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SPECIAL ISSUE: GREEN SCHOOLS

DEPARTMENTS

OurSpace

Therese Mageau, Editorial Director

Putting the IT in Green

AS EDITORIAL DIRECTOR at 1105 Media's Education Group, I oversee *T.H.E. Journal*, which covers technology in K-12, and *Campus Technology*, which focuses on higher education.

While both sets of readers ultimately have as their primary mission the support and improvement of student learning, they go about their work in entirely different ways. So it's not often that I see a strong convergence on issues between K-12 and higher ed IT—until this month.

April, the host month of Earth Day, provides an annual occasion for *T.H.E.* and *CT* to cover sustainable IT practices as well as the strategic role IT can play in the greening of its institution. What struck me as I edited both magazines is that while IT departments are increasingly doing a good job at greening their own backyards, they're still fairly siloed when it comes to involvement in larger sustainability initiatives.

I admit up front that my "evidence" is purely anecdotal, and is based on how hard it was for our reporters to find IT people who could speak to this strategic involvement. School IT leaders are definitely busy lowering IT's own footprint through the cloud, virtualization, remote management systems, and so forth. But they seem to be less than involved in more systemic green initiatives, which often find their home in departments such as facilities and transportation. It has been a surprise to me how often we learn that facilities and IT don't talk to each other, or that IT is not involved in helping design LEED-certified schools.

I realize that the "I" in IT could stand for *instructional* or for *information*, but there's a role for both instructional and information technology in the greening of schools. Green schools, we learn from an interview with architect Wendy Rogers on page 17, can obviously use technology to save energy, but the buildings themselves can provide vital data that teaches students about eco issues and, more important, about the environmental consequences of their daily actions.

Schools have no choice but to find ways to operate more sustainably—from both economic and environmental points of view. And helping students understand the complexities of planetary ecology must be an integral part of a 21st century curriculum. Information and instructional technology should be at the heart of these efforts.

INSTRUCTIONAL AND INFORMATION TECHNOLOGY SHOULD BE AT THE HEART OF SCHOOLS FINDING WAYS TO OPERATE MORE SUSTAINABLY.

IT staff can help institutions assess where they are leaking energy and money; engage with facilities to create smart buildings that teach as well as conserve; be part of the team that designs LEED-certified schools; work with curriculum planners to grow world-class online learning opportunities that will both save energy and engage learners; and provide students with the right tools for learning how to be better, greener global citizens.

If your IT leaders are part of this green revolution in your school or district, please tell me about it. Write me at *tmageau@1105media.com*.

the JOURNAL

thejournal.com

April 2011 : Volume 38 : No. 4

REACHING THE STAFF
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A SMART MOVE TO MOBILE LEARNING

Katy ISD turns to wireless to engage students and improve performance

With 52 schools and 58,000 students, Katy Independent School District (Katy ISD) is one of Texas' largest. But the Houston-area district doesn't let its size get in the way of innovation.

When district technologists brainstormed new ways to introduce flexible and affordable technology into the learning process, the leaders decided to transform the district with wireless learning enabled by Mobile Broadband from Verizon Wireless.

THE CHALLENGES

Katy ISD, like most public school districts across the country, has had to readjust to life with less funding and shrinking IT budgets. Though CTO Lenny Schad has dreamed of providing a computer for every child in every school, in the current economic climate this goal simply hasn't been feasible.

Beyond his 1:1 dreams, Schad wanted to inspire students to become more engaged and increase students' high-tech skills.

He knew he needed an out-of-the-box technological approach to address these challenges. But which one? And how?

THE SOLUTION

IT leaders at Katy ISD found a reliable solution to all of these problems with mobile technology from Verizon Wireless.

The program—which began as a pilot during the 2009-2010 school year—revolved around smartphones. Working with Verizon Wireless and software developer GoKnow, Katy ISD put software-loaded devices into the hands of 150 fifth graders.

These weren't just any smartphones. They were special mobile learning devices equipped with the latest versions of Microsoft Mobile products, as well as the GoKnow Mobile Learning Environment software, which includes applications for mapping, sketching, brainstorming, and project management, among other tools.

To keep students focused on learning, both text and phone capabilities were shut off, so the tools couldn't be abused or used for socializing. The phones operated over a secure private network that Verizon Wireless created for the district. Katy ISD authorized a list of school-approved Web sites for students to access.

Funding the project required creativity. Katy ISD negotiated government pricing on the mobile phones, and an arrangement with Verizon Wireless allowed the district to pay for data plans only during those months that school is in session. Verizon Wireless also was responsible for maintaining the devices and the network, so internal tech support was limited.

Equally important, because the project is enabled by the largest high-speed wireless network in America, Katy ISD doesn't have to pay for Wi-Fi hotspots to connect the devices to the Internet.

THE RESULTS

Results of the initial mobile pilot were inspiring.

Teachers were able to create, deliver, and correct lessons online and distribute them directly to the mobile learning devices.

Educators also reported that students appeared to be more engaged in learning than they had been previously. Test scores were impressive too; among students using the tools—particularly in math, science, and reading—scores increased by an average of 25 percent.

Among students using the mobile learning devices in the pilot—particularly in math, science, and reading—test scores increased by an average of 25 percent.

Perhaps most surprisingly, fifth graders in the program showed impressive levels of responsibility. Schad reports that not one of the 150 devices was lost, stolen, or damaged during the 2009-2010 school year. Educators noted that in many cases, students cared for the phones as if they were pets.

The program was such a success that Katy ISD expanded the use of mobile learning devices for the 2010-2011 school year. With the help of E-Rate funding, Schad deployed about 1,500 additional smartphones in September 2010, making the program the largest K-12 mobile-learning initiative in the country.

So far, the expanded effort has continued to encourage student success.

The bottom line: With mobile education in the hands of students, computing—and learning—in Katy Independent School District will never be the same.

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Gartner: Platform-as-a-Service Gaining Traction

APPLICATION BUILDING IS moving to the cloud and will come into its own as a major technology category this year, according to a recent forecast from Gartner. The IT consulting company researched this lesser discussed cloud segment, called "platform-as-a-service," or PaaS, and predicted that several large vendors will deliver new or expanded offerings throughout the rest of the year.

Gartner identifies PaaS as the layer of technology that operates between the system infrastructure ingredients—such as operating systems, networks, virtualization, and storage—and the application layer. This middle tier includes a wide set of services, including application containers, development tools, database management systems, integration brokers, and portals. With PaaS, these services will be offered online and on demand.

This transition to the cloud will be fraught with confusion and opportunity, as vendors vie to hold onto and gain market share, according to Yefim Natis, Gartner vice president and distinguished analyst who co-authored the report of Gartner's findings, titled *PaaS Road Map: A Continent Emerging*. "By the end of 2011, the battle for leadership in PaaS and the key PaaS segments will engulf the software industry," he warned in the report. "Early consolidation of specialized PaaS offerings into PaaS suites will also be evident. New vendors will enter the market through acquisitions or in-house development. Users can expect a wave of innovation and hype. It will be harder to find a consistent message, standards, or clear winning vendors."

Natis also indicated that over time, narrowly focused PaaS offerings will consolidate to a few major application infrastructure service suites, leading to comprehensive, full-scale PaaS offerings.

Gartner predicts that by 2015, most organizations will run at least part of their enterprise software functionally in the cloud, using PaaS directly or indirectly. The favored approach, the firm says, would be a hybrid environment in which internal, on-premises services and external, cloud-based services are combined.

[green schools update]

Copper Ridge School in Scottsdale, AZ and **Cholla Elementary** in Casa Grande, AZ have completed the installation of solar electric systems with a combined power output of 764 kilowatts. SolarCity installed the systems with no upfront payment from the schools as part of a solar service agreement. The schools will use the electricity savings generated by the project to pay for the installation over the next 15 years. The project will save the schools 10 to 20 percent in energy costs for the life of the solar service agreement, and will offset 33 million pounds of carbon dioxide over the next 20 years.

Irvine Unified School District in Southern California is ramping up its green efforts by installing fuel cells on two of its high school campuses. The fuel cells, which are being installed and maintained by ClearEdge Power, will be used to heat facilities and to generate extra power. This project is part of a larger districtwide green initiative, which began with the launch of a solar power project that is placing photovoltaic arrays on several sites.

Lodi Unified School District (CA) has begun construction of a 2-megawatt solar photovoltaic system that will generate $200,000 annually. The electricity generated by the installations will not be used to power the schools, but will instead be sold to utility companies PG&E and Lodi Electric Utility. The installation, which is expected to generate $5 million in revenue, is currently being done by Cupertino Electric and should be completed this summer.

Somerset Hills School District (NJ) has kicked off $3.2 million in energy-saving upgrades that are expected to save more than $5.2 million over 15 years. The project is part of the New Jersey Energy Savings Improvement Program, which allows public entities to contract with energy services companies to upgrade facilities and pay for those upgrades through the cost savings. The district is partnering with Amaresco for the upgrades, which will include improvements to lighting and energy management.

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[you told us]

*We received an overwhelming response to "Return to Sender" (*thejournal.com/articles/2011/03/07/return-to-sender.aspx*), our March feature that took a look at how K-12 schools are helping—and failing to help—students prepare for tech-infused, 21st century careers. Here is just a sampling of the comments we received from readers.*

Don Knezek makes several good points. However, he misses the mark on technology in education. Most of our students can probably teach our teachers about using modern technology for things like collaboration. That's not where our problems lie. He used science as an example. I'm a scientist. The real problem lies with learning to think as scientists do. Learning to use technology does not advance that goal. However, educational technology, technology specifically created for learning science, can advance that goal by lowering costs of learning, increasing efficiency of opportunities to understand science, and enhancing the effectiveness of teachers.

Our future scientists must have the opportunity to do what scientists do daily. While collaboration may be a part of many programs, it isn't the most critical part. Science is a way of thinking that allows scientists to navigate the seas of exploration into the unknown using imperfect tools. That thinking is what our students should learn. Even if these students are not future scientists, that mode of thinking, not intuitive at all, will benefit them years beyond the time when they have forgotten the phases of mitosis. Don't waste technology. Use it well, and it will pay for itself while delivering recurring learning dividends. Use it poorly, and it will drain your resources while not aiding, and even occasionally harming, your learning goals.
—Harry Keller, Los Angeles

When schools are evaluated by student outcomes on standardized tests as required by NCLB or by college matriculation rates often based on SAT/ACT scores, there is little incentive for students to demand the kind of skills training that those at the end of the pipeline supposedly want. When higher ed offers more flexible evaluation of the skills/knowledge that young people have acquired during their primary and secondary years, then perhaps the system that feeds it will be encouraged to evolve.
—Tim, Vermont

The reason teachers don't embrace the way things are done in the workplace today is because they don't know how things are done in the workplace. They have been in the education bubble so long that what "real world" work experience they had is obsolete. Wouldn't it be wonderful if teachers could be given a year's sabbatical every 5 to 10 years that allowed them to get out into the workforce and learn the skills employers need so they can teach them to their students?
—Anonymous

This article makes many assumptions that are not true. And Eileen Lento makes statements that are not true. She states, "The US isn't creating enough engineers, they're not creating enough math majors, they're not creating enough science majors." These are myths, and there are many other myths concerning science and engineering today. For example: The US suffers serious shortages of scientists and engineers; the number of newly educated scientists and engineers is insufficient to fulfill employer needs; the shortages are due to a failure of the K-12 education system; US students' interest in science and engineering is declining. The truth:

1) There is no shortage of scientists and engineers today. Several RAND Corporation studies found surpluses.

2) There are substantially more scientists and engineers graduating from US universities than can find openings; Harold Salzman of the Urban Institute found roughly three science and engineering graduates for every new science and engineering job.

3) Students coming from K-12 schools have studied more science and mathematics than in the past, and their performance has been improving.

4) The proportion of freshmen entering college who say they will major in science or engineering has been stable over a long period; thus, interest has not declined.

