learning takes on a new dimension," said Carter Ward, MSBA's executive director.

Given the technical acumen of most modern students, Ward said, the content available through the Education Solutions Global Network (ESGN) will represent "a very strong alternative" for technology-literate learners to receive "educational material and entertainment" 24 hours a day, 7 days a week.

ESGN
www.esgn.tv

■ Technology strikes a chord in music education

From elementary schools to Boston's Berklee College of Music, a revolution is quietly taking place in music education. With the help of electronic music software, students who don't even play an instrument now can compose songs or even an entire symphony – and learn more about music theory in the process than ever before possible.

Electronic music software allows teachers to take music education to a whole new level of interactivity. Using programs such as GarageBand, which comes pre-installed on all Apple computers, and Reason, by the Swedish software company Propellerhead, students at all levels of instruction are laying down tracks that can be turned into full-fledged musical productions in just a few hours.

Today's music software gives users access to thousands of prerecorded loops of various instruments and sounds, which can be manipulated and arranged into electronic music creations of all types and genres.

"It's incredibly empowering to children, because they can express themselves in ways that you or I weren't able to traditionally," said director of marketing, Lee Whitmore, for Sound-Tree Inc., which sells and installs learning systems for music education that integrate electronic music instruments, computers and software.

These tools have transformed music education classes by individualizing instruction to a great degree, Whitmore said. The labs SoundTree typically installs have multiple stations where students work on computers with headsets, aided by music software.

"Instead of just giving lectures, teachers can teach a concept and students can illustrate that concept with their own stuff. The minute [students] put their headphones on, they're working at their own pace," Whitmore said. That's music to their ears.

SoundTree Inc.
www.soundtree.com

■ Tech helps special needs children pass key tests

Whether, how and how much educators should deploy technology to help special needs students on high-stakes tests are complex issues in the era of No Child Left Behind (NCLB). As mandated by federal law, teachers and administrators around the nation must strive to make sure special needs kids meet the same high standards as their peers.

That struggle was underscored in July, when the U.S. General Accounting Office (GAO) released a report highlighting the difficulties inherent in giving achievement tests to special needs learners. To achieve NCLB's goal of testing every child, researchers concluded the Education Department must do a better job of providing guidance for alternative forms of testing.

While state and federal officials continue to debate the percentage of disabled students who should be exempt from mandatory achievement tests, others question whether metrics designed to assess standard learners can accurately reflect the progress of special needs students. It's a difficult problem . . . and one Judy Brady, an administrator for assistive technology at the Anne Arundel County Schools in Maryland, says can be solved – at least, in part – with a single word: technology.

With grant money from the Maryland Department of Education, Brady has set out to determine whether certain assistive technologies – such as text-to-speech software or programs that can enlarge the font size – can do a better job of boosting student comprehension and test results.

Learning disabled (LD) students might not process the information until they hear it repeated a second or third time, Brady explained. If they're reading it, they might not get it at all. And that's where the technology comes into play.

So far, the results are encouraging. Brady is now lobbying state education officials to allow the use of text-to-speech software for LD students taking the Maryland State Assessment.

General Accounting Office
www.gao.gov

Anne Arundel County Public Schools
www.aacps.org

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Easy for teachers to use, SMART Board interactive whiteboards are also designed with kids in mind. Toolbars can be moved to the bottom of the screen, so smaller children and children with special needs can be accommodated. Every day, in more than 250,000 classrooms around the globe, teachers use SMART Board interactive whiteboards to help kids touch their world.

www.smarttech.com

SMART
Technologies

by Deena Cox

Teaching Teachers

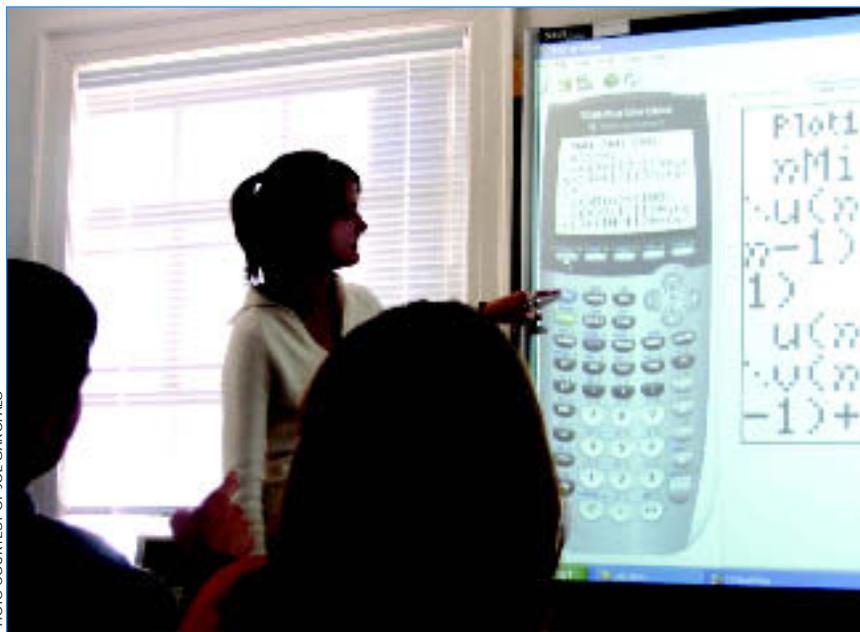## Researchers from the U.S. and UK say ICT training is critical

Researchers say training teachers on the use of interactive whiteboards is the key to successfully implementing this technology.

As the body of research into the use of interactive whiteboards in the classroom continues to grow internationally, the importance of training teachers on the technology is frequently emphasized as central to successfully implementing this tool.

Researchers at the University of Virginia and Keele University in the UK are looking into the effect interactive whiteboard training has on teachers. Both have found that equipping teachers with advanced information and communications technology (ICT) skills not only benefits student learning – it streamlines teacher preparation and efficiency.

Pushing through the last mile

Dr. Joe Garofalo is co-director of the Center for Technology and Teacher Education at Virginia and has taught at the university level for more than 20 years. Over the past decade, as tens of billions of dollars poured into technology initiatives in school districts across the United States, Garofalo and his colleague Glen Bull began to question the effectiveness of ICT use in K–12 schools.

In their 2004 article "The Last Mile," Garofalo and Bull explored the gap between the technology available in schools and the antiquated frameworks in place that constrain students and teachers from reaping any significant benefits, such as overbooked, unreliable computer labs and technology-sharing schemes.

Published in the journal *Learning & Leading with Technology*, "The Last Mile" proposes two solutions to increase the overall benefits of ICT use in education: the one-to-one and one-to-many classroom technology scenarios.

In the one-to-one scheme, students would each be outfitted with laptops, graphic calculators or other handheld initiatives. One-to-one solutions are preferable for some purposes, but several of these solutions are often too pricey for many budget-constrained school districts, and some have inherent classroom management issues. The one-to-many format offers a viable alternative, but requires significant preparation work by teachers.

The one-to-many scenario is now being explored further by Garofalo, Bull and their colleagues Randy Bell and Walt Heinecke from the Center for Technology and Teacher Education at Virginia. They are conducting a three-year study into the effective preparation of pre-service secondary mathematics and science teachers. This project will focus on teachers' use of visual representations to promote whole-class inquiry-based learning and instruction. Through this undertaking, they want to understand the optimal way to prepare teachers to take advantage of technology.

As participants in this project, which commenced in late 2005, fourth-year math and science education students are taught how to best use interactive display systems. These systems consist of the teacher's computer or laptop, an internet connection, a projector and often an interactive whiteboard, and they are used by the pre-service teachers to visualize concepts.

They learn to create and display interactive concepts with the assistance of various applets and software

programs, such as The Geometer's Sketchpad and Notebook software. The emphasis here is less about showing content to their students and more about promoting inquiry, provoking thinking and constructing understanding in classrooms.

"There might be video aspects, there might be dynamic geometry programs, there might be graphing, there might be digital images. We would want [K–12] students to observe things, predict things, analyze things, explain, experiment and even offer content," he explains of the one-to-many concept. "The whole focus of our project is to figure out how to best prepare math and science teachers to use the interactive display system to basically promote understanding."

Still in its initial phase, Garofalo's research – funded in part by a nearly half-million dollar grant from the U.S. Department of Education's Fund for the Improvement of Postsecondary Education – has already yielded a significant and unanticipated result.

They've learned that teachers are not only using the interactive whiteboard as a presentation tool; they're also using it to plan lessons.

"What we are finding out . . . is that our pre-service teachers are now using the [interactive whiteboard], either with Notebook or with PowerPoint, as a lesson-planning tool," explains Garofalo.

In this sense, some of his students have imported diagrams from electronic versions of textbooks so their pupils would see the exact figure at home when doing their homework. Others imported textbook headings or incorporated blank slides or empty grids that would be filled during the presentation of the lesson.

"I had one teacher tell me that he feels that he is less stressed at the end of the day because he feels like he's got a certain lesson plan ahead of him that he can easily modify if he needs to. He basically has all of the resources for the lesson in his Notebook file."

British researchers go inside the classroom

Across the Atlantic, a pre-eminent team of interactive whiteboard researchers – Dave Miller, Derek Glover, Doug Averis and Victoria Door – based at Keele University in Staffordshire, UK, are focusing on in-service mathematics teachers' use of interactive whiteboards in the classroom.

Similar to Garofalo's project, Miller and his colleagues are investigating how interactivity can be effectively incorporated into lesson planning and delivery. Through their observations of 71 classroom lessons, the team has found that extensive hands-on experience with interactive whiteboards is crucial for teachers and results in significant benefits for students.

"Often, the introduction of the interactive whiteboard into the classroom [highlights] the teacher's lack of general ICT skills and, where this is the case, development is slower. Most teachers will need staff development that is relevant, well thought out, appropriate for the individual teacher and timely," explains Miller, who has been a lecturer in mathematics education at Keele for the past 18 years.

"The design and delivery of such training is not simple. Too often, managers and others believe that teachers will develop new pedagogical methods just by the provision of equipment, even though the history of technological innovation in schools tells us otherwise."

Miller and his team have divided teachers who use interactive whiteboards into three groups: limited users are known as "supported didactic," mid-range users are categorized as "interactive," and the most advanced teachers are deemed "enhanced interactive."

As Miller explains, those teachers who fall into the "enhanced interactive" category are well trained and adept in using interactive whiteboards to promote cognitive development in their students.

"Typically the teacher will probably have adapted his or her thinking, will use the technology as an integral part of most teaching in most lessons and will look to integrate conceptual and cognitive development in a way that exploits the interactive capacity of the technology," he says. "These teachers are aware of the techniques that they can use on the interactive whiteboard, are fluent in their use and structure the lesson so that there is considerable opportunity for students to respond to interactive whiteboard stimuli, either as individuals, pairs or groups, with enhanced active learning."

Getting teachers to the enhanced interactive level as quickly as possible, Miller contends, is the best way to ensure interactive whiteboards impact student learning outcomes to their fullest potential.

"I believe pupils need to be interested in learning mathematics both for itself and for its potential usefulness. I think that this is more likely if pupils are taught in an interactive way, however that might be arranged," he says. "Currently, I believe that the best way to do this, from the evidence of the team's observations, is to use an interactive whiteboard and teach at an enhanced interactive level."

Deena Cox is a journalist based in Calgary, Alberta. She has been a contributing writer for Georgia Straight *for five years and is currently a master of arts candidate in communication studies. Deena has written white papers, newsletters and magazine articles about the use of education technology in the classroom.*

by Paul Nastu

Foundations for Fundraising

Schools try tech fundraising when they don't qualify for grants

Concerts and other unique fundraising events are helping schools that don't qualify for grants to raise funds for technology.

