# School Technology Action Report





Dear reader,

With widespread adoption of the Common Core State Standards, the national push for school reform, and a renewed federal investment in education, 2011 just might be the year 21st century innovation finally becomes a reality in our nation's schools.

In this edition of **STAR** (the <u>School Technology Action Report</u>), "Emerging Trends: 2011," *eSchool Media, Inc.*, presents the five emerging trends we believe will take root this year, due to the large amount of attention these trends received in 2010, as well as the positive results they produced in student achievement and administrative effectiveness in schools, districts, and states.

From reducing class lectures as the teaching norm to using mobile devices as the go-to technology, and from the widespread adoption of eTextbooks to implementing anti-bullying policies in every school district, 2011 could be the year education catches up to a rapidly changing, and increasingly innovative, world.

"Emerging Trends: 2011" is a part of a series of reports for *eSchool Media*'s **STAR**—a roundup of *eSchool Media, Inc.* stories, Department of Education (DOE) studies, and industry reports and surveys on current issues and relevant topics in education and education technology.

Thank you for you reading this timely report and be sure to check back for a new STAR topic.

Sincerely,

The editors at eSchool Media

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# **Good-bye, Lecture**

As the DOE continues to lobby for innovative approaches to education reform, a few fearless, and creative, teachers in 2010 redesigned classroom learning to help improve student engagement, promote personalized learning, and improve student outcomes.

From using lectures as homework and homework as class time, to using school bus rides for math and science study, these educators and districts walk the 21<sup>st</sup>-century-education-walk.

## Teachers turn learning upside down

Some innovative teachers are turning the traditional classroom model on its head in an effort to make instruction more valuable to their students.

This new teaching and learning style, often called "flipped" or "inverted" learning, makes the students the focus of the class, not the teacher, by having students watch a lecture at home and then apply the lesson with the teacher in the classroom.

With inverted learning, these forward-thinking educators say, students can absorb the material as homework and then practice what they've learned with guided help from the teacher if they need it. This new learning style not only makes class time more productive for both teachers and students, but also increases student engagement, increases achievement, and caters to all forms of personalized learning, say the teachers.

Although this style of learning might be termed "inverted," perhaps it's the current style of learning with teachers as the "sage on the stage" that is backwards.

"I experimented a lot with differentiated instruction and layered curriculum," said Dan Spencer, a science teacher at Michigan Center High School and educational technology consultant for Jackson County Intermediate School District (JCISD). "One thing I began to realize as I did that was that not all students learn in the same way or at the same pace. Unfortunately, the way schools are set up, all students are forced to learn the exact same thing in the exact same time and in the exact same way. I wanted to find a way to change that."

Spencer, who currently teaches three sections of chemistry and two sections of engineering every day as part of <u>Project Lead the Way</u>, typically has anywhere from 15 to 28 students in a chemistry class period. The school district is relatively small, with roughly 400 students in grades 9 through 12 in a lower-middle class community.

Many of the district's students come from homes where their parents did not go to college, and many say they are going to college but few actually graduate from the next level, says Spencer.

For Spencer, a love for science came naturally, but he realizes this is not true for all students. He also realizes that interest in science is sometimes spurred by the teacher, not just the material.

"I know that very few of my students will go on to become chemists, physicists, or anything of that nature, but they should be able to leave my class knowing how to question, research, and test scientific claims regardless of what they choose to do afterwards," said Spencer. "At the same

time, I also feel that those students who do excel in <u>STEM</u> fields need to have classes that push them and challenge them with real-world problems, and not just memorized facts from a textbook."

To help make that realization a reality, Spencer got a little help from his superintendent, David Tebo, who eMailed the entire high school staff an idea for a "flipped" classroom that came from two teachers in Colorado, Jon Bergmann and Aaron Samms.

Bergmann and Samms' vodcasts can be found here.

When Spencer read the eMail, he knew that this was how he wanted to run his classroom.

"The main idea behind the 'flipped' classroom is for teachers to be available when students need them most. If I lecture for 30 minutes ... in my chemistry classes, that would leave me about 20



minutes to assign homework and let students start on it," he explained.

Chelsea Smith works on her iPod during Spencer's chemistry classes. [Copyright-Jackson Citizen Patriot]

At that point, he said, students were left to their own devices to finish their homework and come back the next day for something new. What he found was that when students left his class, many either chose not to do the homework or gave up as soon as they ran into something that didn't make sense.

"Then we would spend the next day going over questions instead of moving on. So what I was doing was using up valuable class time to lecture and then leaving them to figure things out on their own. That seemed like a very inefficient use of class time to me."

Spencer began to create screencasts of his lectures using <u>Camtasia</u> the day before. Those screencasts then became the homework—and class time was for doing "homework," or answering questions and doing labs/demos.

"I have now reached the point where, because of the screencasts, my students are all able to work through the curriculum at their own pace," he explained. "Since I'm not lecturing in class, and students can access the information whenever they need, I can now spend that 'extra' time helping students one-on-one."