Shocking teachers with that kind of article will not produce the desired results. Insisting that teachers be trained to use [tech tools] and how to integrate the four C's into their subject matter so that they are comfortable with technology and with integration is the solution—and that does not mean the one-day professional development that most administrators have in mind.
—Frank P. Belcastro, Ph.D., retired professor, Department of Education and Psychology, University of Dubuque, IA

My school is lucky because we have received a grant and have good access to technology, but many of the schools in my state do not. And now, the proposed budget for next year cuts technology funds completely. How do we continue to make strides in 21st century teaching without resources to fix and replace our technology? How do other schools that still do not have adequate computers, projectors, etc., meet these needs with no funding?
—Anonymous, North Carolina

To read more comments or to post your own, visit our website at *thejournal.com*. *T.H.E. Journal* editors reserve the right to edit reader responses for length and clarity.

PROFILE

JANA HAMBRUCH, COORDINATOR OF TECHNICAL, CAREER, AND ADULT EDUCATION, AND **DWAYNE ALTON**, DIRECTOR OF IT SUPPORT, LEE COUNTY PUBLIC SCHOOLS, FORT MYERS, FL

NOT YOUR PARENTS' VOC-TECH PROGRAM

Hambruch: "For years, career and technical education was known as the voc-tech program, and a lot of kids were put in those elective classes because they didn't know where else to go. Today it's a whole different ballgame. In our district, teachers and students are getting industry certifications that are preparing them for things like digital design, digital photography, and web design and creation. Our students are going through a rigorous program that is helping them in all of their classes. They are engaged in creative activities that they love, and our data show that their grades go up across the board."

SKILLS FOR 21ST CENTURY JOBS

Alton: "We felt we needed to look at our high school programs a little differently, and supporting a more modern skill set was important. Traditionally, technical and career-type programs have covered things like auto mechanics and wood shop. But with the market the way it is, the local employers want to see a higher technical skill level coming out of our high schools. And the colleges do too, because they want to build on that. If we're producing students who have a 21st century skill set, they have a much better chance of being employed than with a lot of the things we traditionally taught as vocational or tech programs in the past."

HOW WE GOT STARTED

Hambruch: "Before I came to the district, I owned a technical training center and was director of the Center for Technology Education at Florida Gulf Coast University. Industry certification is very important to the job market for postsecondary education, but I would hear over and over from adults that they wished they had this in high school. So in 2005, I was a consultant on a grant for Lee County Public Schools to design a creative technology integration program, and after it was awarded I was hired by the district to coordinate it. We put in 13 industry certifications as part of an elective program at **Dunbar High School** as a pilot, and it was extremely popular and successful. Soon the state began to recognize career technology programs with industry certification, which enabled us to open up the program to all 13 of our high schools and two tech centers."

HIGH SCHOOL MAKEOVER

Hambruch: "Dunbar was a school that, on paper, shouldn't have succeeded. It was a small, ethnically diverse school in a low-income environment. We wanted to create a diverse academic environment for these kids and have programs to meet all of their needs. I wrote the program and the administration jumped right on board and worked with me to ensure that we would have a solid elective program for all grades. Teachers were required to go through certification training. We opened the Academy for Technology Excellence there in the 2005-2006 school year, and there have now been well over 2,000 industry certifications in that school alone. Students are getting certifications in products from Adobe, Cisco, CompTIA Plus, and Microsoft Office. The program has been so successful that Microsoft named Dunbar the first certified Microsoft Certified High School in the world. In Florida we have school grades, and Dunbar went from a D rating to an A school in 2009-2010."

EXTRA CREDIT

Alton: "Dunbar High School is gaining in the school rating system not just in the areas where these students are getting the certifications; it's also because students are progressing in the other areas, and because they enjoy what they are doing. If you talk with these students, you can tell they have critical thinking skills. They're problem-solvers, not just people who memorize things and regurgitate them. We're attracting a wide variety of students, and you can see the benefits of these programs through the rest of their education."

MY TOP 3...

KEYS TO A SUCCESSFUL TECHNOLOGY CERTIFICATION PROGRAM

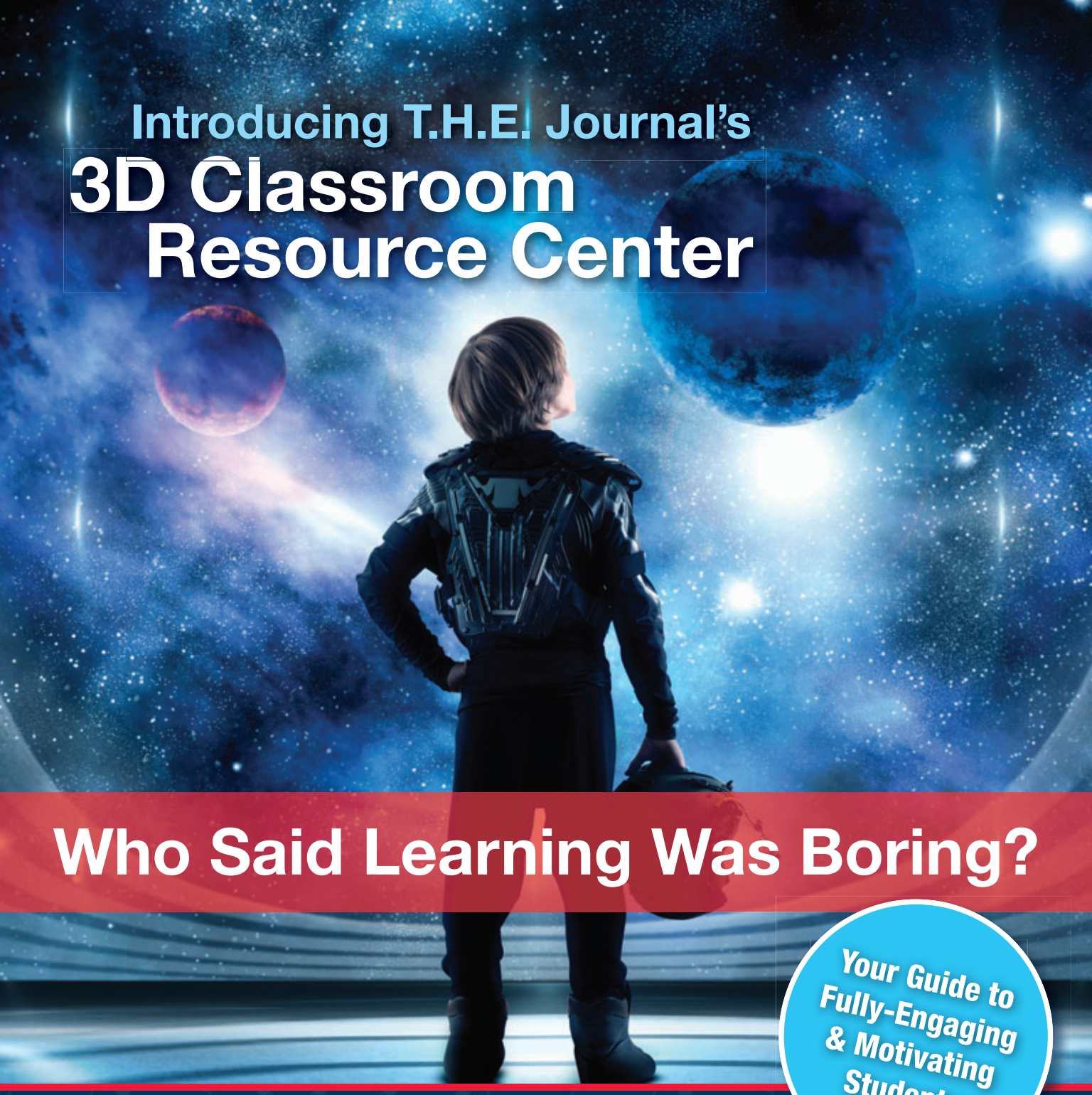
Collaboration with IT: "This ensures the successful delivery of IT certification programs as technology needs change every day."

Practice exams: "They provide a measure that the student can use to assist in passing an industry certification exam."

Teacher training: "There is a gained respect in the classroom when teachers can assist the students in an exam that they have taken and passed."

Daniel Hertzberg

Do you know a K-12 technology leader or tech-savvy administrator or teacher we should profile? Tell us! E-mail olabarre@1105media.com.



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John K. Waters

Teaching Green

An abundance of online tools can help educators inform and instruct their students about environmental issues.

IT HAS BEEN 41 YEARS since the late Wisconsin Sen. Gaylord Nelson launched the first nationwide grassroots demonstration on behalf of the environment, known as Earth Day. The event was actually a national "teach-in" about environmental causes, and it is widely considered the spark that ignited the modern environmental education movement. Within months, President Nixon passed the National Environmental Education Act, and a new subject was introduced into the curricula of K-12 schools across the country.

Four decades later, educators have access to a wealth of online resources for green teaching and learning. Some are intended specifically for K-12; others are educational resources without a K-12 focus. All of them are worth considering. Here are some examples of what's out there.

Classroom Earth (*classroomearth.org*) Designed for high school students and teachers, Classroom Earth provides a ton of content that can be included readily in daily lesson plans. The site was created by the National Education Foundation in partnership with The Weather Channel.

The site's stated aim is to "enhance and strengthen environmental education in high school classrooms nationwide" and to encourage "the inclusion of environmental education into all high school subjects—from biology to art—and make it easier for teachers to access best practices online."

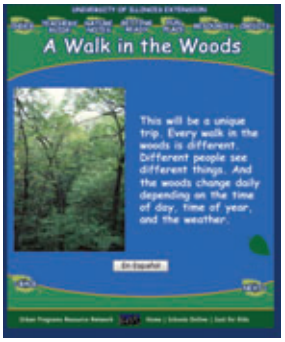
Classroom Earth is well designed, lively, easy to navigate, and constantly updated. It offers several types of resources. The "In the News" section collects environmental news articles; "Where in the World" offers geographically based environmental information, plus resources for incorporating geographically based topics into school lessons; and the "Resource Library" is packed with videos, sample lesson and unit plans, and links to other websites, which users can browse by traditional high school course (social studies, mathematics, etc.) or topic (climate change, energy, recycling, etc.).

Teacher support is plentiful. The main menu bar includes a link to a "Teaching About the Environment" page, which includes a number of useful guidelines and best practices. Another link, "Professional Development," leads to a list of programs, classes, and continuing education. The website also invites teachers to contribute to its evolution through comments, rating tools, and shared success stories. A "Grants" page offers guidance for securing funding for green education programs.

A Walk in the Woods (*urbanext.illinois.edu/woods*) Aimed at urban-dwelling students in grades 3 to 5—city kids who rarely get away from the concrete—A Walk in the Woods provides a clickable virtual trip through the woods, complete with shifting photos of woodland details, sound effects, and voice-over narration in both English and Spanish.

Developed by the Urban Programs Resource Network of University of Illinois Extension program, this simple site might serve as a starting point for the environmental education of kids who encounter very little "green" in their daily lives.

Along with the virtual walk, the website includes a "Nature Notes" section, which provides a kind of scrapbook of the students' virtual trip, with labeled photos of some of the things they encountered on the walk (acorns, chipmunks, mushrooms, lichen, etc.). There's a nice index that provides out-of-order access to sections of the walk. And a resources page offers a useful list of links to web pages aimed at roughly the same age group, specializing in animals, birds, trees and flowers, and insects and bugs.



The website's teachers' guide simply identifies the statewide learning goals of the state of Illinois, but also provides a list of activities that might enhance a teaching plan—things like having students collect leaf and bark samples and holding a scavenger hunt for seeds and acorns.

EEK!—Environmental Education for Kids (*dnr.wi.gov/eek*) Aimed at students in grades 4 to 8, this lighthearted site has lots of good content. The purple home page is bright, but clean, with appealing graphics and simple point-and-click navigation.

Billed as an "electronic magazine for kids," the site was developed by the Wisconsin Department of Natural Resources, and includes links to other resources offered by the DNR for preK-12 educators,

including lessons on a range of topics, from climate change to Wisconsin's own Millennium Tree.

A standout feature of this website is its "Teacher Pages," which guide educators with site navigation instructions, tips for getting students up and running on the site, and a list of subject-specific activities supported by the site for science, math, language arts, and social studies. There's also a news section, a calendar of teacher events and workshops, and list of additional resources.

Another noteworthy feature is the site's "Get a Job" section, which gives students brief summaries of environmental jobs to which they might aspire, such as forester, air quality specialist, lakes protection manager, park ranger, fish health specialist, warden, endangered species researcher, park planner, water-quality specialist, or naturalist. It even provides lists of secondary institutions where students might pursue those goals.