With a large proportion of government and corporate grants focusing on at-risk schools – schools that don't fall into the at-risk category are left to fundraise for technology on their own.

Although school districts that are not eligible to get grants are generally affluent, even affluent districts need funding for the extras, explains Eric Wolf, director of instruction and personnel services at the Governor Mifflin School District in Pennsylvania.

To get the technology they want, these school districts must be creative in the way they solicit and obtain funds. Here's how three schools have done just that.

Governor Mifflin School District

Twelve years ago, Wolf and others in the school district decided to form the Governor Mifflin Education Foundation (www.gmsd.k12.pa.us/edfound.html), a nonprofit organization that has, to date, given about US$325,000 directly to schools to support the purchase of technology.

Wolf put together a board of directors composed mostly of parents. "The initial board was like a Who's Who of business," says Wolf. He sought out members with "wit, wisdom, with-it-ness and wealth."

A lawyer drew up articles of incorporation, and the school board provided $3,000 of seed money. Then the foundation put together a directory of alumni and created a brochure asking graduates to support their alma mater (a member of the board picked up the tab). They sent out 15,000 brochures and got a return of between three and four percent, for a total profit of about $2,000.

In the first year, a board member – the CEO of a large auto group – sold the foundation a Jeep Wrangler at a very good rate. He brought 10 packets of 200 raffle tickets to each board member and told them they had a choice: write a check for the tickets or sell them at $5 each. The foundation made about $9,000 on that venture.

Incredibly, also during that first year, a board member made an exceptional dedicated donation of $60,000. The foundation used the money to renovate one of the business labs in the local high school. This was a key event for the first year because Wolf believes that for a venture such as this to survive, it must show immediate success.

Then the foundation implemented the Change for Education program. When district employees are paid, they can elect to have the small change donated from their paychecks. With more than 300 employees, that comes to about $6,000 per year.

In addition to computers and laptops, the foundation has purchased SMART Board interactive whiteboards, a STARLAB portable planetarium, a yearbook publishing and design studio, and infant simulators to help combat unwanted pregnancies.

Just recently, Wolf walked into a high school classroom and saw a relatively new teacher with a laptop. Across from him were two teachers with over 25 years of experience each. The young teacher was showing the other teachers how to download a video clip on the computer, and the three of them were obviously excited.

Those teachers were using the Internet to boost their teaching, Wolf said proudly. "The foundation purchased those laptops."

Fair Haven School District

The Fair Haven School District in New Jersey also started a nonprofit venture – the Fair Haven Education Foundation (http://fhnjef.org/pages/956207/index.htm). Doug Edler, president of the foundation, says the area is relatively affluent. "But that doesn't mean the amount of money going into the school district is sufficient to cover technology purposes," explains Edler. "Technology changes more quickly than our ability to keep pace with it."

Though the school district applies for federal funding, it doesn't get much.

The foundation was originally called the Fair Haven Technology Foundation when it was founded about 10 years ago; the name was recently changed to the Fair Haven Education Foundation.

A few years ago, the foundation had five board members, but it will be adding its eleventh member soon. "We're looking to grow it as much as we can," says Edler, who has no official ties to the school district except that his children attend its schools.

Two years ago, the foundation provided more than US$50,000 to the schools, outfitting computer labs with 26 desktops and 12 laptops. It's on schedule to provide an additional 24 desktops and 10 laptops this year. It also funded a soundboard and lighting equipment for the stage in the middle school.

Last year, Edler asked teachers to have their students submit proposals for areas in the district that students felt needed new technology. The winning proposal, submitted by two seventh graders, equipped the libraries with laptop computers –

about 12 at the high school and 2 at the elementary school.

The foundation raises funds through partnerships with local businesses such as the Food Circus Foodtown, which donates one percent of participating member purchases to the foundation, and through events such as dinner dances and silent auctions.

Edler admits it's not easy getting people to attend the events. "We're trying to enlarge the number of people involved by expanding the number of board members and encouraging more people to attend the meetings."

The Fair Haven Education Founda-tion also raises much of its money through approaching private foundations; finding those is a matter of networking in the business community and doing searches online. When submitting proposals to these other foundations, Edler says it is important to coordinate ideas with the PTA so both organizations don't approach the same foundations at the same time.

Suzuki Music School

When the Suzuki Music School of Westport, Connecticut, decided to create a technology music room using an interactive whiteboard, they raised the funds for the technology the best way they knew how – through music.

"We teach music theory and came across the SMART Board interactive whiteboard because students have used it in their schools," says music director Andrew Smith. "We wanted students to be able to start associating real sounds with the notes they saw in front of them."

As the school's music technique isn't accredited, the school itself doesn't fall under any general funding areas, so Smith put together

a fundraising concert series, which began in November.

In December, a concert was held featuring two stars from the *Phantom of the Opera* along with the director of the London Pops Orchestra. Smith, who plays violin and viola, performed in February, a flute quartet followed in March, and a faculty concert is planned for the end of the season.

Smith approached staff at the Pequot Library, a building built in the 1800s, to ask if the Suzuki School could hold fundraisers there. "They don't let their hall out for fundraisers, only for education purposes," says Smith. "But when they saw the artists, and that it was educational, they took the idea to their board."

The board agreed, and the concerts are taking place at the historic location.

To keep costs low, Smith reached out to friends, such as the two performers from the *Phantom of the Opera*. "When I told one that the other was going to do it, she was happy to do it as well," he explains. They donated their time and Smith paid only their expenses.

Parents chipped in as well, donating frequent flyer miles to fly the London Pops Orchestra director (also a friend of Smith's) over.

In the end, the school managed to produce six concerts for a "very, very small amount of money," says Smith. In the first two concerts, they earned enough to cover everything they will spend on the series; whatever they earn now will go directly toward technology.

Paul Nastu has taught college courses and worked in college and K–12 writing labs. He has written for eSchool News *and* Safe Schools Today*, and has served as editor and writer for many business publications, including* Retail Delivery News, Credit Risk Management Report *and* Firehose.

by Cara Erenben

Get On-Demand Training

Teacher-to-Teacher Initiative offers free e-learning courses

The T2T Initiative is an affordable way for schools to provide professional development.

Before October 2004, teachers were telling the U.S. Department of Education (ED) they were "eager, hungry, even desperate" for high-quality professional development, says Carolyn Snowbarger, director of the Teacher-to-Teacher Initiative (T2T) (www.ed.gov/teachers/how/tools/initiative/index.html).

In an effort to meet this need, ED created T2T, an initiative offering Web-based courses that complement and supplement local staff development programs. Now, educators everywhere are learning about the latest research-based teaching practices by taking free e-learning courses from T2T. The initiative's overall goal is to help teachers improve student learning outcomes as required by the No Child Left Behind Act (NCLB) of 2001.

To date, educators can access 32 digital workshops including "Writing at High Levels in the Intermediate Grades," "Standards-Based Differ-entiated Math" and "Turning Data Into Information" (www.paec.org/teacher2teacher). Each course consists of an overview, video, course companion guide, follow-up activities and a course assessment. In the United States, all 50 states and the District of Columbia grant professional development credits to teachers who participate.

The content is taken from face-to-face professional development workshops held by the government each summer. Filming the workshops and putting them online means all teachers can access the same content via their computers anytime and anywhere – whether at home, in the classroom or at a staff meeting.

Since it was launched in 2004, the T2T website has received more than 250,000 hits. Snowbarger estimates that even more teachers have benefited from the content than this figure suggests because educators watch the videos in groups.

For many schools, the T2T Initiative is a welcome and affordable way to provide staff with high quality professional development.

Teachers at Payne Elementary School, located in a rural farming community in Ohio, devote their monthly staff meetings to professional development. The free digital workshops have become their main source of content because the school lacks the funds to travel to seek out the best teaching practices.

"The Teacher-to-Teacher Initiative gives our staff the ability to bring the best teaching practices from across the country into our classrooms," says principal Brian Gerber.

Gerber makes professional development a priority for his staff by scheduling it as the only agenda item at staff meetings. "This is the only thing we do at the meetings," he says. "Meetings are not for regurgitation of information. That's what their e-mail is for."

As a group, Payne Elementary's 37 teachers watch the videos, pausing frequently to discuss the content. For feedback, Gerber asks his teachers to complete an evaluation after viewing each program. The evaluation asks questions like "What did you learn or find valuable from the program?" and "What will you use from the program in the classroom?"

> "The Teacher-to-Teacher Initiative gives our staff the ability to bring the best teaching practices from across the country into our classrooms."

Gerber's teachers focused on English and Language Arts courses first. Inspired by what they learned, they created a word-rich environment in which reading instruction and practice span the entire curriculum, including science, math, geography and gym.

"The reading and content courses helped our teachers devise new lessons in reading," says Gerber. From fall to winter to spring, students are increasing the number of words they know. "I've seen our student achievement and literacy scores go up," he adds.

Gerber likes that the workshops cover best teaching practices for his staff. He says the programs are thorough, valuable resources that will help teachers improve student performance if schools use them right.

Stephanie Hirsh, deputy executive director of the National Staff Development Council, agrees.

She says the e-learning workshops, are "good value-added content" when they fit within a school's professional development goals and are used within a collaborative learning environment.

The courses added this fall are shorter and filled with more activities. "The newer courses are done in smaller pieces so those with slower computers can access them," Snowbarger adds.

Although the department expected to get teachers from Alaska to Puerto Rico, Snowbarger says teachers from around the world are also using the service.

In addition to e-learning courses and summer workshops, ED's T2T Initiative site provides updates on NCLB and the

Teachers from Payne Elementary School learn about research-based teaching practices through free e-learning courses from the Teacher-to-Teacher Initiative.

Hirsh explains that quality professional development begins with a school or district's vision. First, educators should examine their standards and achievement indicators to identify low scores and content areas in which teachers need to improve. Then, training should be assigned accordingly.

"Learning together, instead of in isolation, is the most powerful way to use this program," says Hirsh. It means schools can avoid fragmentation – a situation in which teachers of the same grade level learn and implement different teaching strategies.

Even with the success of the workshops, ED continues to refine them.

teacher-training corps program. The site also provides information about the American Stars of Teaching award nominations and announces calls for T2T workshop presenters.

With state-by-state requirements for how to receive professional development credits, the T2T Initiative has already helped more than 200,000 teachers. More courses are being developed for 2006, so the number of participating teachers is sure to increase.

Cara Erenben is an Ontario-based freelance reporter. Previously, she was a full-time school technology reporter for eSchool News in Bethesda, Maryland.

by Wendy McMahon

Raising Reading Scores
Digital content helps students improve reading skills

PHOTO COURTESY OF THE MAMMOTH-SAN MANUEL SCHOOL DISTRICT

Students from Mammoth-San Manuel School District drastically improved their reading skills when an interactive whiteboard was added to their classroom.

At the beginning of the 2004–05 school year, Manuel Chavez's sixth-grade reading class consisted of 16 struggling students who had little enthusiasm for reading. These Avenue B Elementary School students were reading at low speeds and lacking fluency. But in just three months, the class grew from struggling to successful. Chavez attributes their success to digital content and the SMART Board interactive whiteboard.

When an October benchmark test showed the students had low reading scores, Chavez decided he needed to get his students excited about reading. He started using one of the eight SMART Board interactive whiteboards, recently purchased by the Mammoth-San Manuel School District with a SMARTer Kids Foundation of Canada Grant and Title I dollars.

Since Chavez's class followed the Voyager Passport reading program, he decided to use the interactive whiteboard to present the program's curriculum.