Because many of Spencer's students lack high-speed internet access at home, Tebo received a grant for Spencer to get a classroom set of iPod Touches, which Spencer checks out to students who need them.

Like Spencer, James Yoos, 2010 Washington State Teacher of the Year, teaches science. Specifically, he teaches two sections of honors chemistry, two sections of AP chemistry, and one section of bicycle maintenance at Bellingham High School in Bellingham, Wash.—a school known for its low dropout rate, high test scores, and multiple awards. He has an average of 28 students in each class, ranging from freshman to seniors.

Yoos, who prides himself on being a "hands-on" learner and teacher, began his career as a bench chemist for a small biotech company. Though he enjoyed the experience thoroughly, he found himself teaching.

"I decided on a career change that would let me pursue my passion, and I've never regretted it," he explained.

According to Yoos, it's imperative that students learn the thinking process that gets used in STEM subjects.

"We are entering into a new era in which proficient problem solvers that can communicate and collaborate are absolutely crucial not only for our country, but also our world. Students need guided practice in developing problem-solving skills. However, chemistry also requires a specific tool box of skills that they need to apply in problem-solving scenarios," he said.

"There's only so much time in the day," he continued, "and I noticed that I was running out of time in class helping students practice and develop their understanding."

Yoos explained that although lecture was necessary, not all of his students could be engaged through this process. Therefore, many students were trying to modify their inherent learning styles to meet the lecture format.

"It simply was not meeting the needs of my students," he said.

Three years ago, Yoos decided to condense his lectures into 15-20 minute vodcasts that students watch for homework. They are expected to watch and practice with him when they are ready to learn the information.

The power behind the vodcasts, he said, is that students only watch when they need the information or are inspired to learn more. Class time is then dedicated to practicing and using

their preferred learning style. This may be small groups, hands-on, problem sessions, or conversations with Yoos.

"This allows them the space to ask questions for clarification and use each other as a resource to develop their understanding. I become the facilitator of their learning, rather than the dictator," he said.

And students seem to appreciate Yoos' understanding.

Rather than getting questions like "How do I do this?" Yoos hears more questions like, "I don't understand how to do this specific step." And "I saw this in the vodcast, but need clarification on this..."

"Richer questions from my students have allowed me to engage them in more advanced topics at a deeper level. Kids love it, parents love it," he said.

Yoos emphasized, however, that this inverted style of learning does require that students "own their learning."

"What I mean by this is that they [must] take responsibility for developing what they know. They can't be passive recipients of knowledge-they must engage in order to succeed in this system ... but that's what we want for members of our society, isn't it?" he said.

However, Spencer explained that this new learning style might take a while to get used to—for everyone.

"Many students are good at 'playing school' and going through the motions. Now that they have to demonstrate what they learn before moving on, some of them get quite upset when they scribble down a page of notes from a screencast without thinking about it and then are asked to redo it when it becomes obvious that they are just trying to work the system. Another complaint I have heard [from parents] is that 'I'm not teaching them anything.' Many students and parents expect the teacher to be the 'sage on the stage' and not a voice on an iPod."

Yet, now that students have gotten used to the idea, Spencer sees changes, not just in student engagement and achievement, but in the way students perceive learning as well.

One thing that I have learned is that students really resent 'busy work' now. If an assignment doesn't directly lead to them understanding one of our unit objectives, it becomes obvious very quickly," he said.

Yoos also warns that this style of learning is not for those looking for a quick fix:

"My greatest challenge is time. It does take time to set this up and build in the flexibility to meet the students' needs. Unfortunately, there isn't a lot of compensation for extra hours invested, but for me, the investment in our future is worth it."

His advice to other teachers and schools looking to implement this learning is to "start slow one or two vodcasts a month is plenty to whet your students' appetites. Build libraries collaboratively, and don't be afraid to make a mistake. It is through experimentation and modification that we hone our art of teaching."

Currently, Yoos believes this system works the best for classes that need students to be able to access information for remediation. Math and language classes at Bellingham already have started to use inverted learning for these purposes.

"I feel that the typical factory method of education is on its way out. It has to [be]," concluded Spencer. "While it is convenient, it doesn't produce the kinds of 21st-century skills necessary for kids to flourish after high school."

However, Spencer does acknowledge that there are all kinds of teaching and learning methods that can be used to hold students accountable for their own learning, and learning at their own pace, besides "inverted" learning.

"I'd love to hear what others are doing, so please let me know!" he said.

## Not your average little yellow bus

Students in the woodsy, working-class Hector School District in Arkansas now can look at more than the Ozark National Forest in the two-plus hours they spend on the school bus each day.

The Pope County district is participating in a new program for rural schools believed to be the first of its kind: It's playing <u>math and science</u> content over ceiling-mounted computer screens during the lengthy bus rides.