The Ecological Footprint Quiz (*myfootprint.org*) This online quiz asks students the topical question, "How big is your ecological footprint?" Some of the 27 questions in the quiz will be easy for students to answer, such as "What country do you live in?" and "How many people live in your household?" Some will challenge them to think about things they might not have considered before, such as "What energy sources do you use in your home?"

Most of the questions—including this last one—are multiple choice; the trickier ones also provide a default answer that is the average for the country/region where the students live. For example, to the question "If your house uses electricity, what percentage is generated from renewable hydropower, wind, biomass, or solar sources?" the quiz provides the answer "8.29%" for those living in the US. The site displays a "quiz results" popup window so that students can see how their results compare to the national average as they take the quiz.

Created by the Santa Fe, NM-based Center for Sustainable Economy, the quiz is designed to estimate the amount of land and ocean area required to sustain one person's consumption patterns and absorb that person's wastes every year. It measures carbon footprint, housing footprint, and goods and services footprint, which together form the student's ecological footprint. The result is displayed in the number of planet Earths we would need if everyone had that footprint.

The test questions are probably too advanced for elementary or middle schoolers, but they could be effective at the high school level to generate a wide-ranging conversation about our personal impact on the environment.

PowerUp (*poweruptheg ame.org*) This freely downloadable, 3D, multiplayer game takes students to the planet Helios, where environmental disasters threaten to destroy the world. The planet's atmosphere is choked with carbon dioxide and other greenhouse gases. Extreme weather threatens almost every ecosystem. Fossil fuel plants are pumping tons of poisonous gases into the air. And dense clouds of carbon-based emissions called SmogGobs seem almost alive. Players join a group of brave volunteers working together to save the planet. They're challenged to carry out missions to supply solar, wind, and water power before severe storms wreak havoc.

PowerUp is one of the oldest environmental science-themed educational games. It was launched in 2008 by IBM as part of its TryScience initiative, with input and advice from the Tech Museum in San Jose, CA, and the Bakken Museum in Minneapolis, not to mention 200 students between 12 and 16 years old. Since then the interface has been refined and the graphics upgraded to modern standards.

The game is a bit engineering-focused, as the students must build solar towers and repair wind turbines. But there's also plenty of environmental science in the mix. The website provides both a parents' guide and a lesson plan. The teachers' guide includes a sample assessment rubric and other resources for facilitating effective project based learning.

The US Environmental Protection Agency Teaching Center (*epa.gov/teachers*) This teacher-focused site offers plenty of useful background information, lesson plans, and classroom activities for teaching about the environment. There's also information about workshops, conferences, grants, and awards.

Here, the EPA has organized a list of on-site documents and links to other sites to provide educators with "basic and clear information to assist you in teaching your students about the environment."

The site design is relatively frills-free—essentially, it's a well-organized collection of teaching resources—but there's a lot of meat on these bare bones. The overall content is divided by topics, such as "Air—acid rain, indoor air pollution, ozone, radon" and "Waste & Recycling—garbage, household, hazardous and solid waste, landfills, superfund cleanups, trash," among others.

Under those topic headings, the EPA has collected articles and tools aimed at specific student age groups. Under "Air," for example, you find the "Noise Pollution for Kids" marked for grades 6 to 8, "Ozone Depletion" marked for grades 9 to 12, and "Mixing Ratios or Parts per Million, Billion" marked for teachers. Along with articles, collections of related articles, and PDFs, visitors to this site will find tools like the AirNow local air-quality map of the US.

This site also links to the EPA Kids Club, the Student Center, and the High School Environmental Center, all of which are also worth a visit. the

John K. Waters is a freelance writer based in Silicon Valley.

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Buildings That Conserve and Educate

Sustainable school buildings, says a green-schools architect, can be powerful teaching tools to help students monitor and change their own energy-consumption behavior.

WENDY ROGERS IS design principal at the architectural firm LPA in Irvine, CA, as well as a LEED AP (Leadership in Energy and Environmental Design Accredited Professional). Throughout her 24-year career she has advocated for sustainable design in schools. Rogers works closely with the US Green Building Council (USGBC), speaking with districts and civic organizations throughout California to help them plan for and design green schools. She recently spoke with us about the relationship between technology and sustainable school environments.

***T.H.E. Journal*:** How do you define a "green school"?

Wendy Rogers: A green school provides an environment that is more conducive to learning, with better lighting and acoustics that will allow for better communication and more effective engagement with technology.

***THE*:** What does "more effective engagement with technology" mean to you?

WR: Technology is important to a green school because it allows the building to educate us about how that building is being green. If you have more information about what your building is doing you may be able to change behavior.

***THE*:** It's so interesting that in your definition of a green school you left out the features we would expect—like recycling bins or solar panels. You seem to define it as having an instructional function.

WR: Being green can't be just about what the building does, because there's a different way we need to think, whether it's as simple as [knowing] that when we open a window, the air conditioning goes into a different cycle.

***THE*:** So how can schools use technology to help students to think differently about their environment?

WR: Some schools have red lights and green lights on their windows—the students see them and know that something needs to be turned off. At the high school we just opened up in South Lake Tahoe, CA, they have wind odometers attached to the building. When a storm is coming in, that measurement is taken into a piece of software in the environmental sciences lab that they can then monitor and understand. [See "Students Taking the LEED," p. 18.]

***THE*:** Do you find younger people enthusiastic about these kinds of efforts?

WR: Absolutely! It's been interesting working on projects in higher education—we know that students at college are demanding green buildings on their campuses. They want that healthier environment when going to school. What's really interesting is as those students graduate and start young families of their own—and we're beginning to see this—they want that same environment for their children. I can hardly go to a town hall meeting without a parent or a student raising their hand to say, "Are you going to go after LEED certification for this school? Are we going to be in a green environment?"

***THE*:** Some time ago cost savings were the most important reason why school districts pursued energy-efficient practices. Is that still true?

WR: That's been a great help to sustainability and how we present it to our

"A sustainable school is going to use less energy and is going to cost less in the long term. If you're saving money on your operational costs, you then have more money to spend on teacher salaries, technology, and equipment in the school."

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"Technology is important to a green school because it allows the building to educate us about how that building is being green. If you have more information about what your building is doing you may be able to change behavior."

clients and how I communicate it through the USGBC. A sustainable school is going to use less energy and it is going to cost less in the long term, looking at what those life-cycle costs are going to be. There isn't a school district in the nation that isn't pressed in some fashion for its operating dollars. They aren't going to be funded in the regular way. Everybody's going to have to do business in a different paradigm now, and so if you're saving money on your operational costs, you then have more money to spend on teacher salaries, technology, and equipment in the school. We're definitely seeing superintendents and business officials in our school districts who are making these connections.

THE: Do you have the data to convince those decision-makers?

WR: We do. Some of it is anecdotal. One of the biggest things that USGBC is doing, as every project is certified, is seeking to do more measurements and metrics, because some people just have to see the proof. Everyone wants more data to prove these [projects] out. But the anecdotal evidence is unbelievably clear. There is a study from a number of years ago that says, on average, [green] schools save $100,000 a year in operating costs, which is enough to pay for at least one teacher, 200 computers, or 5,000 textbooks.

THE: That study also says that it costs about 2 percent more to retrofit green buildings versus nongreen buildings. Do you agree?

WR: I have not found [that] to be the case.

THE: Where do you think that 2-percent number came from?

WR: At the time when the study was done I don't think the [green products business] was as competitive as it is today. Everybody out there who's making anything understands that they need to be making a competitive green product that they can sell, so we've seen prices come down on things. It used to be that it was a big deal to get recycled content in your carpet or ceiling tiles, but now there's a lot more competition.

Students Taking the LEED

One of the US Green Building Council's primary goals in its Green Schools Campaign is for students to understand how their school has been constructed or modified to be environmentally responsible. The LEED for Schools certification program even offers a credit for innovation in this regard. "In effect, the school itself becomes a wonderful teaching tool on the subject of sustainability," says Anisa Baldwin Metzger, manager of USGBC's LEED Green Schools fellowship program.

Photo Credit: James Steinkamp

Adlai E. Stevenson High School (pictured at left), located in the village of Lincolnshire outside of Chicago, just recently filed for LEED-EB (existing building) certification. As a part of its LEED initiative, Stevenson has instituted an innovative educational program called Net Zero Classroom. The project, an advanced environmental sciences class for select students in their senior year, is designed to have students create and run an energy self-sufficient classroom.

Among its many sustainable features, the Net Zero project has a small array of solar panels that generate electricity and heat water for the classroom. Dave Wilms, the science teacher behind the project, as well as the school's sustainability coordinator, has made a special effort to get students involved with the district's green committee and to ensure that the school's science curriculum includes topics related to the environment and sustainability.

Currently, one student at Stevenson is carrying out a study on LED lighting to determine the impact of changing all the school's athletic-field lights to the new bulbs. Marya Graff, a sustainability consultant who advised Stevenson through the LEED certification process, explains: "They've installed a sample fixture and are going to monitor the energy usage and light output. The student will write a report about it—and based on the findings, the school may consider a widespread lighting retrofit."

*Profile by **Lenny Giteck**, a freelance writer based in Las Vegas.*

***THE*:** Many educational advocates, ourselves included, are pushing for the increased use of technology in schools. But technology is an energy hog. How is that consistent with sustainable buildings?

WR: We're working with schools built in the '30s. They don't have air conditioning; they only have a couple of computers. We're going to be able to go in and transform that entire campus. All of those buildings will be air-conditioned. The students are going to have access to technology and recharging stations. We know that the amount of power generated in those spaces is going to be far more, because they're state-of-the-art, 21st century learning environments. That's what makes it even more of a moral imperative that we do things to offset the amount of energy we're using.

***THE*:** What's a good way to offset that energy usage?

WR: The HVAC [heating, ventilating, and air-conditioning] system is one of the largest energy consumers in a school, so even modest improvements in that system's efficiency can represent a significant savings to a school's operating budget. There are sophisticated tools that should allow just about any HVAC system to meet a really high level of performance.

***THE*:** Talking about buildings from the 1930s, is it better to just start from scratch or to go for a retrofit?

WR: Often when boards and policies are established they want everything to be green, "except for our existing stock," because they think it's going to be so costly to retrofit. In many ways it's almost the biggest imperative that we have the ability to restore a school that is an existing resource—so that we're not tearing down and then spending more when we have the ability to restore the schools in place. It's almost more critical that we address those schools rather than build new schools.

***THE*:** What can school IT leaders do to really promote a green agenda in their districts?

WR: I think that every IT group that has the opportunity should provide software that allows feedback to the folks in the building—whether it's technical data about the performance of the building that their own staff has the ability to audit and measure, or whether it's data going into science classrooms so that a middle-school science teacher might use it to [help students] understand how their behavior in the building can affect the energy performance of the building. [Teachers can also] integrate that information into their general curriculum...and maybe make things more relevant to their students. the

Interview by **Tim Prentiss**, a creator of online learning for Learnable.com and other organizations.

What Makes a School Green?

LEED—which stands for Leadership in Energy and Environmental Design—is the brainchild and handiwork of the US Green Building Council, a nonprofit entity founded in 1998. The LEED program offers a rigorous process to certify buildings—new or older retrofits—to meet high environmental standards in design, construction, operations, and maintenance.

The USGBC's Green Schools Campaign is working to get more K-12 schools to become LEED certified. (A Green Campus Campaign is working toward similar goals for higher education institutions.) According the USGBC website, as of July 2010, there were more than 300 LEED certified schools and another 1,700 registered LEED school projects.

"There are a few things unique to our schools initiative," notes Anisa Baldwin Metzger, who manages the LEED Green Schools fellowship program. "For example, some modifications have been made for transportation credits a school can earn with regards to busing. Also, there are prerequisite credits—meaning they're required on every school project—for the buildings' acoustics, which are essential for creating a quiet space conducive to learning. In terms of lighting credits, school lights need to be adjustable for regular classroom levels and when audiovisual equipment is being used."