"By computerizing my lessons and making them interactive, I was able to capture the students' attention. The kids became engaged in the lessons, and their reading scores came up tremendously," explains Chavez.

Improved results

"When the readers first started at the beginning of the year, our class average was 89 words per minute. As sixth graders, they needed to be reading 120 words per minute. When we took the second benchmark test in January, the average was 125 words per minute.

I even had three students who were reading 160 words and above."

When Chavez administered the third and final benchmark test of the school year, the students' average had risen to 165 words per minute.

Chavez says that before he started using digital content and the interactive whiteboard, most of his students were also failing their seat work, which usually consists of reading short stories and answering comprehension questions pertaining to the story.

"Once I started using the interactive whiteboard and making lessons more interactive, they started focusing on what was being taught. Anytime I gave them seat work, very rarely would I get somebody who scored less than a seventy. Everybody scored in the eighties and nineties."

Mary Kyle, the district administrator of student achievement, introduced SMART Board interactive whiteboards to the district. She says when students in Chavez's class took the second benchmark test for reading in January, the results were so strong that they were no longer considered a low-reading class by the district. They were now rated as a medium- to high-reading class.

"The students in Chavez's class also increased their retell fluency tremendously. This lets us know that their reading comprehension also increased," explains Kyle. "For students in [the] sixth grade to make this kind of progress is really incredible."

Bell-to-bell teaching

Chavez says being able to present his digital lessons using the interactive whiteboard also increased the amount

of time he spent actually teaching. When his class first began following the Voyager Passport reading program, Chavez had to write a lot of instructions and vocabulary on the chalkboard during class. He spent a lot of time with his back to the students, and the students had to sit and wait for him to finish.

But Chavez discovered that using the interactive whiteboard to present the curriculum from the reading program was the perfect combination.

"By using the interactive whiteboard and the software that comes with it, I computerized all my lessons. They didn't have to wait for me to finish writing. I prepared everything after school or before school," explains Chavez. "It was strictly bell-to-bell teaching when the kids came in."

Digital content for all subjects

Chavez now uses the interactive whiteboard and Notebook software to create entire units in all of his classes, including math, science, social studies, language arts and spelling. He says digitizing his lessons has reduced the amount of time he spends preparing lessons after school.

> "By computerizing my lessons and making them interactive, I was able to capture the students' attention. The kids became engaged in the lessons, and their reading scores came up tremendously."

"With the interactive whiteboard I have everything at my fingertips – the Internet, Notebook software and the tools that come with it. It saves me a lot of time. Otherwise, I'd be running around, going to the office and running copies or trying to find something in a book."

Chavez says that he can also see his students gain a better understanding of what he's teaching, especially because he can include images to reinforce an idea and hyperlinks that connect directly to an example of the topic in the lesson.

"For instance, we were doing a unit on electricity, and I could show them what a circuit is, and then we could create a circuit on the interactive whiteboard. The students make the connection because they are seeing the picture as it's actually happening."

One of the best outcomes of adding the interactive whiteboard to his classroom and digitizing his lessons is how excited his students got about their lessons.

"I have to beat them off with a stick when we're doing our lessons because everybody wants to participate," laughs Chavez.

Chavez's enthusiasm for using the interactive whiteboard to present digital content is catching on. The school recently purchased ten more SMART Board interactive whiteboards, and Chavez has been designated to help train other teachers in his school district on how to use the technology.

Wendy McMahon is the managing editor of i.e. magazine. Based in Calgary, Alberta, she has written a variety of articles about education technology, including many case studies about the successful use of technology in schools.

Mammoth-San Manuel Unified School District

Overview

Mammoth-San Manuel Unified School District has 1,350 students enrolled in preschool through grade 12. The district consists of four schools, San Manuel Junior/Senior High School, First Avenue Elementary, Avenue B Elementary and Mammoth Elementary.

Challenge

Sixth-grade teacher, Manuel Chavez, wanted to find a way to help his students improve their reading skills and get excited about reading. He also needed to decrease the amount of time he spent with his back to the class writing on a chalkboard and increase the amount of time he spent teaching.

SMART Solution

Chavez decided to computerize his lessons and teach his classes using one of the district's recently purchased SMART Board interactive whiteboards.

Results

Students have gone from reading at an average rate of 89 words per minute to reading at an average of 165 words per minute, and test scores have improved significantly. Chavez also says he doesn't waste time writing lessons on a chalkboard during class – it is now strictly bell-to-bell teaching during his reading class.

by Nancy Knowlton

Shining Examples
Taking a moment to celebrate excellence

Teachers have a profound effect on students during their time in school and well into their futures.

Celebrating educators is something that can't be done often enough. Expressing appreciation to everyone associated with the education of a country's young people should be second nature.

Today, as many educators quietly effect change in their classrooms through the everyday use of technology, let's recognize the profound effect these teachers have on students during their time in school and well into their futures.

Teachers of the year

Each year thousands of teachers are chosen around the world for their outstanding contributions to children, schools, districts, states, provinces and countries. These teachers are nominated by a variety of interested parties for that special something they bring to the classroom. More than just a personal award, a teacher of the year award carries with it the obligation of speaking on behalf of all educators on matters of critical importance – namely the education of the next generation of citizens.

More than simply a profession, teaching, for these wonderful educators, is a calling that cannot be ignored. They often speak about their passion for sparking the will to learn in their students. They talk about the third-grade child who struggled to read, but who, with a teacher's patience and attention, developed capabilities and the desire to learn. They talk about students who return to them later in life to share how their careers and lives have developed. They talk about their willingness to try a new approach or pedagogy if it promises to improve student outcomes.

As well, these teachers of the year talk about the issues facing education – lack of funding, new curricula, social challenges, integration of new technology or the low priority too often given to education.

In short, these teachers talk about what is right and not so right with education today – all from the perspective of making it better. Shining the light on education through these exemplary teachers helps other educators, parents, businesses and the community understand and appreciate the vital role that education plays.

Technology adopters in the classroom

Another set of teachers who should be celebrated are those adopting new technology.

Technology adoption can take many turns, depending on the kind of technology you're introducing and the people and resources you have at your disposal. There are, however, some standard considerations that can make or break technology integration.

As new technology products are introduced, early adopters are the first to line up to buy them. They just have to have the latest and greatest because they are pioneers and like to be seen as such. They are the people who bought the first personal computers with an 8088 processor. They

bought the first-generation iPods.

Early adopters play a vital role in the development and adoption of new technology products. Their purchases allow companies to sell enough products to fund the production of later generations of products that appeal to broader groups of people. However, the willingness of early adopters to use new technology when it may not be quite ready for the masses doesn't necessarily make them the right users to watch.

"In looking at bringing new technology into the classroom, we often focus on benefits for students. While this is critical, it just might surprise you to see a reinvigorated and motivated group of teachers excited about using the new technology tools."

Instead, we should look to the often unheralded pilot users of technology in the classroom. They may be less technically advanced than early adopters, but they are making a difference both to their students and to other teachers. Teachers are inspired when they see other teachers using technology in the classroom. They need to see someone like themselves using new tools successfully, not just teachers who are always game to try the latest technology or gadget.

If you are an administrator, and you want to infuse new technology throughout the curriculum, choosing the right person to pilot the new approach is one of the most important decisions you'll make. Teachers will be watching and putting themselves in the pilot teacher's place. It works best if the pilot teacher is someone to whom the other teachers closely relate.

In looking at bringing new technology into the classroom, we often focus on benefits for students. While this is critical, it just might surprise you to see a reinvigorated and motivated group of teachers excited about using the new technology tools. Much of this excitement arises when teachers are able to accomplish what they thought they would when they entered the profession – guiding motivated children to reach their potential.

Graduates of the future

Another great way to celebrate educators is to focus on their results. With all of the pressure and attention on test scores, it might be easy to forget that every graduating class is filled with hopeful individuals whose ideals, aspirations and goals must now carry them forward. These young adults take with them not just what the curriculum dictated they learn, but also a framework for learning and a value system. It's our responsibility to celebrate student successes at every level of the system – from the classroom, to clubs and sports teams, to community involvement.

So much to celebrate. So little time.

Nancy Knowlton is the President and co-CEO of SMART Technologies Inc., the company whose name has become synonymous with interactive whiteboards. Ms. Knowlton is one of the world's leading experts on technology integration, and she travels extensively speaking with educators on this topic. Here, in "Nancy's Notebook," she transcribes her notes on the subjects she hears about most in her travels.

by Lee Shenkman

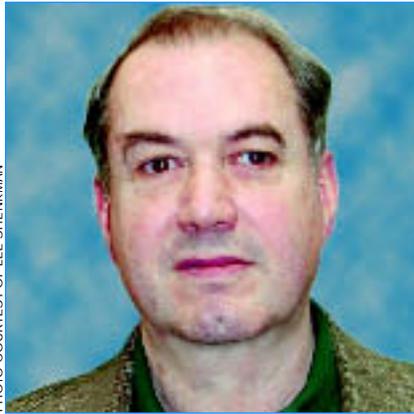# New Pathways to Fluency

Imagination and technology help improve language lessons

Lee Shenkman

Now, for the first time ever, the Internet, wireless networks and interactive whiteboards combine with portable devices, such as iPods, MP3 players and laptops, to form a powerful combination of tools and content that can transform foreign language instruction.

Transforming language instruction

Although knowing a foreign language opens a world of exciting possibilities, learning a foreign language is often anything but exciting. But when teachers use technology during language lessons they can make the basic building blocks of comprehension – vocabulary, conjugations and grammatical constructions – come alive.

Teachers with imagination and creativity can make learning a language an exciting and interesting adventure – especially those who are constantly on the lookout for new resources and new ways to teach. Gordon Freight, is definitely one of these teachers.

"One of the advantages is that the technology encourages a greater sense of community in the classroom," says Freight, who teaches French at Strathcona-Tweedsmuir School in Calgary, Alberta, Canada. Freight's school has entirely converted to wireless technology. All students use laptops and can access the local network, and all classrooms are equipped with interactive whiteboards.

"The interactive nature of the whiteboard and the Web, and the fact that the entire class can be involved at the same time, makes the classroom come alive," notes Freight. "It adds an element of enthusiasm and increased involvement in the teaching process. The instant feedback and communal nature of the process lead to a feeling in the students of 'if so-and-so can do it, then so can I.'"

Tangible teaching opportunities

At the Defense Language Institute (DLI) in Monterey, California, the same sense of involvement is a key part of the school's approach to language teaching. The students are U.S. military personnel who undergo intensive foreign language training – at least seven hours a day – in preparation for upcoming assignments.

"Failure is not an option for our students," says Dr. Jack Franke, who teaches Russian at DLI. "Their success affects national security, so we have to make our instruction as thorough and effective as possible."

All textbooks and instructional materials are digitized, and easily searchable MP3 sound files are embedded into the books. The students

are issued MP3 players and CDs that contain all the course materials so that they have the entire course with them all the time. All DLI classrooms are also equipped with SMART Board interactive whiteboards.

"The interactive whiteboard is what ties things together, linking the instructional materials to the real world," says Franke. "It allows for an immediacy not possible in the past. For example, when Hurricane Katrina was in the news, I was able to access in-class Russian news coverage of the events. The foreign coverage sparked classroom discussions and questions that were great teaching opportunities."

The new classroom technology also makes it relatively easy to discover new instructional materials or new ways of presenting traditional materials. "For example, basic foreign language concepts like subject–verb agreement and verb conjugations can now be made into interactive exercises," says Freight. "If one is willing to seek out and find out what's available, it is possible to find exercises and materials suitable for all grades and levels of maturity. Whether dealing with grammar or looking at pictures and descriptions of the Montreal Metro system, a lot is available."