The green schools program actively promotes the use of technology to heighten building inhabitants' environmental awareness. For example, installing an up-to-date building automation system (BAS) in a school enables administrative, operations, and maintenance personnel to closely monitor the energy use and performance of devices such as air conditioners, heating systems, fans, and lights. "You can either hook right into the system at the school," Baldwin Metzger explains, "or you can look at it remotely. These systems are capable of communicating alerts to whoever is monitoring the school building."

Below are the USGBC's characteristics of green schools to consider whether you are building from scratch or retrofitting an existing edifice. For more information, go to *usgbc.org*. A green school:

- Conserves energy and natural resources
- Saves taxpayer money
- Improves indoor air quality
- Removes toxic materials from places where children learn and play
- Employs daylighting strategies and improves classroom acoustics
- Employs sustainable purchasing and green cleaning practices
- Improves environmental literacy in students
- Decreases the burden on municipal water and wastewater treatment
- Encourages waste management efforts to benefit the local community and region
- Conserves fresh drinking water and helps manage storm water runoff
- Encourages recycling
- Promotes habitat protection
- Reduces demand on local landfills

5 Essentials
to Greening the Data Center

A growing number of districts are overhauling their data centers to conserve energy and cash. Here's a primer on the most important elements of any sustainability effort.

By Dan Gordon

A 2008 STUDY BY THE management-consulting firm McKinsey & Co. projected that the world's data centers would surpass the airline industry in greenhouse gas emissions by 2020. Certainly adding to those emissions are K-12 districts, whose data centers hold the equipment that serves as the backbone for an ever-growing number of computing initiatives. Inevitably, the dramatic rise in K-12 technology use in recent years has given way to soaring energy usage and power bills in many districts.

"These data centers are needed to support 21st century education," acknowledges Jim Maclay, director of energy services for LPA, an Irvine, CA-based design firm with expertise in K-12 sustainability issues. But that doesn't mean data centers have to be wasteful, he says. "They can be designed in a way that both reduces the harmful effects of fossil fuel-based energy consumption and doesn't put a burden on the operating budget."

The good news is that many K-12 school districts are recognizing their data centers as fertile ground for energy and cost savings and are taking steps to improve their energy efficiency. In CDW-G's annual survey of IT energy efficiency, 77 percent of K-12 respondents indicated that they have or are planning a data center consolidation strategy at their school or district. Among the educators who said that their institutions have taken these measures, 63 percent reported energy savings of 1 percent or more.

Of course, not all energy-saving plans are created equal; some greening measures clearly rise to the top of the list of best practices. We talked to energy experts and district IT directors who have undertaken data-greening efforts, and from these conversations we were able to identify five essential elements to any data center greening initiative.

If your district has not yet begun a data center redesign, then the following guidelines can help you get started on a plan. Even if your district is on its way to a greener data center, taking a look at these essential elements may help ensure you're not missing steps integral to achieving strategic energy and cost savings.

James Kaczman

ELEMENT 1: Measuring Usage

Management guru Peter Drucker is credited with saying, "What gets measured gets managed," and it's no less true in data centers than it is in corporate boardrooms. While CDW-G's annual survey reveals that many schools and districts report taking steps to overhaul their data centers, it also tells us that 88 percent of respondents said they are not tracking their data centers' power usage effectiveness (PUE). This means that many districts don't know how much energy their data centers are actually using—even the districts that have energy-saving plans in place.

"If you don't have any idea how inefficient you are, you don't know where to start," points out Gary Markowitz, president of Kilojolts Consulting Group, an energy-management consulting firm based in Lexington, MA.

Markowitz says that data center overhaul efforts must begin with baseline energy-usage measurements, and then incorporate strategies for continuous tracking of energy consumption throughout the process. His group is one of many to offer toolkits for tracking energy consumption. [See "Tools for Tracking Energy Usage," right.] In addition, the US Environmental Protection Agency and US Department of Energy offer initiatives through their joint Energy Star program to assess data center improvements.

Without such information, it becomes harder to justify expenses toward data center greening, notes Rich Kaestner, green computing project director at the Consortium of School Networking (CoSN), a professional association for K-12 technology leaders that offers its own web-based tool for estimating annual kilowatt-hours used and related costs.

The point about measurement isn't lost on Art Stellar, superintendent at **Burke County Public Schools** in Burke County, NC, which has been named an Energy Star Leader by the EPA and Department of Energy because of its efforts in energy conservation. Before Stellar arrived, he explains, the district was doing little monitoring of its energy usage. Now, he says, "We conduct energy audits of the buildings on a routine schedule, and include the rooms containing the data centers during those audits."

The district uses an energy management software program from EnergyCap to track utility bills, generate management reports, and calculate "cost avoidance" accrued from energy management activities. Armed with detailed information about where it was and was not expending energy, Burke County made changes both inside and outside its data center—from consolidating its servers and installing a more efficient cooling system to data center-initiated shutdown of all computers after 6 p.m. As a result, the district

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TOOLS FOR TRACKING ENERGY USAGE

Here are some of the free tools available to help measure energy usage, an important part of creating a greener data center:

CoSN Energy Usage Calculator
cosn.org (search words: usage calculator)
The Consortium for School Networking offers this quick approach for estimating annual kilowatt-hours and related costs for computer use by K-12 users (by group) and the related data center infrastructure.

Data Center Energy Efficiency Calculator
infotech.com (search words: energy efficiency calculator)
Info-Tech designed this tool to help analyze metrics in order to optimize power utilization and cooling in the data center.

Green Data Center Calculator—Virtualization
itbusinessedge.com/cm/docs/DOC-1131
This calculator from IT Business Edge gives a quick approximation of the results that can be expected from server virtualization.

PUE and DCiE Calculator
42u.com/measurement/pue-dcie.htm
42U's interactive calculator helps measure power usage effectiveness and data center infrastructure efficiency.

Data Center Efficiency Calculator
www.apcmedia.com/salestools/WTOL-7CMGPL_R2_EN.swf
APC offers a tool that calculates the impact of alternative power and cooling approaches on energy costs.

IT Carbon & Energy Allocation Calculator
www.apcmedia.com/salestools/WTOL-7WTM24_R0_EN.swf
APC's allocation calculator helps IT staff figure out efficiency, load characteristics, and location of carbon and energy allocation.

Data Center Maturity Model
thegreengrid.org (search words: data center maturity)
The Green Grid enables users to benchmark the current performance of each element in a data center, determine levels of maturity, and identify the ongoing steps and innovations needed to achieve greater energy efficiency and sustainability.

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TOP ENERGY-SAVING CONSOLIDATION MEASURES

There are measures beyond our five essentials that can reduce energy consumption in the data center—many of them in use in K-12 schools. According to CDW-G, the most popular energy-saving measures IT administrators report using include*:

- Virtualizing servers and/or storage (63%)
- Consolidating servers (61%)
- Building private or using public clouds (37%)
- Retiring unused or "ghost" servers (36%)
- Replacing old processors with low-power versions (35%)
- Consolidating UPS devices (24%)
- Shutting down or pausing servers during off-peak operations (22%)
- Employing high-density cooling (14%)

*Those who have or are developing a strategy were asked to select all that apply. Source: *CDW-G 2010 Energy Efficient IT Report* (*newsroom.cdwg.com*, search words: 2010 energy efficient).

was able to reduce costs by $1.2 million last year alone, enough to save teacher positions. "Once you start putting it in those terms, it's much easier to justify the changes you're making," Stellar says.

ELEMENT 2: Virtual Servers

Server virtualization—using software to run multiple applications concurrently on the same host computer—is arguably where districts can make the most impact in their data center greening efforts. Virtualization cuts energy usage by reducing the number of physical servers in the room while maintaining and making room for increased data storage capacity.

"So many servers are running with minimal utilization," says Mark Lafferty, CDW-G's director of strategic solutions and services, servers and storage. "By virtualizing and getting more efficient utilization out of fewer servers, there's a major benefit to power consumption. Instead of having 10 servers running at full power but with only 3 to 4 percent utilization, you can have one machine that runs at 60 to 80 percent."

In the case of **Alvarado Independent School District**, a school system with 3,400 students and 400 employees spread out over 96 square miles in north Texas, concerns about energy costs and the spiraling growth of the district's data needs led to a redesign of the data center in 2009, with a focus on server virtualization.

Approximately 40 servers and 45 terabytes of network storage centrally ran the data operations over the district's eight locations, and one of the major steps taken by the IT staff was to consolidate the servers through a new storage-area network infrastructure. Kyle Berger, the district's executive director of technology services, says that by virtualizing the servers, he found that, on average, he could use one server to perform the work previously done by eight without losing any functionality. Besides the significant reduction in power consumption, the move lowered hardware and maintenance costs, he notes.

It's probably not news to anyone in IT that server virtualization can save both energy and money. But how great the savings depends largely on careful preplanning. "You have to analyze the CPU usage of your servers and figure out what works together—and make an initial financial investment, particularly if you find that a new server is needed to do the job," says CoSN's Kaestner. "In a K-12 district, the technology department is often understaffed, so when new applications are added, they might just buy a server and put it on the network. Consolidation takes time and planning, but it's worth it."

ELEMENT 3: Joining the Cloud

When it comes to improving energy efficiency in the data center, a step beyond server virtualization is moving to cloud computing—outsourcing the hosting job so that services and storage are provided over the internet. Many K-12 districts have begun moving that way by using e-mail applications such as those offered by Google or Microsoft Office Live rather than supporting their own server. Others have implemented online programs such as Pearson PowerSchool for student record keeping, or rely on software-as-a-service providers such as SchoolDude to host applications that they can then access on demand.

For some districts, the cloud is not always an easy call. At Alvarado ISD, Berger and his staff have been exploring ways in which they can adopt cloud computing and have shifted certain applications in that direction. The concern, he notes, is that turning over hosting tasks can also mean relinquishing some control over how applications are run. "You're putting your faith in someone else, and it can mean losing flexibility with what you need to do," he says.

Matters of faith notwithstanding, Burke County Public Schools has moved several of its instructional software packages from server-based configurations to the cloud. "Moving this software to the cloud has improved local server performance by freeing up server space and processor power," reports Superintendent Stellar. "In some cases, we were running separate servers just for certain software packages; moving to the cloud eliminated hardware and maintenance."

Eliminating hardware can be a huge step in the right direction, says CoSN's Kaestner. He notes that while server

processors typically run at less than 10 percent of capacity, the energy they consume goes well beyond the active processing, since they are required to be on around the clock. "Less than half of the energy use of the data center comes from the servers themselves," he says. "The rest comes from the support systems, including HVAC [heating, ventilating, and air-conditioning], power supplies, and backup. So when you eliminate a server, in a sense you're saving twice the energy that server actually uses."

ELEMENT 4: Climate Control

Alvarado's Berger stresses the importance of paying attention to ancillary systems like HVAC. "Cooling is half the battle," he says. "If you don't have the right infrastructure for that, you can lose out on a lot of potential savings."

Taking control of a data center's climate issues should begin with assessing its current setup. Airflow obstructions from cables and other materials should be removed, particularly in a raised-floor environment. Since hot air rises and cool air descends, the cooling should come from above rather than below. Ductless heat exchangers and the use of outside air can also help to save on HVAC costs. In many cases, Kaestner notes, data centers are running with air-conditioning units that are inefficient. Although it requires a capital investment, newer equipment can bring substantial energy savings.

Alvarado ISD installed an APC InfraStruxure device for in-row cooling that enabled the data center to keep certain aisles hotter than others depending on equipment needs. In doing so, the IT group found it could increase data center power and cooling capacity while saving space. "It allowed us not to have these robust units cooling the entire room to frigid temperatures," Berger notes. "With the focused cooling, we have more room to grow." Berger estimates that between the improved design and the adoption of virtualization and cloud computing, his data center has reduced energy consumption by 25 percent.

A district can save even more energy by taking steps as simple as turning up the thermostat, depending on the equipment's specs. "Modern computers don't need to be at 68 degrees; they can float all the way up to 78 and work perfectly fine," points out Kilojolts' Markowitz. Newer computers also have less stringent relative humidity requirements than those of previous generations, Markowitz says, noting that many who oversee data centers continue to operate on previous standards, cooling and humidifying the air more than is necessary.

ELEMENT 5: Collaboration

None of these energy-saving changes can occur in a vacuum. "You have to open up the communication early on between the IT department and the facilities and operations department within the school district," says Berger. Often, he notes, the IT staff aren't seeing the electric bills, so they're unaware of where savings potential lies; on the other side, facilities personnel need to understand IT requirements and goals and how they can be accomplished through a greening strategy.

"The prevailing attitude has to be that facilities is part of the IT team," agrees Markowitz. "In many organizations IT is seen as an entity of its own, buying its own equipment without telling anyone and then going back to facilities and saying 'Where's our power?' That attitude has to change."

Because technology leaders typically don't have budget responsibility for energy use, it's easy for data center greening to remain a low priority. IT directors, Kaestner notes, "are dealing with a budget crisis, and it doesn't help their own departmental budgets to be green."

But districts that have taken the initiative to go green have found that the benefits can be considerable—and not just financial. In 2009, **Orange City School District** in Pepper Pike, OH, underwent data center renovations that included consolidating servers through virtualization and cloud computing, and moving the physical servers into a concentrated area to reduce cooling costs—all of which bought the IT group "a lot of goodwill," says Kurt Bernardo, technology coordinator for the district. "As part of a school district you try to set a good example," he adds. "After what we've done, people in other departments are trying to do their part."

Alvarado ISD's Berger believes the goodwill gained by IT for their greening efforts carries substantial value. "Funds are decreasing everywhere," he says. "If we can show what we're doing to conserve power and how we are putting our savings back into the students rather than just running these things in the background, that's great political value."

Orange City and Alvarado are two of eight districts that have earned Green Computing certification as part of a program run by CoSN to provide K-12 technology leaders with an opportunity to be recognized for their efforts at reducing their school or district's carbon footprints. "Schools are in the public eye, and having good public relations is important. Try working to pass a school bond if you don't have good relationships with your community," says CoSN's Kaestner. "Greening the data center gives technology leaders an opportunity to set an example while saving money that can be used to improve education." the

Dan Gordon is a freelance writer based in Agoura Hills, CA.

LINKS

- **EnergyCap**
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- **Energy Star Data Center Energy Initiatives**
  energystar.gov
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- **Kilojolts Consulting Group**
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  lpainc.com
- **McKinsey & Co. carbon data emissions report**
  mckinseyquarterly.com
  (search words: 2008 data centers)

Conservation efforts and green technologies are integrated into the daily curriculum at both Asheville, NC-based Evergreen Community Charter School (top middle) and Environmental Charter High School in Lawndale, CA (remaining photos).

CHARTING A GREEN COURSE

BY JENNIFER GRAYSON

Photo Credits: Kevin Smith (top middle); all other photos courtesy of Environmental Charter High School

Environmentally focused charter schools have shed their Birkenstock image by preparing students for the high-tech, clean energy jobs of the future.

"We're not tree huggers!"

That's what Alison Suffet Diaz's students used to say in the early days of Lawndale, CA's **Environmental Charter High School**, the environmentally focused charter school she founded in 2000 in a South Los Angeles neighborhood where four out of five families live below the poverty line.

That was when the mere mention of a charter school — let alone a green charter school — conjured up images of kids climbing trees and practicing yoga poses at recess. "When they played in sports, the other teams on the field would burn a tree [in effigy], thinking that was our mascot," she laughs.

Image wasn't the only thing Environmental Charter High struggled with at first. Because charter schools — essentially independent public schools — do not typically receive funding to cover the cost of securing a facility, Environmental Charter High originally shared its space with a local church. Since the facility didn't belong to the school, technology integration was a challenge, to say the least. "We started off just being very wireless, and struggled with firmware — not to mention getting the resources in order to get technology working correctly," says Suffet Diaz.

On top of it all, securing resources like E-Rate funding, for instance, was a challenge without a stand-alone facility recognized by the state. Needless to say, the school had to make do with the few technology purchases it could afford. "In the early days, it was hard to have anything as simple as an LCD projector in your classroom," recalls Principal Jenni Taylor, who taught at ECHS that first year. "We just didn't really have technology unless it was some resource we brought in." Science equipment, especially, was fairly limited.

A lot has changed since then. To begin with, charter schools don't carry the stigma they once did. Although only 4 percent of the nation's students are currently enrolled in charter schools, that number is fast increasing. According to the National Alliance for Public Charter Schools, the number of US charter schools grew by 6.7 percent last year; a 7.5-percent increase is projected for the current school year. And in areas of the country plagued by underperforming public schools, stressed further by recession-fueled budget cuts, charter schools are being added at a dizzying pace. New York state, for instance, anticipates 20 percent more charters by the end of 2011.

The green movement, too, has evolved over the years: With renewable energy production now the fastest-growing industrial sector in the world and as many as 37 million US jobs expected in the renewable energy and energy efficiency industries by 2030, it has become clear that the days of associating environmental sustainability with hippiedom are behind us. Students in school today must prepare for these high-tech, science-driven green jobs.

Enter green charter schools. Given the autonomy to develop their own curricula, these institutions have evolved into veritable showcases for 21st century, tech-integrated learning, preparing a new generation of students to not only be good stewards of the Earth, but to take the science world by storm.

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"OUR GREEN CHARTER SCHOOLS REALLY ARE AT THE FOREFRONT OF NOT ONLY GREENING THEIR SCHOOLS AND SUSTAINING OUR EARTH, **BUT THEY'RE ALSO AT THE FOREFRONT OF INNOVATIVE EDUCATION PRACTICES."**

More than 200 charter schools in the United States call themselves members of the Green Charter Schools Network, a consortium and clearinghouse that was founded in 2008. Schools become members by adhering to the network's "green print," or list of core practices, according to Jim McGrath, the group's president and executive director. Another hundred or so schools affiliate themselves to some extent with the organization. The network facilitates communication among educators, parents, and policymakers alike, connecting them to resources and other schools that might want to adopt their own eco-focused programs.

McGrath points out that, for these environmentally focused schools, "green"

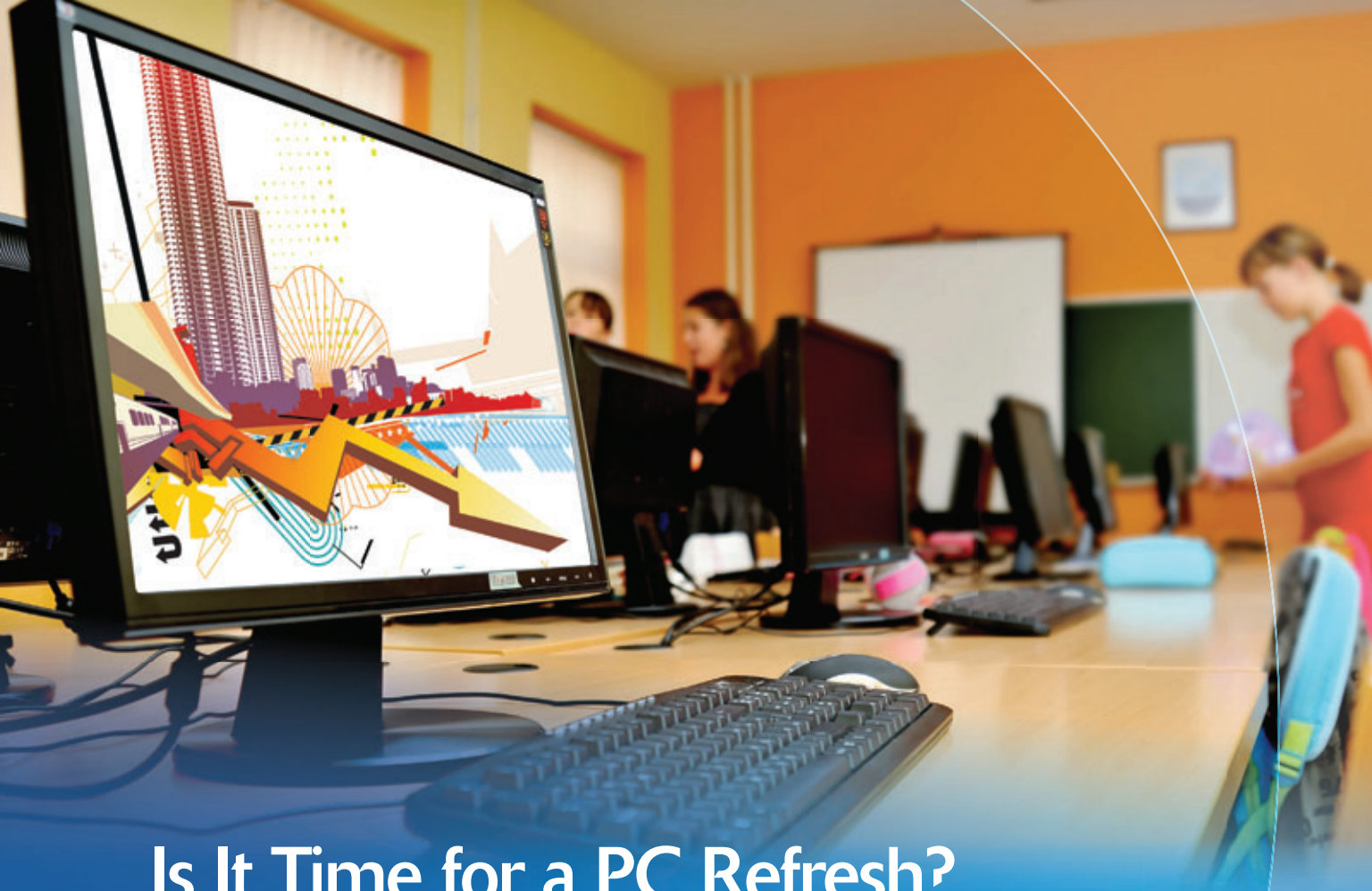
PAYING THE BILLS

Just how are these STEM-focused green charter schools funding technology purchases for their students? "Grant writing," says Ariel Levi Simons, science teacher at **Environmental Charter High School** in the Los Angeles County community of Lawndale, CA. As public schools, charter schools receive a per-student allotment of taxpayer dollars, but in some states they don't receive the same amount as their more conventional public school counterparts do. What's more, charter schools do not typically receive any financial help with facility expenses, making budgets even tighter than they are for cash-strapped traditional public schools.

In the little over a year that Simons has taught at ECHS, he has spent about 150 hours alone on writing grants—a daunting but somewhat familiar task for the physicist who still spends his summers as a researcher. The organizations that Simons has applied to include Raytheon, Toyota Tapestry, ING Unsung Heroes, Donors Choose, Edison International, and Chevron.

Grant writing is also a large part of fundraising for **Evergreen Community Charter School** in Asheville, NC, says Development Director Eleanor Ashton. In North Carolina, charter schools do not receive money from state lottery profits like other public schools, so Evergreen must put on a number of fundraising events each year, including an annual benefit concert and silent auction. Asheville is a very arts-focused community, so a number of prominent artists in the area donate their work to the auction. Parents, too, are very involved in keeping the school afloat financially—giving to the school's endowment, volunteering in the office, even driving on field trips. Ashton is one of those parents: She helped found the school 12 years ago (both of her children attended) and stepped into her full-time position after the former development director chose not to return from maternity leave.

Even with this support, says Ashton, the school struggles financially. "Funding is a challenge for charter schools," she says. "We don't have the latest and greatest technology like some of the other public schools do." Technology teacher Kevin Smith says that just forces him to be creative. "A lot of times schools are just going out saying, 'We need a Smart Board,' and then it just sits in the room and no one ever ends up using it," he says. "We make the most with what we've got."



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is just a starting point for an ambitious educational and social agenda. "Our green charter schools really are at the forefront of not only greening their schools and sustaining our Earth, but they're also at the forefront of innovative education practices," he says—something he saw firsthand as founding principal of the **Oakwood Environmental Education Charter School** in Oshkosh, WI. Not surprisingly, McGrath and educators at network schools believe new technology will be fundamental to those changes.

STEM and Sustainability

"Science, technology, engineering, mathematics: STEM is the new buzzword in schools," says Suffet Diaz, now executive director of Environmental Charter High. Ten years after the school was started, the acronym is placed at the forefront of student learning—thanks, in large part, to the grant-writing skills of science teacher Ariel Levi Simons. Via the funds he's secured (see "Paying the Bills," p. 28), the school's 460 students are now armed with a host of technologies to support their project-based learning.