Tailoring instruction

In addition, the advance of technology in the classroom has enabled teachers to customize lessons as never before. As Franke notes, "The students at DLI are adults and come from a variety of education backgrounds and often have very different learning styles. Thanks to the fact

that our materials are digitized and accessible on computers, it is relatively easy to tailor instruction to achieve the greatest effect. I can go from being the sage on the stage to being the guide on the side, letting the students shine."

Tailoring instruction, however, works both ways, and it is up to teachers to learn to take advantage of the new tools at their disposal in a way that works for them. According to Freight, "teachers should apply the resources where they are most comfortable and most confident with the applications. Not all teachers are technology wizards."

That same sentiment is echoed by Franke. "Our teachers come from diverse backgrounds and many are products of different cultures and educational systems. But they are willing to adapt to the new way of teaching. The success of the student is paramount."

Adapting for the future

In the end, good teaching comes down to adaptation. Technology cannot be perceived as a panacea. However, teachers who use technology will eventually replace those who do not. Whether it is an iPod, an interactive whiteboard or the Web – or even karaoke or a foreign language film – teachers who combine technological tools, including multi-media, with creativity and imagination will be fluent in 21st-century teaching and learning. They will be the ones for whom language learning of any kind must include technological fluency.

PHOTO COURTESY OF STRATHCONA-TWEEDSMUIR SCHOOL

Students at Strathcona-Tweedsmuir School are more enthusiastic and involved in language lessons now that they include technology like interactive whiteboards.

Technology fosters Chinese language learning

One area of language instruction where the benefits of technology have become increasingly evident is in teaching Chinese.

Like most educators whose schools have started Chinese language programs recently, officials with the Chicago Public Schools (CPS) — which launched a Mandarin Chinese language program in 1999 — hope their program will help prepare students for life and work in the new global economy, one where emerging nations such as China and India are expected to play a key role.

Unfortunately, for a school system the size of Chicago — the nation's third largest — finding a solution that meets its needs, and the needs of its students, isn't easy.

Though the market for technology-based learning tools is growing, Robert Davis, who works with the Chicago Chinese Connection Program, says the district is cautious about implementing new solutions and tries to research each new product thoroughly. Currently, the district's Chinese program makes use of a multimedia program called Chengo Chinese, a joint venture of the U.S. Department of Education (ED) and the Chinese Ministry of Education. The Web-based, Macromedia Flash-based tool is aligned with district curricula and uses quizzes and games to help students grasp the Chinese language.

"Clearly, using technology for this generation of kids, who are so familiar with it, is going to be helpful," said Michael Levine, education director for the Asia Society in New York City. "We haven't broken the mold for how to use technology in languages, and these early projects represent a very good, if inadequate, start in what we hope will become an extremely important use of technology in the future."

There's a teacher
behind everything we do

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Educators share stories of their technology success

Toni Heinowski and Rachel Yurk accepted a technology challenge
that transformed them into a successful teacher-training team.

by Sharon Oosthoek

Three case studies show how technology can improve learning in the classroom

As more and more teachers experiment with technology, many say they're beginning to see results in the classroom. They're finding students are increasingly on task and motivated to learn.
Of course, behind every technology success story is a teacher determined to help students in new and innovative ways. In the spirit of sharing their expertise, several educators recently spoke with *i.e.* magazine about best practices and the impact technology is having on their students. The following three case studies highlight some of the best that technology has to offer in the classroom.

Stepping outside the comfort zone

The long distance line from Milwaukee, Wisconsin, cuts in and out as Toni Heinowski struggles to make her cell phone behave.

"I can run an interactive whiteboard, but I can't run my cell phone," she laughs.

Don't let this self-effacing elementary school teacher fool you. Heinowski, 42, may not be a whiz with all the latest gadgets, but her colleagues say she's one heck of a teacher-trainer when it comes to showing others how to motivate students with technology.

Their first decision involved how they were going to share the single interactive whiteboard between two classrooms – the process would involve constantly unhooking it, moving it to the adjoining classroom and hooking it back up again.

Heinowski decided to take advantage of the situation and use it as an opportunity to boost the confidence of two students. She asked the two boys to learn how to set up and use the interactive whiteboard to save time for the teachers. The result was impressive.

"It was amazing how their behavior changed. It was amazing what they achieved," says Heinowski. She

> ❝ Their exploration made them proficient in using the interactive whiteboard and a host of other technology tools that work well with it. ❞

"One of Toni's strengths as a teacher-trainer is that she's patient. She's been a beginner. She understands that sometimes teachers are a bit fearful of technology and she puts them at ease," says Kevin Messman, coordinator of instructional technology for the New Berlin Public School District, where Heinowski teaches fifth grade at Elmwood Elementary School.

Although Heinowski knows what it feels like to be a beginner, she's now become an expert. In fact, she is part of a two-person technology training team with colleague Rachel Yurk, 36.

The transformation from technophobe to technophile started two years ago, when Messman approached Yurk and Heinowski with the idea of having them explore the uses of a SMART Board interactive whiteboard in their classrooms. He knew both teachers were looking for leadership opportunities and thought this would be a good project for them to share.

"He said, 'I'll buy one and I'll put it in your classroom. But you must agree to teach others,'" recalls Yurk.

Heinowski and Yurk agreed, and then spent the next year learning just what they could do with their new piece of technology. Their exploration made them proficient in using the interactive whiteboard and a host of other technology tools that work well with it – everything from laptops and video cameras to DVD burners and reading software.

"We had [what we called] a Kramer door between our classrooms like in [the TV show] *Seinfeld*. In the early days, the Kramer door would fly open and one of us would rush in. The kids would laugh and say, 'Ms. Heinowski,' or 'Ms. Yurk has a problem,'" says Yurk.

explains that the students had always needed to focus more in school, but because they could use and set up this new technology, other students now saw them as the smart kids.

Despite their enthusiasm for technology, both teachers take great pains to point out that simply having technology in the classroom is not enough.

"You need to make sure you're doing something with it that you couldn't do if they took it away," says Yurk. Heinowski agrees. "I try to get the most bang from my technological buck," she explains.

One of Heinowksi's more innovative uses of the interactive whiteboard is to link it up with Kurzweil reading technology, which reads out loud to her dyslexic students. She also uses the technology to read aloud the work of all her students so they can hear grammatical mistakes, such as run-on sentences.

"Now everyone wants the SMART Board to read to them," says Heinowski.

She's particularly pleased because this means her dyslexic students are no longer seen to have a different learning style.

One of her dyslexic students made a movie with a classroom digital camera about Kurzweil technology, presented it on the interactive whiteboard and explained how it has made a difference in his life.

Another student created a lesson about her trip to Mount Rushmore. "She downloaded pictures from e-mail, added hyperlinks and gave a lesson to the class about why kids should see Mount Rushmore and learn history. It fit right into curriculum," Heinowski says, the pride in her voice almost palpable.

"When you're in fifth and sixth grade, no one wants their work to be seen. Now they want to show the class," says Heinowski.

In the middle of all this learning and experimenting with technology, the pair also kept their original promise to teach others what they've learned. For two years, the duo has been traveling across the district and state, often with their gizmos packed into the back of a van, showing colleagues how to use technology to improve their students' learning.

Drawing on their own learning experiences, support from their school district and direct examples of how technology has helped their students, Yurk and Heinowski have become an ideal technology-training team.

Putting science in motion

High school physics teacher John Moyer loves to drive home the idea that using technology in science classrooms benefits students – literally.

Since signing on to the Delaware Department of Education's Science Van Project in 2004, Moyer has been driving a van full of technology goodies – including data-collecting probes, laptops loaded with specialized graphing software, and interactive whiteboards – to schools across the state.

"We bring equipment with us that teachers wouldn't be able to buy, or maybe they already have it but don't know how to use it," says Moyer.

The project also provides schools that can't afford technology the opportunity to teach scientific concepts with tools they wouldn't otherwise have access to, making it easier for students to learn.

"Carbon dioxide probes are $250 each and you need 10 for a class. That's a lot of money for one lab. But if we spend the money and take it to 25 schools, then it makes economic sense," explains Moyer.

Launched in 1997 as part of the state's reform of science education, the Science Van Project is meant to help high school students meet the high expectations of Delaware's Science Content Standards. It helps teachers use technology to take an inquiry-based approach to teaching science. The cost of the program to schools, which varies from US$250 to $1,600, is eligible for Title II funding.

Moyer, 32, was a science teacher for 10 years before joining biology and chemistry teacher Kathy Melvin on the project. Today, he and Melvin regularly visit the state's 25 public high schools to deliver training to teachers on how to use a variety of technologies in the science classroom.

Before visiting a school, they provide teachers with an initial five-day or weekend-long training session at their home-based lab in Dover, Delaware. These sessions prepare teachers to make the most of the school visit. Together, Moyer and Melvin train about 500 teachers a year in Dover.

After the initial training, these teachers can request an on-site visit. That's when Moyer and Melvin hop in the van for four to six days of follow-up work. They spend that time team-teaching science classes with the help of some of the most advanced science education technology available.
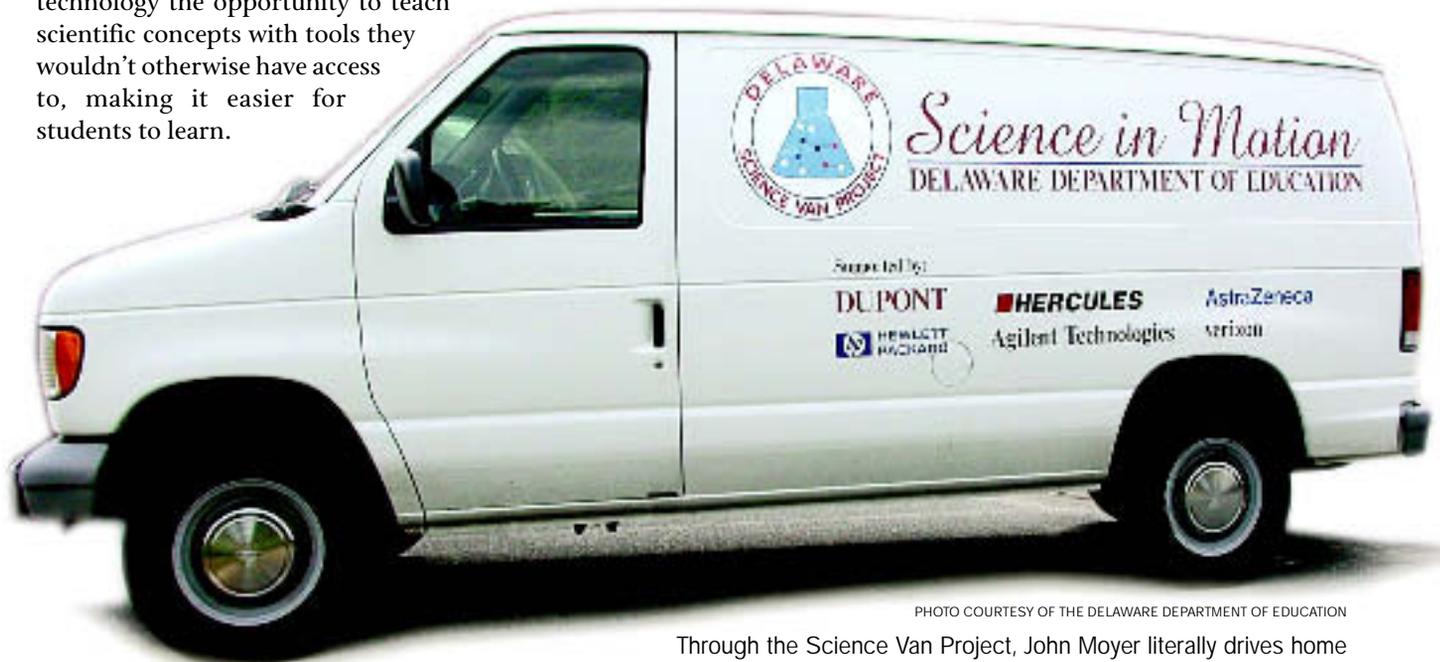

PHOTO COURTESY OF THE DELAWARE DEPARTMENT OF EDUCATION

Through the Science Van Project, John Moyer literally drives home the idea that using technology in science classrooms benefits students.