In Simons' AP Environmental Science class, for instance, students work like mini field scientists: In one recent project, they used handheld computers with plug-in sensors from Pasco to test water quality over a three-week period at five different sites in the area surrounding the school's campus. Video cameras were also employed to record visuals of the testing sites.

Once the data was gathered, the students headed back to the classroom and incorporated geotagging into the project—editing their data in Google Docs, placing it in a spreadsheet, and putting that and the video they had recorded on Wikimapia, a satellite imaging site that combines Google Maps with a wiki system in order to "describe the whole world." The students, says Simons, get a kick out of seeing their own little corner of the world up there. "Now you can go on Wikimapia, click on the five sites we've been to, and pull up a video and water quality record of what we did at that point," he says.

Water quality is also a hot topic for the **Evergreen Community Charter School**, a K-8 school with nearly 400 students in Asheville, NC, that follows an expeditionary learning model for its eco-focused curriculum. At Evergreen, eighth-graders took the water-sampling project a step further by focusing on a real-world problem: possible water pollution in the area. They collected samples from a local stream and plotted the sample data by geographic location via Google Maps.

By accessing the local Buncombe County Geographic Information Systems, the students made a list of property owners in the area. Once they have analyzed their data to determine the condition of the stream, they plan to contact the property owners to pass along that information. If, for instance, pesticides and fertilizer runoff are uncovered in the samples, the students will make recommendations as to how the property owners can minimize pollution.

"Whenever we're creating a project, we're trying to do it with an authentic audience," says Evergreen technology teacher Kevin Smith. "We want to make the students feel like they're truly responsible for something, that there are people out there who are really invested and interested in what they have to say and the outcome of their project."

Making the Connection

At Environmental Charter High, students connect to their authentic audience through the school's Green Ambassadors program. In the program, both a class and an extracurricular club, students use what they learn in science class to organize community outreach events. Their events, covering topics like composting and water conservation, incorporate everything from how-to videos and PowerPoint presentations to photo exhibitions. The "green ambassadors" also learn how to work with the media, both writing press releases and blogging to publicize their events.

To enhance their students' public relations skills, ECHS teachers incorporate yet

GREENING THE GREEN SCHOOL

At **Environmental Charter High School** in Lawndale, CA, students take what they've learned in the classroom about conservation and spread that knowledge to their local community through the school's Green Ambassadors program. So, it would only make sense that the school would take its environmental outreach inward as well, greening its own facility wherever possible.

The result is one of the most environmentally progressive campuses in the country (remarkable, given its urbanized South Los Angeles location), complete with multi-material recycling, composting stations, rainwater collection, edible organic gardens, a biodiesel refinery, and student-built cob benches. What's more, "a lot of the transformation that has happened on campus was a result of the kids identifying problems," says Executive Director Alison Suffet Diaz. Through the school's permaculture class, for instance, students worked with instructors to solve the problem of giant puddles that would ruin their outdoor lunch area during the rainy season. The solution? A seasonal campus stream and wetlands, creatively constructed to divert the flooding.

At **Evergreen Community Charter School** in Asheville, NC, students are working with technology teacher Kevin Smith to brainstorm ideas for a new building the school is adding to its campus. They're using Google SketchUp to put together three-dimensional renderings for the project. "The architect is interested in seeing what green design principles the students can incorporate," says Smith. "It's really neat that some of their ideas from the model they create could actually be incorporated in the master plan."

another important technology component: social media. "They learn how to navigate and use social technology in order to organize events and make effective community change," says Taylor. Facebook and Twitter are utilized, and a student intern monitors the social websites for the school.

This emphasis on social media not only helps students hone their environmental messaging skills—it also should serve the students well once they enter the job market in a few years, explains Suffet Diaz. "The reality is, to be successful in your work life, you have to be able to sell yourself," she says. "A lot of what the Green Ambassadors class teaches them is how to be PR and marketing geniuses."

At Evergreen Community Charter, where younger students navigating the world of Twitter and Facebook could pose a security risk, tech teacher Smith introduces his fifth- and sixth-graders to social networking by having them create their own sites on Ning to complement the science curriculum.

For a lesson on aquatic organisms, Smith's students created a social network where they posted profiles as salamanders, mayflies, water penny beetles, and other invertebrates. "That's been a really fun project because it's so similar to Facebook and what they're doing in their day-to-day life," he says.

Getting Results

For Smith, the integration of technology and the environment is a perfect fit. It's precisely this combination, he says, that gets kids excited about learning itself. "The kids are very self-aware and extremely self-motivated compared to what I've seen in the past," he says.

Evergreen's development director, Eleanor Ashton, echoes that sentiment, pointing out that there is more to the school than technology and the environment. "As much as our kids are using technology, they're also doing a lot of outdoor activities: snowboarding, skiing, rock climbing, backpacking," she says. The students end each school year with a camping excursion, leading up to a four-day Outward Bound trip for the graduating eighth-graders.

"Sometimes people get the impression that we're a camp," Ashton laughs, "but we're not." She points to Evergreen's academic record as proof that this kind of hands-on learning works. Last year, the school was named an Honor School of Excellence—the highest designation awarded by the state of North Carolina—for its end-of-grade state test scores. Ninety-four percent of students in grades 3 through 8 tested at or above grade level for reading and math; every single eighth-grader passed the science exam; and the school met all 13 Adequate Yearly Progress goals established by No Child Left Behind.

Environmental Charter High boasts similar results: In a part of Los Angeles where many young people don't even graduate from high school, 92 percent of ECHS students are admitted to four-year colleges and universities—a requirement for graduation. *US News & World Report* recently ranked ECHS in the top 3 percent of public high schools, and the school was a finalist in President Obama's 2010 Race to the Top commencement challenge (a competition one of ECHS' social networking–savvy students learned about via Twitter).

Not every charter school sees this type of success, of course. A recent study by Mathematica Policy Research, for instance, found that middle school students in charter schools across 15 states generally performed no better in math and reading than other public school students. But Principal Taylor credits ECHS' tech-focused curriculum for engaging today's 21st century learners, many of whom would be bored in a traditional classroom setting. "We have a lot of kids who are just really kind of science brains," she says. "Without the right equipment and techy stuff for them to be able to play with, you won't engage that learning experience for [them]."

For Suffet Diaz, who has seen her school's credibility evolve from "this hippie blah blah blah kind of school to one that's serious about learning about science and technology," the added green focus provides more than the potential for a cleaner environment. "The larger picture for me in creating this school is inspiring the kids to care about anything, so that they care about their learning," she says. "Once you get kids to care, then they say, 'Okay, I need to pass my English class so that I can apply to college so that I can do this career I really want to do.' So having the STEM materials on campus and having the teachers who have the ability [to use them] is critical to our students' success." the

ALISON SUFFET DIAZ HAS SEEN HER SCHOOL'S CREDIBILITY EVOLVE FROM "THIS HIPPIE BLAH BLAH BLAH KIND OF SCHOOL TO ONE THAT'S **SERIOUS ABOUT LEARNING ABOUT SCIENCE AND TECHNOLOGY."**

Jennifer Grayson is an environmental journalist based in Los Angeles.

LINKS

- **Buncombe County Geographic Information Systems**
  buncombecounty.org/governing/depts/gis
- **Green Ambassadors**
  greenambassadors.org
- **Green Charter Schools Network**
  greencharterschools.org
- **National Alliance for Public Charter Schools**
  publiccharters.org
- **Pasco**
  pasco.com
- **Wikimapia**
  wikimapia.org

Susan McLester

Creating Calm in the Midst of Crisis

When faced with a serious threat, an Iowa school district quickly mitigates panic and confusion with the help of a newly implemented mass notification system.

JUST BEFORE DINNERTIME on an unseasonably warm Sunday in early November last year, Jarrett Peterson, communications and marketing coordinator for **Ankeny Community School District** (IA), got a call from the district office. It was the kind of call he had hoped he'd never have to take: **Ankeny High School** had received a bomb threat.

Peterson was told to report immediately to the Emergency Operations Center—a room that could quickly be set up as a dedicated radio-, phone-, and computer-equipped headquarters at the district office—where he would meet with 15 other emergency operations team members to make some quick decisions about protocols to be followed over the days ahead.

A Well-Laid Plan

Despite shocking incidents in idyllic towns like Columbine, CO (1999), and Nickel Mines, PA (2006), major violence in pastoral Ankeny, a rapidly growing community of 45,000 located about seven miles from the heart of Des Moines, IA, still did not seem likely. In fact, Ankeny's well-kept parks and lakes had earned it a place on *Family Circle* magazine's "Top Ten Best Towns for Families" list in 2008, as well as *Money* magazine's "Top 100 Best Places to Live" list in 2009.

Even so, Ankeny, like many other school districts across the country, knew that an emergency preparedness plan was crucial. If nothing else, natural disasters and extreme weather conditions warranted an organized procedure for dealing with school closings. A Readiness and Emergency Management for Schools federal grant helped Ankeny finance the district's emergency preparedness plan and bring in an outside consultant with experience in homeland security to assist in developing and carrying out a plan.

Although the district already had its emergency preparedness plan in place when it received the written bomb threat, less than two weeks had passed since Ankeny had done an initial small-scale test of its newly acquired AlertNow mass notification system from Blackboard. This new program offered broader and more customizable notification options and integrated a full-fledged emergency notification strategy with the district's data management and communications systems.

From Plan to Action

At the Emergency Operations Center that Sunday, Peterson and his colleagues evaluated the situation, including the specifics of the threat and police findings. There, they discussed what security measures would be best for Ankeny High School to take over the next couple of days, as well as what message they should send immediately to parents, educators, and the community. The group decided to close the school the following day and quickly make announcements to all stakeholders that would include essential facts about the situation, as well as instructions for finding additional information. As the district communications specialist, Peterson was responsible for articulating that core information and ensuring that it was dispatched in a timely manner using AlertNow.

The police department had completed one sweep of the facility as the Emergency Operations Center was being activated, and as Peterson worked to craft the appropriate messages, police swept the building and its surroundings for explosives a second time. The school's administrators were also on hand to help identify any unusual or suspicious changes in the building's appearance.

Back at the Emergency Operations Center, Peterson had finalized what would be his first communication to staff and par-

Scotty Reifsnyder

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ents: the script for a voicemail that relayed the main facts of the situation.

Before proceeding, he had another operations team member review the draft to ensure that he had interpreted the information correctly. Once the team approved the wording, administrators, principals, and staff received the information first via the school's Microsoft Outlook e-mail system.

The AlertNow system allows users to upload or copy-and-paste the script from Microsoft Word into the system software. The software then offers the option of having the message read and recorded by a live person or by a computer through a text-to-speech feature. Peterson logged on to the AlertNow website and opted for the personal recording. "They needed to hear a voice from a real person in the district," he says.

Peterson then used the software to send a message to the parents of the affected high school students. The voicemail included the following key messaging: The school had received a bomb threat; the police had been notified; school would be closed Monday but would reopen Tuesday; the public would not be allowed on the school facility on Monday; and, on Tuesday, students were not to bring backpacks or book bags to campus. The message also directed parents to the school website for more detailed information. Peterson ensured that the voicemail message was less than 60 seconds in length, the maximum amount of time to include key information without confusing recipients with too much detail or risk exceeding the recording length of most voicemail systems.

Peterson relayed the message to all numbers on file for each student's household, including numbers for cell phones, office phones, home phones, or care providers' phones. Within 25 minutes of being notified of the bomb threat, the district had sent 4,900 voicemails to the families of its high school's 1,630 students.

After sending the voicemails, Peterson then sent out the same message to parents via e-mail—more than 1,700 notices in all—with links to the district website, where parents could find more information. He also notified staff members with the same essential information that he had sent to parents, but with additional customized details about work hours, contracts, and other matters, as well as a link to the district's employee portal.

After wrapping up initial parent and staff communications, Peterson drafted a press release to alert local radio and television stations and print media. Prior to AlertNow, press releases had been the primary communication channel for the district during emergencies.

Back at Ankeny High School, the police department completed its thorough sweeps of the grounds and found them clean. Monday passed without incident, and Tuesday students returned to school, where Peterson reports that there was "a very high rate of compliance" with the directive to not bring backpacks.