During their visits, they show teachers more about how to use and benefit from technology in the classroom.

Take temperature probes, for instance. Moyer explains that this one tool allows teachers to drive home several important opportunities for learning. The probe looks much like a thermometer, with a cord attached, and connects to a student's laptop. It can be used when studying chemical reactions that give off or absorb heat.

The student places the probe in a test tube of liquid – water, for example – and then begins to cool the liquid. As the liquid's temperature drops, the probe feeds the data to the laptop and special science software graphs the temperature drop in real time. This way, students learn that when water freezes, it flat lines at zero degrees for 30 seconds.

"You can see it freeze and see the graph flat lining at the same time. They see it right before their eyes. There are a lot of aha moments when you collect data in real time," says Moyer.

The probes can also plug into a special device that allows students to complete between four and eight experiments at one time. "Let's say an experiment takes 10 minutes, and you need to do eight. Instead of waiting

through visitations or just by troubleshooting science technology problems via e-mail. This in turn impacts an even greater number of students in our state.

"It's a very rewarding job. I enjoy turning students on to science and teachers on to teaching science using high technology," says Moyer.

Using the allure of technology

Chris Klein knows technology can be a good learning tool – but he also knows the allure of cool technology can be a good way to get students interested in learning.

Klein is the technology coordinator for Maplewood Richmond Heights School District in St. Louis, Missouri, a 1,100-student district with an early childhood center, an elementary and middle school, and a high school.

But for one class a day Klein also teaches a popular broadcast class.

By combining both roles, Klein says he's able to help other teachers implement technology solutions in the classroom in ways that make sense to teachers, not just administrators.

> **It's a very rewarding job. I enjoy turning students on to science and teachers on to teaching science using high technology.**

for 80 minutes, you can get the data in 10," says Moyer.

Moyer also encourages teachers to capture the experiment on digital video cameras to show later on an interactive whiteboard. The teacher can then export the video of the experiment to the whiteboard, insert data tables or graphs and even write on the screen.

This is especially useful when recapping the previous class's experiment before moving on to the next one. "Students see the data as the experiment is going on, and they retain the information better," says Moyer.

But it's not just students and their teachers who learn during Moyer's traveling Science Van sessions. Moyer often finds that he comes away from his trips with nuggets of teaching knowledge himself.

"I just saw a teacher with 41 years' experience. I learned a lot about classroom approaches from him, and he learned about technology from me," says Moyer.

While he's only been with the Science Van Project for about 18 months, Moyer says he's not likely to tire of it any time soon. He says it's the perfect combination of science, teaching and technology.

"I'm able to impact a great number of teachers per year

"Teaching is the root of everything I do," explains Klein. Although stepping into the teaching arena can be frustrating at times, Klein feels that spending time in the classroom helps him to stay current with the challenges teachers face.

The class also helps Klein reach students who are bright and attracted to technology, but easily bored in a traditional classroom setting – the type of students who might sleep in and miss a class. That's why Klein schedules his class for first thing in the morning, helping to ensure that students are at school for the rest of their daily classes. "Once I get them through the door, they're engaged and ready to go. They're here for the rest of the day. Many might not come otherwise," he says.

But getting into Klein's class isn't easy. And those who do get in make a big commitment.

Klein declined to base acceptance on previous grades, insisting poor or good marks would be no indicator of performance in the kind of class he wanted to teach. He had a different type of student in mind.

"What I need is for students to be committed. It was a Tuesday at lunchtime, and I gathered them together and

said, 'I've got 12 spots and 17 of you. I need three letters of recommendation from faculty in 24 hours.'

"I send these students out into the field with $7,000 or $8,000 worth of equipment. I need them to be dependable," he explains.

He also needs them to meet deadlines – hence the 24- hour deadline for letters from faculty.

If there's still work to be done at the end of class, Klein expects students to take responsibility for it. After all, in a real news broadcast operation, the whole team depends on each team member to get his or her work done on time. It's not unusual for Klein to leave the school while students stay behind to meet deadline.

"I got a call from students at nine-thirty one night saying, 'We just finished. It's on the server and ready to go.' I'd left, and it was just a few students in the building with the janitor," Klein recalls.

Klein assigns each student a job that mirrors a real news broadcast operation. Students work as executive producers, directors of photography, segment producers and anchors.

Together, they produce a 20-minute, bimonthly news show about school events and broadcast it to each homeroom. The show is also available on iTunes as a podcast called the *Devil's Advocate* (the school team is called the Blue Devils).

"They're coming along. If you watch broadcast one and broadcast eight, I think you'll see a difference," says Klein.

While students strive for professional standards, Klein also wants them to have fun.

"If they say, 'Let's take a camera and strap it to a skateboard and run it down the hall,' they take the ZR40 camera (a single-chip handheld). I'd rather risk a $300 camera than a $2,500 camera," he laughs.

The potential for cameras on skateboards may explain why Klein's class is so popular. He got five more applicants than there were spots. And it's just the second year he's offered the class.

To date Klein's arsenal of alluring technology includes US$40,000 worth of cameras, video editing stations, microphones and software,

$12,000 of which was donated by the local cable company. The rest came from the Maplewood Richmond Heights School District.
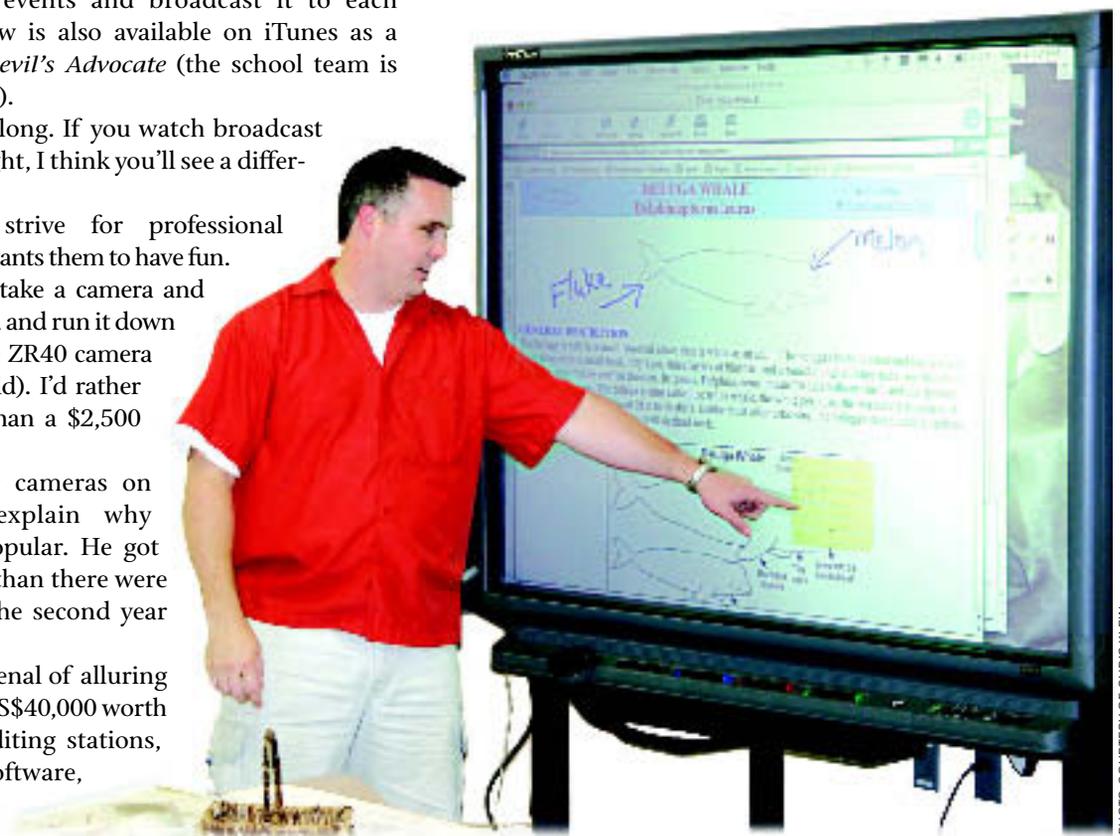
"A course such as this reinforces the soft skills of education. It helps teach students how to manage time," says Klein. "Everything is deadline driven. They work in groups and change speaking and writing styles depending on what they're trying to produce.

"[The course offers] a lot of real world skills. It's not about remembering facts and figures like 'The Civil War started in this year.' It's not knowledge like that. This is a vocational course. They're learning workplace skills."

Exceptional educators

Forward-thinking teachers such as Heinowski, Yurk, Moyer, Melvin and Klein are essential to our education system. Every day these educators push their limits and step outside of their comfort zones in an effort to not only instill students with a useful, quality education, but also to provide their colleagues with the means of providing that education.

These educators and many others like them make a difference in students' and teachers' lives each and every day.

Technology coordinator Chris Klein uses technology to get students interested in learning.

by Michelle Lomberg

Initiating a
technological
evolution

How one district
became an
education
technology leader

How does a school district with a technology department of three, a patchwork of local networks and a scattering of computers become a technology leader? Richland School District Two in Columbia, South Carolina, and its superintendent, Dr. Steve Hefner, seem to have found the answer. Ten years ago, Hefner realized that his district was behind in technology implementation. Today, both the district and its leader have been recognized across the United States for their vision in integrating modern technologies with all aspects of learning. The technology department has grown to 27, schools are connected by one of the most robust WANs in the country and the district's 31 schools have over 10,000 computers and 650 interactive whiteboards. There is also digital streaming video in every classroom.

The district's impressive technological evolution is the result of a clear and forward-looking focus on several key areas: planning, infrastructure, teacher training, funding and leadership.

Planning and patience

Planning was essential in the effective decision-making process that led to the success of Richland Two's technology makeover. Tom Cranmer is the director of information technology for Richland Two. His role involves creating and managing the district's technology plan, a job that requires him to identify the district's technology needs and research appropriate solutions. He gathers information through the RFP (request for proposal) process and by attending technology conferences. "Upfront planning is essential," Cranmer says. "You have to think through the entire process from purchasing to installation to training to support."

District Superintendent Dr. Steve Hefner agrees with the need for well-thought-out decisions. "One of our practices is to only purchase technology resources that are research-based solutions and not 'high-glitz' marketing promotions. Furthermore," he adds, "we look for a return on investment. There has to be an identifiable and quantifiable benefit for teaching and learning."

Just as important as planning is having the patience to see those plans come to fruition. Richland Two's technological evolution has taken place over ten years. Even with the most significant implementations coming only in the past five years (including the virtual high school, virtual classrooms, streaming video on demand and a teacher-centric data warehouse) the district has been pleased with the results from the start. "Even with smaller steps in the beginning," Hefner comments, "the efforts were making a difference almost immediately."