Within 25 minutes of being notified of the bomb threat, the district had sent 4,900 voicemails to the families of its high school's 1,630 students.

Despite the fact that many families had not yet updated their contact information for the year, says Peterson, the AlertNow system confirmed in a delivery report that it was able to reach 96 percent of the students' families through the first voicemail message. "Everything went smoothly," he sighs.

A Second Scare

Unfortunately, the fear and trepidation of the week was not yet over for students, parents, or district personnel. Just one day after Ankeny High School students had returned to classes, the district received another written bomb threat. This time, though, **Northview Middle School** was the target.

"It was late in the afternoon, and school was almost out," says Peterson of this second emergency. The district office was notified of the threat by Northview administration, at which point the principal immediately alerted staff and began implementing evacuation procedures. Teachers had students file out fire-drill style and led them to a sports complex adjacent to the school.

Meanwhile, the district office again notified the police, and the emergency operations team assembled once more and worked down the chain of procedures. A response team member was also sent to the middle school to act as a public information officer for any media that arrived on the scene.

Because students were on campus during this emergency, much of the parent messaging had to do with where to pick up children. The AlertNow system allowed the response team to contact only those families with students in the affected building. A total of 3,600 voicemails and 1,300 e-mails were dispatched.

Once the school accounted for all of the students and dismissed them from the sports complex, the team started a further evaluation of the specifics of the situation. Based on their assessment, they decided that school would remain open the following day, Thursday. The middle school would implement the same security measures that the high school had employed earlier in the week, including increased staff presence, police presence, and a ban on book bags. Again, Peterson drafted staff and parent voicemail and e-mail messages, as well as a press release to send out to local media.

The Debrief

In the wake of the emergencies, members of the emergency response team met to review and evaluate procedures and, Peterson explains, talk about "what went well and not so well." With the help of the consultant who had assisted the district in developing its plan, the team wrote a report that examined the details of the week's events.

Peterson applauded the district for conducting regular and full-scale emergency drills in advance of the threats, citing the schools' preparedness as a primary reason that "everything fell into place." He also acknowledged the benefit of having outgoing notifications reviewed by more than one key

member of the operations team. (During the Northview incident, one of Peterson's colleagues caught and corrected an error in the street directions regarding the relocated student pickup area.)

Many parents offered positive feedback, as well, explaining that they felt confident that good decisions were being made and that the situation was in hand. They also acknowledged that the personally recorded voicemail, in particular, had calmed them. The district gathered this feedback through the AlertNow system, receiving 1,300 responses within the first 72 hours of sending out survey questions. Previously, when the district had sent home written communications asking for feedback, the return rate had been poor, resulting in only 1,200 responses districtwide over a three-week period.

"If I had it to do over again," says Peterson, "I'd tweak a couple of areas, including omitting one or two details from the initial voicemail and putting them on the website." He also notes a need to have more than one person handling communications—three, ideally—in order to send messages through different channels simultaneously, instead of consecutively. Also, one person could focus on crafting messages, while the other two could focus on disseminating them. Finally, Peterson suggests that adding a centralized network printer to the Emergency Operations Center would eliminate the need to use a printer in a distant office to produce hard copies of the communications for operations personnel to sign.

"In the final analysis, what is more important than the safety and security of students and staff?"

Overall, Peterson emphasizes the importance of making emergency preparedness a districtwide priority. He acknowledges that while focusing on a clear and organized emergency plan can feel like a "tacked-on chore" in the midst of all the tasks that schools must deal with on a daily basis, it is nonetheless "time well spent." After all, he points out, "In the final analysis, what is more important than the safety and security of students and staff?" the

Susan McLester is a freelance writer based in Berkeley, CA.

LINKS

- **AlertNow**
  alertnow.com
- **Blackboard**
  blackboard.com
- **Readiness and Emergency Management for Schools**
  rems.ed.gov

Dian Schaffhauser

A Taste for Telepresence

Although high-end videoconferencing is still new to this Maryland school district, it's a sensible next step on a well-planned path to location-free communication.

CHARLES COUNTY PUBLIC SCHOOLS, a southern Maryland district with 26,780 preK-12 students in 35 schools, isn't new to pushing the technology envelope. In 2006 it was the first district of its size to go completely wireless. Prior to that, the district introduced a data warehouse to enable teachers and administrators to make data-driven decisions. Laptops, streaming video, and interactive whiteboards are ubiquitous in the district's classrooms.

Nonetheless, when Superintendent James Richmond approached his school board three years ago with a plan for telepresence in the classroom, he was ahead of his time, even by Charles County standards. Telepresence—high-end videoconferencing that simulates in-person experiences—is increasingly favored in corporate and higher education settings but has largely lagged in K-12 due to its high-end price tag.

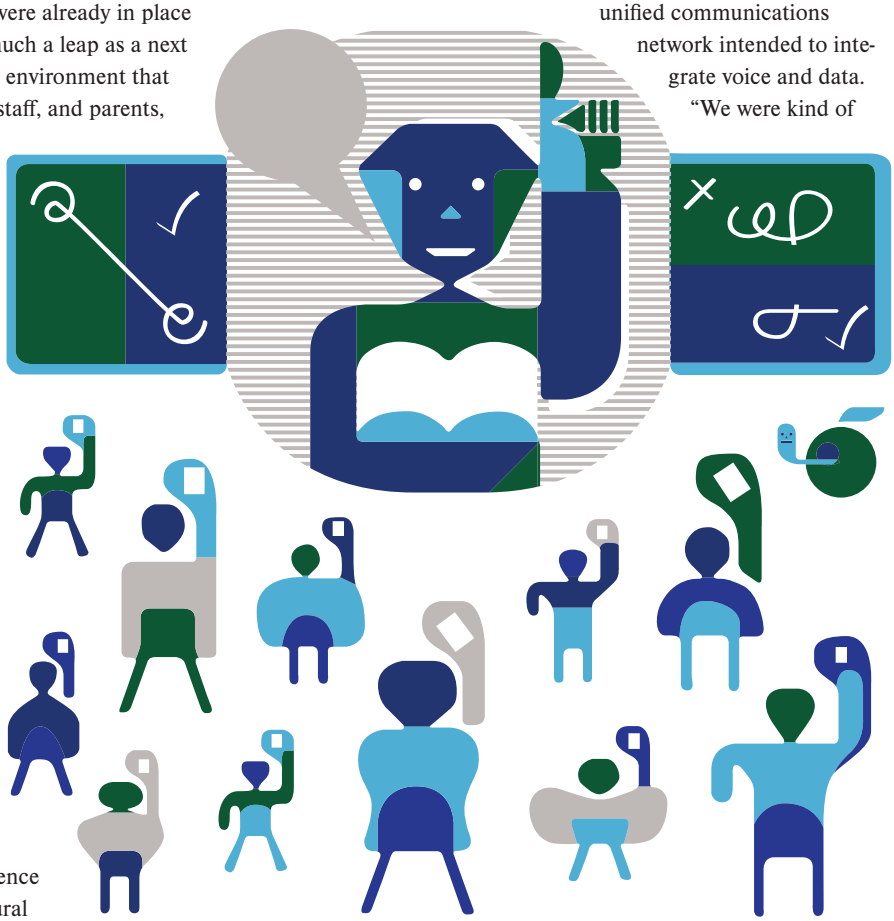
Yet, the building blocks for such a system were already in place in Charles County—telepresence wasn't so much a leap as a next step in the district's overall effort to create an environment that could seamlessly connect students, teachers, staff, and parents, regardless of location.

A Foundation for a Vision

In 2008, Richmond met with representatives from Cisco Systems, a major technology provider to the district, to explore ways to offer additional advanced placement courses through distance learning. A mainstay player in the telepresence market, Cisco suggested the district consider trying out a limited telepresence implementation.

Richmond immediately saw possibilities of holding higher-level classes whose low enrollments would normally exclude them from school schedules. "An example is biochemistry, a subject in which we would have limited, scattered interest from students," he wrote in a report to the school board that year. "Instead of hiring a full-time biochemistry teacher at each school, we could contract with a university professor to teach the course via telepresence on a Saturday or in the evening for students from all high schools." He envisioned that telepresence would allow the district to participate in cultural exchanges among local students and those in other countries. It could be used to deliver staff development courses and enable people to get together for district business meetings without the time, expense, or carbon emissions associated with physical travel.

Richmond probably could not have lobbied his board for such an implementation if a foundation for his telepresence vision had not already been laid years earlier. One might even say that the first brick was put in place the day CIO Bijaya Devkota joined the district in 2004. When he arrived on the job, Devkota faced an abundance of networking gear that the district had purchased the year before to upgrade its wide area network (WAN)—including equipment for a new unified communications network intended to integrate voice and data. "We were kind of



Federico Jordan

"Instruction needs to be like Netflix's video on demand. Why can't we have education on demand?"

overwhelmed," he recalls. "The timeline was completely not realistic. We had 38 different buildings. We had limited staff, and they had to get trained. We had to run these projects in a sequential fashion."

Undaunted, Devkota initiated a step-by-step plan to tackle the upgrades. The first job was to get the infrastructure in place. That encompassed replacing T-1 service with 2-gigabit fiber links between facilities. Then came the WAN, which required outfitting the data center with new blade servers, a storage area network, and multiple systems for security, backup, and disaster recovery.

Next, the IT team tackled the voice over IP (VoIP) phone system, a time-consuming undertaking at a district with hundreds of classrooms and offices. That project included installation of IP phone switches wherever they'd fit in each building, as well as deployment of handsets in offices and classrooms. It also meant upgrading electricity in many of the buildings, especially those built in the 1960s and 1970s, in order to accommodate the proliferation of new technology throughout the district.

In doing the VoIP technology upgrade, the district discovered a multitude of analog phone lines that had no phones attached to them, even though the schools were still paying for those lines. The discovery led Devkota to consolidate the multiple phone bills into one bill that his department now handles. "Why pay 30 different phone bills when you can just pay one?" Devkota notes. School principals had previously handled the bills—not an ideal situation, given the unused lines that sprang from multiple accounts.

VoIP was a revelation to the district. Teachers have become more immediately accessible to parents, who no longer have to leave messages in the main offices and hope to be available when teachers call back. And now, when a teacher or staff member moves to another location in the district, the phone and a person's number can follow along; all it requires is a simple update through software. "We know who's got that device, where they have it, where they have it plugged in," Devkota explains. In short, VoIP gave the district community a taste for location-free communications, which naturally led to the next best thing to being there: telepresence.

Adding Video to Voice

In 2010 the district installed three telepresence rooms, two at high schools and a third at an administrative building. Each classroom fits about 30 people, reports Devkota. The original rooms were gutted and then redesigned from the floor up—including window shades, paint, furniture, and audio and video gear. Each room is outfitted with dual side-by-side, 65-inch screens and a Cisco Tandberg codec, which delivers integrated voice and video to those displays. Devkota estimates the cost at about $100,000 per room, a quarter of that going to cosmetics and the remainder invested in the technology.

The next step is to fill those telepresence rooms with classes and meetings, fulfilling superintendent Richmond's dream of providing the right instruction to the right students, regardless of location. First on the roster are distance-learning classes delivered by Kaplan, whose instructors will be teaching advanced placement statistics via telepresence from a location in New York City to classes located at the two high schools.

The district is also working with Duke University. As Devkota describes it, "Professors will be at Duke teaching a course and our students will be jumping in to learn AP math, AP physics. We'll work with their Nicholas School of the Environment to teach our kids about marine biology and take them on virtual field trips. These professors will possibly never meet these children in their lifetime."

The district is hoping to deliver professional development courses locally to its staff and faculty from the College of Education at Towson University in Maryland, which is about two hours away by car. "Towson is the biggest producer of teachers for our county," explains Devkota. "A lot of our teachers take courses out there, but it's kind of far to drive."

Devkota believes the outcome for the use of video and other forms of communication provided through telepresence can't be predicted, but he expects it ultimately to be positive. "If we have limitations in areas, or we don't have certain teachers to teach high-level courses, or we want our teachers to be experts in certain fields, rather than having them go somewhere, we can bring that whole world to our school system," he observes. "Instruction needs to be like Netflix's video on demand. Why can't we have education on demand? If I need to teach German, and we only have 20 students, they should still be able to take it. The four walls of the classroom should not be the barrier anymore." the

Dian Schaffhauser is a freelance writer based in Nevada City, CA.