Building the infrastructure

With Richland Two's initial technology plan in place, Tom Cranmer's first job, when he joined the district in 1996, was to create an infrastructure that would support the planned implementations – in some cases, schools did not even have sufficient electricity to power the proposed new technology products. Cranmer began with the basics: under his direction, the district installed computers grade by grade, established reliable host sites for Web pages, acquired top-quality instructional software and created a technology department to support and train teachers.

Beyond the basics, the district acquired an impressive array of instructional hardware and software, including laptop and desktop computers, virtual-learning software and interactive whiteboards. Students can go online to obtain class information and to submit assignments. They can also take credit courses online through Richland Two's virtual high school.

PHOTO COURTESY OF RICHLAND SCHOOL DISTRICT TWO

Superintendent Steve Hefner's leadership has been the drive behind bringing technology products to students at Richland School District Two.

Even though the technology purchases and installations were well planned, challenges were multiple. In addition to such fundamental issues as electrical power, the district struggled, and continues to struggle, to secure funding for technology purchases and upgrades. And the district could not necessarily count on unanimous support from its stakeholders. "Leadership buy-in is also sometimes a challenge," says Cranmer. "Your school principals have to be on board in technology leadership to find success."

How did Richland Two overcome these challenges? "Technical issues are always solvable," asserts Cranmer. He credits his "outstanding staff of technical engineers and field technicians," as well as Hefner's leadership, with the success of the district's technology implementation program. Hefner agrees that having the right people has been essential to Richland's success. "That's the biggest intangible component in the overall formula."

Getting teachers on board

"There is one word for our success – teachers," Tom Cranmer asserts. When he began working on Richland Two's technology implementation program, one of his first priorities was to create a technology department that could support and train teachers. Now, school-based IT specialists offer support and mentoring. In addition to in-school support, teachers can also take technology night courses, which are open to all members of the community.

Peer mentoring is also part of the reason for the district's technological achievement. Linda Winburn, South Carolina's Teacher of the Year in 2005, is an instructional coach for Richland Two. Winburn works with induction and second-year teachers, observing them in the classroom and coaching them – a job she finds rewarding. "To see an induction teacher's excitement as he uses a new strategy in a lesson that becomes a tool for inspiring learning is a powerful reminder of a teacher's ultimate role in creating positive experiences for all students," she says.

One of Richland Two's early technology champions, Winburn had one of the first interactive whiteboards in the district. She and other instructional technology innovators represented a groundswell of interest in classroom technologies, a movement the district championed. "Support from our community and district personnel began to increase what many of us were able to do in our classrooms during the early years of technology," says Winburn.

The bottom line

Securing ongoing funding is a constant challenge for Richland Two. State budget cuts have posed difficulties, especially in the face of the district's rapid growth. "Adequate and ongoing funding for purchasing hardware and software are crucial," says Hefner. Cranmer adds, "If there is such thing as a wish list, I would change technology funding so that we would have more of it." He cites obsolescence management and the need for one-to-one computing in the growing district as ongoing expenses.

Over ten years, the district has invested approximately US$25 million in the overall technology implementation. This investment includes the infrastructure and more

than ten thousand computers. "The majority of our technology implementations has been funded through the use of general obligation bond sales," says Hefner. In Richland Two, technology is seen not as an extra, but rather as a core feature of any new school – a perception that informs the district's planning and ensures ongoing funding. "It is important to include technology as part of the base cost of a school when you're planning new facilities," asserts Hefner. "Without these inclusions in our long-range facility plan, we would never be able to maintain equity with our existing investments."

Strong leadership

Both Tom Cranmer and Linda Winburn credit Superintendent Steve Hefner with Richland Two's continued success. Cranmer says Hefner's plan for the district, the Superintendent's Initiative for Technology, was the starting point for Richland Two's success in education technology.

From a teacher's point of view, Hefner's leadership has been invaluable, both in bringing technology products to students, and in garnering support and enthusiasm for technology in the classroom. "The key factor in Richland Two's successful implementation of technology is the vision of our superintendent," Winburn asserts. "His vision became the vision of other leaders in our district." For Winburn, Richland Two's instructional technology implementation is essential to students, who must be prepared to compete in an increasingly technology-driven world.

Students and their success are at the core of Steve

Richland School District Two has over 10,000 computers, 650 interactive whiteboards and one of the most robust WANs in the country.

PHOTO COURTESY OF RICHLAND SCHOOL DISTRICT TWO

workplace, and they're taking advantage of opportunities for creative expression through digital photography, filmmaking and presentations. And they will continue to gain from Richmond Two's ongoing commitment to providing schools with the best and latest in instructional technology products. As Linda Winburn says, "Our students are the beneficiaries of our vision that knows no end. We know that to continue to help our students to be successful in our world, we must continue to stay abreast of the never ending advancements in technology."

> " It is important to include technology as part of the base cost of a school when you're planning new facilities. "

Hefner's vision. "First and foremost," he says, "my number one goal is higher academic achievement for students." He aims "to create a high school graduate who exits the schoolhouse doors armed with 21st-century skills and training to compete in a global economy."

Progress and possibilities

When asked if he would change any aspect about Richland Two's technology implementation, Tom Cranmer's reply was, "No. We have had such phenomenal success in rolling out technology system-wide, I wouldn't look to change how that happened."

Students are seeing the benefits of the district's success. They're finding their lessons more engaging, they're mastering the technologies they'll encounter in the

Steve Hefner agrees that the district's work is far from over. Nevertheless, he is pleased with the progress Richland Two has already made. "We were able to move from the back of the pack to the front of the pack. We feel fortunate for that."

As Cranmer says, "What we do today has a direct impact on [a student's] ability to contribute in the future. After all, tomorrow's innovators and leaders are in our classrooms today."

To learn more about Richland Two's approach to implementing technology visit the district's website (www.richland2.org/depts/Technology/Technology.aspx?id=212), or download a copy of the district's technology plan (www.richland2.org/lib/files/DistrictOffice/Department/Technology/Docs/rsd2_tech_plan.pdf).

by Wesley A. Fryer

Laptop
LEARNING

Reforming education with one-to-one learning

Amid discussions about school reform proposals, moving teaching and learning into the 21st century, and legislative arguments about how to adequately fund education, innovative educators in Floydada, Texas, are turning a future-oriented, collaborative vision into reality.

Two years ago, students and teachers at Floydada Independent School District (ISD) looked like those you might find in almost any West Texas school system. Today, every student and teacher in grades six through twelve is equipped with a laptop computer and the skills to use them effectively in the classroom.

The change is a result of the district's decision to focus on one-to-one learning, creating an environment in which every student and teacher in an education setting has access to a wireless, mobile laptop.

Of course, the acquisition of laptop computers and digital curricula for students and teachers won't solve all of the problems facing education. But having these tools can help teachers advance a school reform agenda of student-centered, constructivist teaching methods that engage students while preparing them for their digital futures. To that end, the story of Floydada ISD's experiences with one-to-one learning is enlightening.

Genesis of one-to-one in Floydada

Floydada ISD is a small, rural West Texas independent school district with a total enrollment of just over 1,000 students. The district includes a high school, a junior high school, two elementary campuses and several alternative education settings.

Floydada ISD is not a wealthy school district: no oil wells or multinational corporations are found within the boundaries of Floyd County. Currently, 86 percent of the students enrolled in Floydada ISD are classified as low SES (socioeconomic status).

Yet despite these challenges, a visionary school board and district administration have assertively secured grant funding as well as local dollars to make 21st-century teaching and learning an everyday occurrence for the students and teachers in Floydada.

In the spring of 2004, the state of Texas announced a new competitive grant program funded through federal Title II dollars, called the Texas Technology Immersion Pilot Project (TxTIP) (www.txtip.info). The primary goal of the initiative is to test the hypothesis that student achievement can be positively impacted in a technology-immersed environment. The initiative involved funding of both immersion and control campuses involved in a multi-year study.

When campus project participants were announced by the Texas Education Agency in summer 2004, Floydada Superintendent Jerry Vaughn was quick to take actions to make Floydada Junior High School the first TxTIP immersion campus in the entire state to roll out laptops to teachers and, subsequently, to students.

Working closely with a project manager, technical consultants and curriculum specialists from Apple Computer, Floydada ISD staff made plans for ongoing professional development training. Required upgrades were made to the district's Internet computer network, a robust wireless network was established at the junior high school campus and timelines were established for project implementation.

While some TxTIP campuses did not put laptop

computers into the hands of their students until April 2005, Floydada sixth-, seventh- and eighth-grade students received their laptops in October 2004.

The evaluation of TxTIP in year one (www.etxtip.info) has been published by the Texas Center for Educational Research (www.tea.state.tx.us/technology/tip/). While this analysis paints a varied picture of results across the state, feedback on the Floydada experience has been extremely positive.

Visionary leadership

A school reform initiative on a district level can be successful only through the vision, leadership and cooperation of multiple individuals working in concert. The story of one-to-one learning in Floydada affirms this contention.

The unanimous decision of the Floydada school board to extend the one-to-one learning environment from the junior high (which had been grant funded) to the entire high school (with local funds) was also a bold move.

In reflecting on the reasons this was approved in Floydada, Superintendent Vaughn stated, "The school board is committed to this because they saw the success of the project [last year] at the junior high. This was a spark for our school district, a spark for our community and for the area."

Elemental to the spark in the Floydada community are the stories of student engagement and success with laptop computers that have emerged as a result of the project. Students are now able to access digital, online content virtually anytime, anywhere.

The school district has worked with local Internet service providers to negotiate affordable home Web access options for families. While students don't keep their laptops over the summer, they can take them back and forth from home and school during the academic year. This is not the case on all TxTIP campuses, where some local policies prohibit students from taking them home.

From the beginning, Floydada administrators and teachers saw great potential in laptop computers, enabling students to expand not only their own technology skills, but also those of parents and other family members who may not have previously had access to computer technology at home.

Leveling the playing field

The digital divide, which separates the technological haves and have-nots in the early 21st century, is a significant issue of concern to all educators. Access to, and proficiency with, the resources of the global information superhighway is a requirement rather than an option for tomorrow's workforce. In embracing a one-to-one computing environment in Floydada ISD, educators have made a commitment to leveling the playing field of academic and vocational opportunities for students and community members.

Floydada Independent School District created a one-to-one learning environment by giving every student and teacher access to a wireless, mobile laptop.

> ❝ Elemental to the spark in the Floydada community are the stories of student engagement and success with laptop computers. ❞

In the words of Superintendent Vaughn*, "one-to-one learning . . . levels the playing field immediately for those kids and puts them on a plane that some of them never had an opportunity [to be on before]."

Focusing on teaching and learning

Despite the fact that the initial TxTIP grant to Floydada was primarily focused on enabling students and teachers at the junior high to work in a technology-immersed environment with laptop computers, observers should not mistakenly assume that the focus of education in Floydada has switched to technology. The focus of the project is teaching and learning, and helping prepare students for their future.

As Bill Dean, president of the Floydada ISD Board of Trustees, stated in October 2005 at the high school student laptop rollout, "We're a poor, rural district, there is no question about that. But the board unanimously agreed that this was the direction we needed to go. Technology is the future for our students."

Floydada ISD leaders understand that literacy in the 21st century includes traditional reading, writing and mathematics skills, but also extends into other domains of visual and digital literacy, which go beyond a traditional school curriculum.

Thanks not only to computer hardware but also online digital curriculum resources, Floydada students are writing more frequently and better than ever. Sixth-, seventh- and eighth-grade writing teachers report that technology has permitted students to write five or six essays in the same time they previously would have written just two or three. Students are writing more and as a result are writing better.

Following Floydada's lead

Books like *The World Is Flat: A Brief History of the Twenty-First Century*, by Thomas L. Friedman, and *A Whole New Mind: Moving from the Information Age to the Conceptual Age*, by Daniel Pink, make a strong case for education reforms needed in the United States. Jerry Vaughn, Bill Dean and other education leaders are not merely advocating for a superficial quick fix. They see the future staring them in the face. But that future is not an

PHOTO COURTESY OF GLENN CHASE

Writing teachers report that technology has helped Floydada students to write more essays in less time.

inevitability. It will only come to pass if leaders emerge with the vision and courage to take others into that future today.

Superintendent Vaughn summarized the importance of continuing to support the changes being made in Floydada classrooms and the learning which must continue each day. He said, "It's a phenomenal opportunity. We're in a farming community and we've related it to this. Once you put the seed in the ground and you get the plants up, the work's not near over. You have to cultivate, water and fertilize. That is what this is all about."

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by Deena Cox

Games Foster Learning

Author, advocate Marc Prensky explains education gaming

Marc Prensky

I n a varied professional career, spanning nearly four decades, Marc Prensky has taught math to high schoolers in Harlem, played the lute in Broadway musicals and hustled in high-powered boardrooms, such as the Bankers Trust Company, where he was an e-learning consultant. Add a couple of Ivy League master's degrees to his curriculum vitae, two critically acclaimed books and numerous keynote conference speeches, and Prensky's latest incarnation as a champion of digital game-based learning seems like a natural progression. He is regarded as a visionary when it comes to e-learning and has a lot of insight to offer into this relatively new field, so we asked Prensky about using interactive digital games to teach students in the classroom.

Q: How did you become inter-ested in teaching with games?

A: As soon as I got involved with corporate training, I saw how boring most of it was. Games seemed to liven up training sessions for both the trainers and the trainees. As [digital] games continued to develop, it became clear to me that they had huge potential to educate. My company moved from creating learning games in the corporate arena to doing the same for the military and then for K–12 and higher education.

Q: Why teach kids with games?

A: Games are a language most kids know and will pay attention to. Things presented in this format are much more likely to be taken seriously – assuming the games are good – than the readings, lectures and activities that make up most school lessons.

Q: You refer to digital natives and digital immigrants in your books and speeches. Can you explain these terms?

A: Digital natives are people born into the world of digital technology. For them, it's not technology; it's their world and they have taught themselves to function well within it. Not only are they comfortable with all things digital and the world of information they bring – they have taught themselves to take in and process information more quickly, to do many things in parallel and to put together infor-mation from many disparate sources, among other skills.

The digital immigrants, that is, those who came to the digital shores later in life, will never – even if they love the technology – have the total comfort with the tech-nology that kids have. Even when immigrants become relatively comfortable, they still retain a foot in their nondigital past. This is

their digital immigrant accent. The least subtle version of this is printing out their e-mails, but the accent covers more subtle things like not going to the Internet first for information, and not connecting and communicating in the same ways as the natives.

Most of today's adults were born in analog times. The demarcation begins roughly between 30 and 40 years old, with the younger people, such as students, being native to technologies that were out before they were born. However, the whole thing, remember, is a big, but useful generalization, helpful in under-standing why kids learn through games, but not to be read into too specifically.

Q: How do kids learn from playing games?

A: First, the games kids learn the most from are not the mini-games that the digital immigrants played and that we see on many websites, but

Interactive digital games have a huge potential to educate because they are a language most kids know and will pay attention to.

rather complex games that take from 30 to over 100 hours to master and are almost always played with others. These complex games get kids to learn through a combination of factors: focusing on engagement first, then providing goals and a leveling-up structure [where a player must master one level before proceeding to the next] so players can see themselves learning. This requires the players to make lots of interesting and meaningful decisions and choices.

In addition, games are adapted to each player's skill and achievement, so the game gets easier when a player has trouble and harder as a player does well. Good complex games keep each player right in the zone of thinking, "I can do this if I try just a little harder."

You don't have to be a digital native to learn from games, but games for immigrants will probably be different. Boomers, for example, are big fans of TV quiz games. The biggest digital game-based learning application is almost certainly Jeopardy, which is used in various forms in corporate classrooms all across America and the world.

Q: How do you see games being used in a school context?

A: There are four ways. First, teachers can use off-the-shelf games in class, and second, they can use specially designed educational games. These first two are difficult given typical class setup and structure, but many teachers are experimenting with this and some are doing it quite effectively. Third, teachers can bring games played outside of class into the classroom by asking questions like, "Does anybody play a game that relates to what we are discussing?" or "Is there an example of this in any of your games?" And, fourth, teachers can use the principles of good, complex games to make their classes more game-like, especially by adding decision making, setting meaningful goals, leveling up and iteration to continually make lessons better. To me, the third and the fourth ways are the most important.

Q: What subjects are best taught with games?

A: In my view, there is no relation between games and subjects. That is, with some imagination, good game-based learning can be created for any subject. Certain game formats, however, do lend themselves better to certain types of content. For example, role-playing games teach about behavior, communication and judgment, while puzzles teach strategic and analytical thinking.

Q: What are some of the K–12 projects you are working on?

A: I'm working on a game that enables kids to teach themselves the entire algebra I curriculum. I've also completed a game that lets kids learn about materials science by building robots that face off against each other on the Internet, and I'm working on a cell phone game for chemistry. My ultimate dream is to build a free game that allows kids to teach themselves to read before the age of six.

Marc's recommended gaming links

www.socialimpactgames.com

www.gamesparentsteachers.com

www.marcprensky.com

by Chris Dede

Virtual Reality of Learning

Chris Dede explains how emerging media can help students learn

Chris Dede

Over the next decade, three complementary interfaces will shape how people learn:

- The familiar world-to-desktop interface provides Web access to distant experts and archives, enabling collaborations, mentoring relationships and virtual communities-of-practice
- Multiuser virtual environment (MUVE) interfaces allow participants' avatars (virtual representations of participants) to interact with computer-based agents and digital artifacts in virtual contexts, as in multiplayer Internet games like *The Sims*
- Interfaces for ubiquitous computing enable mobile wireless devices (MWDs) to infuse virtual resources as users move through the real world, using for example, a smart cellphone to take digital pictures and playing videoclips of movies and television

Researchers are studying ways in which the latter two interfaces are powerful tools for teaching and learning, and educators can soon expect to see commercial products that take advantage of the features MUVEs and MWDs offer.

Outside of classroom settings, many students are active in collaborative videogaming or in using mobile media for text messaging and sending images to their friends. Even though the content they are mastering is often not useful, the learning processes they typically employ in these media are sophisticated. When they are in school, kids rightly resent having to give up the powerful ways of learning and personal expression they have mastered. My research team is studying how MUVEs and MWDs can empower students to learn the deep academic knowledge and higher order thinking skills that are important for the 21st-century workplace, while still retaining the engagement and learning styles they exhibit in their informal use of emerging media.

For example, my team's MUVE, River City, is centered on skills of hypothesis formation and experimental design, as well as on content related to national standards and assessments in biology and ecology. We are demonstrating how students can gain these skills through immersive simulations, interactive virtual museum exhibits and participatory historical situations. The River City virtual world consists of a city with a river running through it; different forms of terrain that influence water runoff; and various neighborhoods, industries and institutions, such as a hospital and a university (http://muve.gse.harvard.edu/muvees 2003). Three strands of illness in River City (waterborne, airborne and insect-borne) are integrated with historical, social and geographical factors to allow students to experience the realities of disentangling multi-causal problems embedded within a complex environment.

Students learn to behave as scientists while they collaboratively identify problems through observation and inference, form and test hypotheses, and construct evidence-based conclusions about underlying causes. Our goal is to promote learning for all students, particularly those who are unengaged or low performing.

The results thus far are promising:
- All learners are highly motivated, including students who are typically unengaged in classroom settings
- All students build fluency in various modes of communication and expression, and value using multiple media because each medium empowers different types of communication, activities and experiences
- Even typically low-performing students can master complex inquiry skills and sophisticated content
- Shifts in the pedagogy within the MUVE alter the pattern with which students do best

Other researchers who study educational MUVEs designed for young people, such as Quest Atlantis (http://atlantis.crlt.indiana.edu/start/index.html) and Whyville (www.whyville.net), are also assessing how immersive virtual environments influence their participants' learning styles.

Funded by the U.S. Department of Education, my team is also beginning

research on how MWDs can help teachers improve students' skills in math and literacy. This builds on work by Eric Klopfer and his colleagues at MIT, who are developing augmented reality (AR) handheld-computer simulations. These simulations embed students inside lifelike problem-solving situations to help them understand complex scientific and social dynamics (http://education.mit.edu/ar). For example, their Environmental Detectives augmented reality simulation engages high school and university students in a real-world environmental consulting scenario not possible to implement in a classroom setting (Klopfer & Squire, in press).

Students role-play environmental scientists investigating a rash of health concerns on the MIT campus linked to the release of toxins in the water supply. Working in teams, players attempt to identify the contaminant, chart its path through the environment and devise possible plans for remediation. As participants physically move about campus, their handheld devices respond to their location, allowing them to collect simulated field data from the water and soil, interview virtual characters and perform desktop research using mini-webs of data. At the end of the exercise, teams compile their data using peer-to-peer communication and synthesize their findings.

Initial research on Environmental Detectives and other AR-based educational simulations demonstrates that this type of immersive, situated learning can effectively engage students in critical thinking about authentic scenarios. My team is now designing augmented realities that build on popular television shows like *CSI: Crime Scene Investigation*, are implemented inside school settings, and engage students in mathematical reasoning and multimedia forms of technical writing.

Researchers say MUVEs, which are similar to online multi-player games, can motivate students while helping them learn.

This type of immersive media can also link to interactive whiteboards. MUVEs generate rich digital logfiles of students' actions and utterances that teachers could extract, show on the interactive whiteboard and discuss as examples of effective and ineffective behavior. Teachers could also export information from students' digital notebooks within the MUVE, allowing the class to discuss a team's observations, data and images.

Results from this early research on MUVEs and MWDs is promising. My research team believes a variety of powerful products will emerge to aid teachers in engaging all students and helping them learn deep academic concepts and complex reasoning. The power to accomplish this lies not in the technologies, but in the sophisticated forms of pedagogy these technologies enable, as well as the way that curricula based on interactive media build on the learning strengths and styles that kids are developing outside of school.

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IMAGE COURTESY OF HARVARD UNIVERSITY

by Wendy McMahon

New SMART Board Software

Version 9.5 makes it easier to add digital content to lessons

Teachers who want to create and teach digital lessons will welcome the latest version of SMART Board software – it's all about making the integration of curriculum-based content more seamless.

"Version 9.5 was inspired by the teachers and students who use SMART Board software – by their suggestions, their ideas and an understanding of the changing landscape of educational technology," explains SMART Board product-line manager Rob Abbott. "We've added a lot of new features and teaching resources to this version, but, as always, it's been with a close eye on ease of use and intuitiveness."

First and foremost are the software's latest features and functions, which are designed to help teachers find and use digital content easily when they create and deliver lessons.

For example, Notebook collaborative learning software (part of SMART Board software) has a new keyword search function in the Gallery, so teachers can quickly find the pictures, backgrounds, sounds, Macromedia Flash files or videos they need to build lessons or illustrate ideas. As well, the Gallery now offers an online resource section that provides a direct link to 750 lesson activities correlated to Canadian and U.S. curriculum standards and 700 online classroom resources.

Also new to 9.5 is video and audio support, so teachers can add video and sound clips to the Gallery, then play these clips within a page in Notebook software, which eliminates the need to leave Notebook software for another multimedia player.