LINKS

- **Cisco Systems**
  cisco.com
- **Kaplan**
  kaplan.com

Gear Box

Southern Maryland's **Charles County Public Schools** purchased a Cisco Tandberg bundle for each of its three new telepresence classrooms. The bundle includes:

- Tandberg Profile 65 Dual 65-inch, side-by-side, high-definition LCD displays on floor stands
- Cisco TelePresence Codec C90
- Tandberg PrecisionHD 1080p Camera
- Digital Audio Module
- Microphone
- Remote control

ProductFocus

By David Raths

Green-Eyed Monitors

Old-school monitors devour electricity at an alarming rate. With prices falling on new LED-backlit displays, we profile 15 models that lay off the juice.

REMEMBER WHEN COMPACT fluorescent lightbulbs first hit the market? Despite the promise of significant energy savings, few people could stomach the purchase price of nearly $20 each. But today, these electricity-sipping bulbs cost as little as $1.50 with rebates, and the incandescent bulb has been consigned to darkness.

Much the same thing is now happening with computer displays, which have always been big energy consumers. Two years ago, schools probably wouldn't have given serious consideration to the new energy-efficient monitors coming onto the market. Despite the promise of energy savings and the use of fewer hazardous materials, the new monitors, backlit by light-emitting diodes (LEDs), carried price tags about 35 percent higher than their traditional counterparts. But falling prices, coupled with greater customer focus on power savings and environmental footprints, have transformed these monitors from novelties into worthy contenders. In a survey of the market, we found that schools can now choose from a range of energy-efficient LED-backlit monitors for less than $1,000—and, in some cases, for less than $200.

Apple LED Cinema Display

All the acronyms used with monitors can blur into a confusing alphabet soup. One acronym that isn't going away is LCD, which stands for liquid crystal display. Until fairly recently, the majority of LCDs were backlit with cold cathode fluorescent lamps (CCFLs), which contain mercury and consume a lot of power. The power savings of LED backlighting lead to lower carbon emissions, which are an increasingly important consideration for education institutions that have pledged themselves to carbon neutrality. Some monitors even include power-management features and carbon footprint meters. And because LED-backlit displays contain few or no environmentally hazardous substances, such as mercury, arsenic, and lead, they are easier to recycle than traditional monitors.

Displays with LED-backlit technology also offer advantages beyond the environmental. Because they use smaller, solid-state components, the monitors can be thinner and lighter than CCFL monitors. Also, unlike most other displays, LED-backlit displays don't take time to warm up: They turn on instantly and are uniformly bright.

In trying to decide which monitors best meet your school's needs, you need to cut through some of the marketing hype around "green" features. One option is to look for products that earn a Gold rating from EPEAT (Electronic Product Environmental Assessment Tool), which assesses electronics products for their responsible manufacturing, energy efficiency, and recyclability. EPEAT (*epeat.net*) is a procurement tool designed to help purchasers evaluate, compare, and select electronic products based on their environmental attributes. A product that earns EPEAT Gold has met all 23 of the organization's required criteria, plus at least 75 percent of the optional criteria.

On the next page, we highlight LED-backlit monitors that are not only environmentally friendly, but are also standouts in ergonomics, high-end performance, and price. (Note: All prices are the manufacturer's suggested retail price; the reseller price may be up to 50 percent lower. The lists are based on manufacturers' specifications compiled by GovConnection.com and from the manufacturers themselves; we have not done any product testing to verify manufacturers' claims.) For a complete listing of all of the LED-backlit monitors in our survey, sortable by key features, go to *thejournal.com/green_monitors*.

Photos courtesy of Apple, NEC, Samsung

ERGONOMIC STARS

In many offices and classrooms, people take turns using the same workstations. For that reason, ergonomic flexibility can be a key consideration when choosing monitors. Most of the new generation of LED-backlit monitors can be tilted, but only a few are height-adjustable. The monitors listed here can do it all: tilt, swivel, and be adjusted for height.

NAME	LIST PRICE	WEIGHT	MAXIMUM RESOLUTION	NOTABLE FEATURES
Acer 24" B243HL LCD Monitor	$271	16.7 lbs.	1,920 x 1,080	5ms response time; 160-degree viewing angle (horizontal/vertical); Energy Star compliant
Asus 21.5" VW228TLB Widescreen LED LCD Monitor	$170.13	12.3 lbs.	1,920 x 1,080	DVI, VGA interface connections; EPEAT Gold
HP 20" LA2006x Widescreen LED LCD Monitor	$253.44	12.1 lbs.	1,600 x 900	170-degree wide-viewing angle; EPEAT Gold
NEC 19" EA192M-BK LED LCD Monitor	$230.63	12.1 lbs.	1,280 x 1,024	Carbon footprint meter; EPEAT Gold
ViewSonic 24" VG2436wm-LED Widescreen LCD Monitor	$279.38	11.9 lbs.	1,920 x 1,080	Hidden stereo speakers; Energy Star compliant

HIGH-END OPTIONS

Most LED-backlit monitors cost less than $300, but if you want upgraded features, such as a bigger screen, higher resolution, or a built-in camera and speakers, then you're going to pay more. Here's what is available at the higher end of the price spectrum.

NAME	LIST PRICE	MAXIMUM RESOLUTION	WEIGHT	INTERFACE CONNECTIONS	NOTABLE FEATURES
Apple 27" LED Cinema Display	$979	2,560 x 1,440	23.5 lbs.	DisplayPort	Built-in iSight camera, microphone
Lenovo ThinkVision 24" L2461x Widescreen LCD Monitor	$629	1,920 x 1,080	17.9 lbs.	VGA, HDMI	Built-in webcam, microphone and speakers; 120Hz MEMC (Motion Estimation, Motion Compensation) technology
HP 23" LA2306X Widescreen LED LCD Monitor	$389.01	1,920 x 1,080	15 lbs.	VGA, DVI, DisplayPort	Built-in two-port USB hub; VESA compatibility for mounting flexibility
Samsung 24" FX2490HD Widescreen HDTV LED Monitor	$369.95	1,920 x 1,080	11.69 lbs.	DVI, VGA, HDMI	Picture-in-picture capability; built-in digital TV tuner
Asus 27" VK278Q Full HD Widescreen LED LCD Monitor	$341.63	1,920 x 1,080	14.3 lbs.	DVI, VGA, DisplayPort	Built-in webcam; 2ms response time

OPTIONS FOR LESS THAN $200

If cost is a key consideration, you can choose among several entry-level LED-backlit monitors for less than $200. They still deliver on the environmental front, although some may have lower screen resolutions and fewer bells and whistles than models intended for high-end graphics use.

NAME	LIST PRICE	NOTABLE FEATURES	MAXIMUM RESOLUTION	ERGONOMICS	INTERFACE CONNECTIONS
ViewSonic 19" VA1931wa-LED Widescreen LED Monitor	$107.91	Energy Star compliant; automatic aspect ratio adjustment	1,366 x 768	Tilt	DVI, VGA
Asus 19" Energy Efficient LED Monitor	$111.77	Energy Star compliant; VESA wall mount; cable manager	1,440 x 900	Tilt	DVI
Acer 20" S202HL bd Ultra Slim Widescreen LED Monitor	$169.95	Energy Star compliant; high-contrast ratio; rapid response time	1,600 x 900	Tilt	DVI, VGA
Samsung 22" EX2220X Widescreen Monitor	$179.95	EPEAT Gold; reduces energy consumption by auto-adjusting brightness	1,920 x 1,080	Tilt	DVI
NEC 20" E201W-BK Widescreen LED LCD Monitor	$197.54	Energy Star compliant; 4-way ergonomic stand; carbon footprint meter	1,600 x 900	Pivot, tilt	DVI, VGA, DisplayPort

David Raths is a freelance writer based in Philadelphia.

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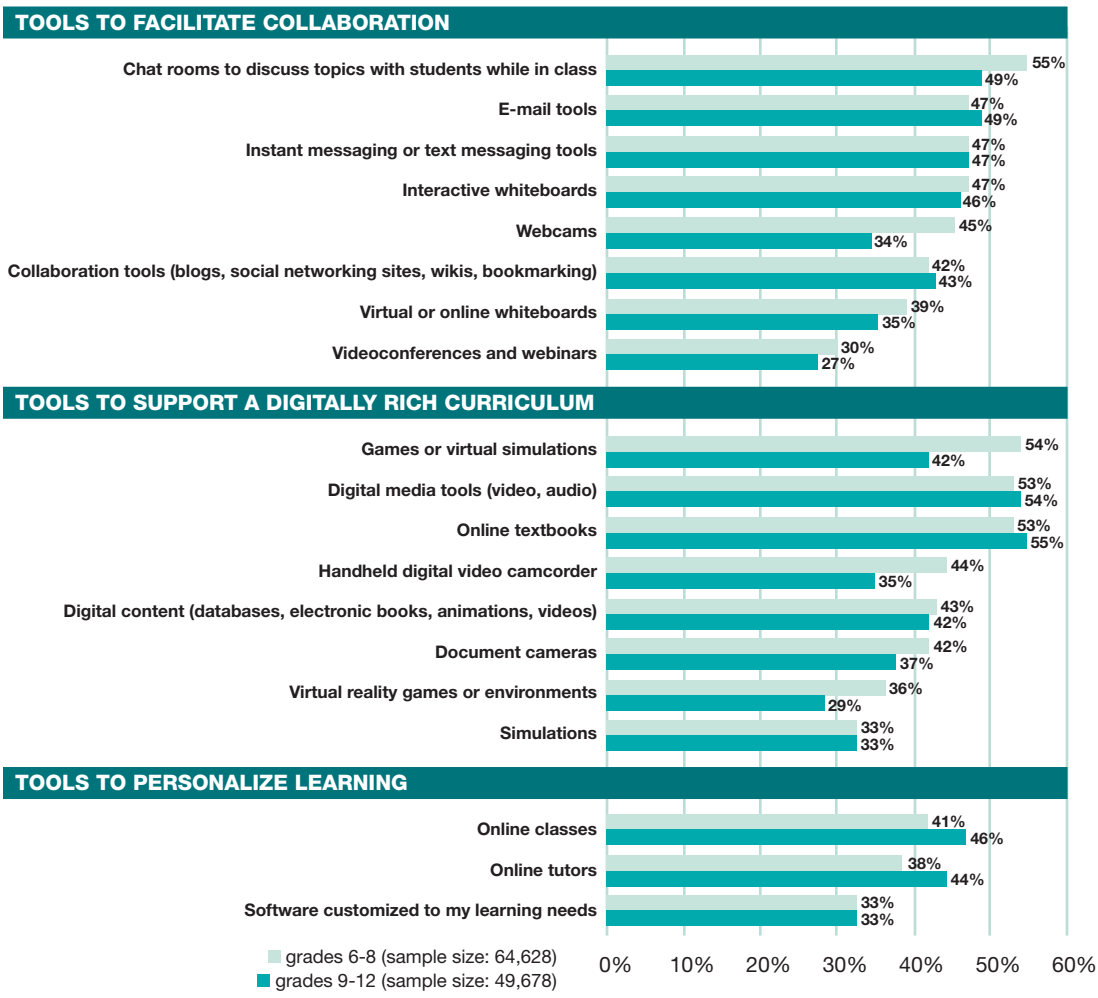
GETTING TO THE BOTTOM OF VITAL INDUSTRY DATA

TODAY'S STUDENTS ARE inundated with technology both inside and outside of the classroom. This month's Speak Up data looks at which types of tech tools young people would choose if given the chance to create their ideal 21st century learning environment.

HIGHLIGHTS

- High school students most frequently chose chat rooms as tools that would positively impact their learning, and chose videoconferences and webinars the least.
- Middle school students were more likely than high school students to value games and simulations as learning tools.

Imagine you are designing the ultimate school. Which of the following tools do you think would have the greatest positive impact on your learning? *(Multiple answers allowed.)*



Data courtesy of Speak Up 2010. Speak Up is an annual national research project that surveys K-12 students, teachers, parents, and administrators. Speak Up is produced by Project Tomorrow (*tomorrow.org*), a national nonprofit organization providing leadership, research, and programming to support science, math, and technology education in America's schools.

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