"Now, virtually any type of content can be integrated into a Notebook lesson and stored in the Gallery. Notebook provides teachers with a single entry point and platform for all of their content, whether it's their personal content, a school's shared content or online content," explains Abbott.

New take-home privileges in Notebook software also allow teachers and students to install the software wherever they wish and on as many computers as they want. It ensures that teachers have access to lesson development tools whenever and wherever they want them, and students can use the software for work at home.

To go along with the new features, version 9.5 is loaded with more content, bringing the total number of resources in Notebook software's Gallery to more than 6,100 free images, backgrounds and dynamic Flash content.

The latest content includes new curriculum-based materials targeted at literacy and numeracy. There are 500 new learning objects, including sound clips of the alphabet, numbers and phonics-related sounds, as well as images, Flash files and videos. Chemistry and math teachers will be happy to know that the software now supports scientific notation text, for example, scientific symbols, subscripts and superscripts.

In addition to SMART's new content, version 9.5 also includes content from partners like Intel Skoool, Espresso Education, Daydream Education, the International Phonetic Association, Froguts and 3Es.

"The improvements in SMART Board software make it even more classroom friendly because I can now move toolbars, use mathematical symbols, immediately access the Gallery and easily make changes on the fly in front of students," says Barbara Post, a math teacher at Santiago High School, Garden Grove, CA.

SMART Board software 9.5 for Windows and Mac will be available as a free download to SMART customers by mid-April at www.smarttech.com/support/software. As always, the new version operates on all models of SMART Board interactive whiteboard and Sympodium interactive pen display.

by Cara Erenben

Tools for Schools

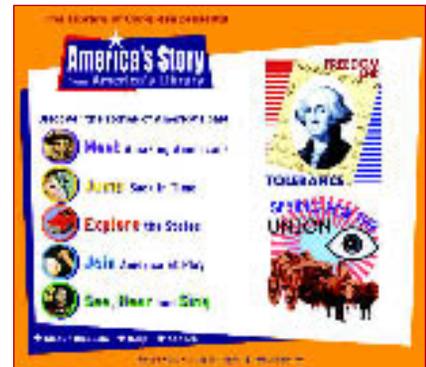## Digital resources for the interactive classroom

Dissect digitally

Walking step by step through a frog dissection on your interactive whiteboard is a captivating way to introduce science students to laboratory dissection. The digital dissection software from Froguts, Inc. uses simulated scientific instruments and three-dimensional interactive specimens that closely resemble real life. It guides students through the proper techniques and procedures for dissecting frogs, squids, starfish and other animals. After each dissection, students are quizzed on what they have learned. Striving for the most realisitic experience possible, Froguts is an eco-friendly and cost-effective supplement or replacement to traditional dissection. A subscription for unlimited users at a single school costs US$300 per year. Volume pricing for multiple schools is available.
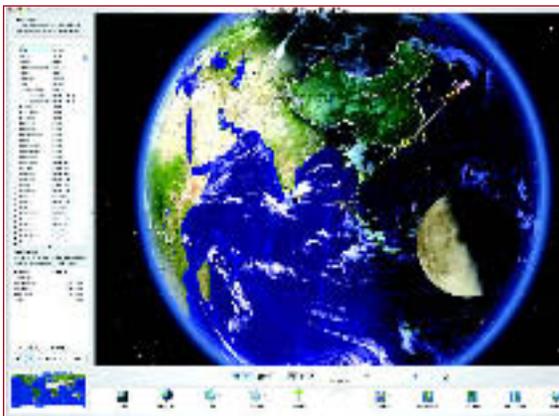
Go to www.froguts.com

Watch the world's weather

To teach students the basic concepts of geography, astronomy or weather, teachers can call up real-time data from around the globe on their interactive whiteboard using 3D Weather Globe and Atlas. The software, from Software MacKiev Co., provides current weather conditions and seven-day forecasts for 10,000 cities on top of high-resolution NASA maps and satellite images.

Whether it's Boston or Bangkok, the software delivers real-time data, including temperatures, wind speed, humidity and cloud cover. In addition to weather, 3D Weather Globe and Atlas shows country borders, cities, time zones and more. The software, which can plot travel routes, also comes pre-loaded with famous routes, including as Amelia Earhart's attempted flight around the world. Available for Mac and PC, 3D Weather Globe and Atlas costs US$39.95.

Go to www.mackiev.com

Visit the new Library of Congress

Recent updates to the Library of Congress website make this treasured resource even more valuable to the interactive classroom. The free website now includes several audience-specific resource pages that link to the library's vast collection of content. Not only will teachers find links to historical photographs, documents and audio, but also lesson plans and live support from librarians. The site includes more than 600 audiovisual webcasts of speeches, lectures, readings, concerts, conferences and more. Topics range from publishing the Declaration of Independence to examining the life of Andy Warhol. The Library of Congress also launched a kid's version of its America's Library website.

Its multimedia content explores "Amazing Americans," including U.S. presidents, statesmen, musicians, athletes and entrepreneurs. In addition, the library's new poetry section houses webcasts of recent poetry readings, the papers of Walt Whitman, and information on past and current Poets Laureate, including Ted Kooser, winner of the 2005 Pulitzer Prize in poetry.

Go to www.loc.gov

Online Library
Web resources for the interactive educator

Science

Access Excellence: The Mystery Spot
www.backyardjungle.org
Explore this collection of online and offline activities created by Access Excellence, a national education program that provides teachers of health, biology and life sciences with access to new scientific information. These activities use science to solve mysteries, such as why frog populations are dying and the fate of stranded Arctic explorers.
Elementary/Secondary

Connect the Stars
http://kids.msfc.nasa.gov/Puzzles/Connect/Connect.asp
Explore the stellar constellations with interactive lessons developed by NASA Kids. A handy Hint button briefly reveals the correct constellation to guide your students as they connect the stars by dragging lines to build Orion's Belt, Leo, Scorpio and others.
Elementary

Science and Engineering Experiments for Kids (SeeK)
www.seekscience.org/interact
Check out these action-packed interactive adventures that explore the sciences of light, sound, forces and motion, electricity, Earth and the solar system through a series of situations, including an alien invasion, an undersea odyssey and an astro adventure. These hands-on experiments are based on the UK National Curriculum standards for sience and technology – Key Stage 2.
Elementary

Reading and Language Arts

Read, Write, Think
www.readwritethink.org
Try out these detailed reading and language-arts activities located in an expansive searchable database that caters to K–12 students. All lessons are aligned with the National Council of Teachers of English (NCTE) standards for English Language Arts, and students can access an interactive area of the website to further practice their skills.
Elementary/Secondary

Math

National Library of Virtual Manipulatives
http://nlvm.usu.edu/en/nav/vlibrary.html
Explore visualized, interactive math concepts, such as algebra, geometry, measurement and others, that actively involve students in lessons and are arranged by grade level.
Elementary/Secondary

Project Interactivate
www.shodor.org/interactivate
Check out this science and math resource that provides you with interactive lesson activities covering a wide range of topics, including number and operation concepts, algebra, geometry and measurement. These lessons are accompanied by detailed lesson plans and are arranged according to the National Council of Teachers of Mathematics principles and standards for school mathematics.
Elementary/Secondary

Cross-Curricular

Crayola Creativity Central
www.crayola.com/educators/lessons/index.cfm
Explore over 700 lesson activities spanning the language arts, science, math, social studies and visual arts subject areas that you can search easily by curriculum, grade and time allowance. Links to curriculum standards for the United States, United Kingdom and Canada are provided, along with subject and grade-level suitability charts for each lesson activity.
Elementary/Secondary

Scholastic Ready-to-Go Resources
www.funbrain.com
Check out this comprehensive, searchable site of curriculum-spanning lessons, animated movies and other fun, interactive Macromedia Flash activities. Monthly and yearly, grade-specific lesson guides authored by five outstanding teachers chosen by Scholastic provide you with a handy planning resource.
Elementary/Secondary

History

Lesson Plans and Resources for Social Studies Teachers
www.csun.edu/~hcedu013/onlineactivities.html
Explore this compilation of highly engaging online lesson activities for social studies, economics or history lessons gathered by Dr. Marty Levine, professor emeritus of secondary education, California State University, Northridge (CSUN).
Elementary/Secondary

Arts

Albright-Knox Artgames
www.albrightknox.org/artgames/index.html
Discover art with these colorful, highly interactive, multifaceted activities that encourage students to explore their artistic sides while learning about color theory, and other art-related lessons, through Flash animations and famous paintings.
Elementary

Art Safari
www.moma.org/momalearning/artsafari
Take your class on an online adventure with the Museum of Modern Art's Q&A-style resource that uses artwork to investigate and create different animals. Each safari module encourages students to write stories about the paintings and animals they have learned about.
Elementary

New York Philharmonic for Kids
www.nyphilkids.org/main.phtml
This entertaining music resource offers interactive games and quizzes on famous composers, musical instruments, music history, members of the famed New York Philharmonic Orchestra and more in a series of Flash activities.
Elementary

Win an AirLiner™ wireless slate!

All you have to do is tell us about a technology success story in your school or district. Send your responses with your name and contact information to ieeditor@smarttech.com by May 31, 2006. Please include information on what technology was used, how it was used and what outcomes made it a success story.

For more information about SMART's AirLiner wireless slate, visit www.smarttech.com/airliner.

Five lucky winners will receive their very own AirLiner wireless slate.

In 250 words or less, describe your technology story and explain why it was such a success.

- Did it enhance teaching to make you more effective in the classroom?
- Did it spark student interest?
- Did it improve student engagement?
- Did it positively impact you and your students?

Send your success story to ieeditor@smarttech.com by May 31, 2006. One entry per person please.

About AirLiner wireless slate

Interact wirelessly with your SMART Board interactive whiteboard or Sympodium interactive pen display from up to 52 feet (16 m) away. The battery-free tethered pen lets you control any software application, write notes and highlight information in digital ink.

by Deena Cox

Percentage of K–12 public schools in the U.S. that **offer some form of e-learning or virtual school instruction: 25**

Percentage of U.S. children who **do not have access to a computer at home: 26**

Number of people **involved in formal education in the U.S.** in 2004: **81 million**

Projected percentage **increase** of total U.S. **elementary and secondary** school **enrollment** between 2002–2014: **4**

Percentage **increase** of total U.S. **elementary and secondary** school **enrollment** between 1989–2002: **19**

Percentage of U.S. **fourth-graders** performing **at or above Basic in math** in 2005: **80** (compared to 50 percent in 1990)

Percentage of U.S. **eighth-graders** performing **at or above Basic in math** in 2005: **69** (compared to 52 percent in 1990)

Number of pupils per teacher in U.S. public schools in **2004**: **15.6**

Number of pupils per teacher in U.S. public schools in **1994**: **17.3**

Percentage of U.S. school districts **planning to expand their distance** education courses citing **course development** and/or **purchasing costs** as a **major preventative factor: 36**

Get the easily digestible cure for technology headaches

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Thinking
Learning
Sharing
Good to grow

The new SMART Board™ 600 series interactive whiteboard

As educators like you work to integrate technology, digital content and pedagogy, schools are recognizing the value of SMART Board interactive whiteboards in the classroom. Students can use them to grow ideas through brainstorming, researching and collaborating on projects. You can use them to grow the skills and knowledge you need to encourage inquiry-based learning with digital content.

But growth doesn't have to come with steep learning curves. If you can use a computer, you can use a SMART Board interactive whiteboard.

Get the world's leading interactive whiteboard. It's good to grow.

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