"To say we are rural is an understatement," Superintendent Karen Cushman said, noting that more than 60 percent of the 600-student district is located in the Ozark National Forest and that 75 percent of students qualify for free or reduced lunch.

The district is working with Vanderbilt University's <u>Aspirnaut Program</u> to turn the bus into a mobile classroom of sorts. The program, founded by Arkansas native Billy Hudson, works with rural schools in Arkansas and Maine to help educate students in science, technology, engineering, and math.

The project aims to engage students and take advantage of the fact that they're a captive audience with few distractions, Cushman said.

"It's hard to get students excited about math and science when a teacher stands up there to lecture," Cushman said.

The upgraded, high-tech bus has five ceiling-mounted screens that show math and science content geared toward different age groups during the long bus rides.

Younger students sit toward the front of the bus, and older children sit in the back. Each seat is equipped with headphones for the students. The programming rotates daily and features videos from PBS, NASA, the Discovery Channel, and the Smithsonian Institution.

Officials say that showing educational programs during commutes provides 10 extra hours of learning each week—the equivalent of 12 class periods weekly.

Long bus rides are becoming more common in Arkansas and throughout the country as states force tiny school districts and rural schools to consolidate in the hopes of providing a better education for students. While more educational opportunities are available at school, more and more students spend hours on the bus each day getting to campus.

Officials with the Aspirnaut Program estimate that about 200 students in Arkansas now ride buses that can provide educational content. The program began in 2007 in the Sheridan School District, where students were given laptops and iPods for their commutes on a school bus equipped with wireless internet access. (See <u>"Students ride emerging trend: Bus-based</u> connectivity.")

So far, Hector officials have noticed one definite difference: The bus rides are a lot quieter.

Bus driver Kenny Bull picks up his first student at 6:42 a.m. each day and has all 50 students dropped off at the school by 8 a.m. He's used to writing up students for bad behavior on the lengthy bus rides, but since the video screens were introduced, he hasn't had to reprimand anyone for acting out.

Younger students really get into the programs, he said, although the math and science content hasn't entirely caught on with high-school students, who are allowed to use their cell phones on the bus.

"They like their iPods and mp3 players better," Bull said.

## Instilling life skills takes a village

Twice a week, Randy takes the school bus to his local school. On the bus, Randy and his friends talk about what they think the day will bring, what they'll learn, and they look forward to hanging out with their other friends. Randy says he's interested in helping the school become the best it can be, and thanks to Principal William Sprankles, Ohio's Princeton High School makes it possible for Randy to be himself and make a difference.

What makes Randy Wilhelm stand out from other kids at school is that he's got kids of his own—and he's also the CEO of netTrekker, maker of an educational search tool.

Wilhelm is part of a new initiative at the Ohio high school not only to spur community support for education, but also to help kids learn critical life skills that will serve them well beyond graduation.

This group initiative is unique in that it involves every one of the 1,700 racially-diverse students at Princeton High School, and it lasts for all four years of their school experience. It also includes school staff other than teachers, such as janitors and the cafeteria crew.

The initiative began as part of Sprankles' mission to help his students and teachers better connect with one another. Even though Princeton High has a diverse student body—around 60 percent of its students are African-American, 33 percent are Caucasian, 20 percent have a disability, and 50 percent receive free or reduced-price lunches—many students said they didn't have a chance to get to know their peers of different races or backgrounds, and many teachers had never taught a diverse mix of students.

During the 2009-10 school year, Sprankles established various opportunities to let his students, whom he calls his "customers," speak freely about how they felt the school should be improved.

"Many students commented that they wanted and desired to know more about other students in school to genuinely experience all of our true diversity. Furthermore, many students discussed how they wanted more time during the day to have a voice, explore their passions and interests, and ultimately discover their core belief system and develop their core relationships," Sprankles said.

That's why, with the approval of the school board and staff, he created CORE (Creating Opportunities for Relationship Enrichment)—an initiative he says is built upon the values of meaningful relationships, celebrating diversity, and collective ownership.

It's also about looking beyond graduation rates and focusing on teaching kids the life skills they'll need to succeed after high school—life skills such as introspection, goal-setting, conflict resolution, and time management.

"We have the highest graduation rate for African-American males in the state [98 percent], but that's not enough," Sprankles said. "Students need skills beyond graduating. Another purpose of CORE is to figure out how we can get the other two percent to graduate. It's about every student, not just some."

"I was so impressed with the quality of leadership that was in this school after just my first meeting with Mr. Sprankles and the staff," said netTrekker's Wilhelm. "They're the kind of people who will put everything on the line for their kids; their conviction really sets them apart."

Wilhelm said his relationship with Princeton High began when he drove past the school every day and wondered why his product wasn't used in the school. One day, he decided to go and see what could be done—after all, it was "the neighborhood school," he said.

After meeting with Sprankles and his staff and hearing about their mission to help students connect with different people and learn critical life skills, Wilhelm knew he wanted to be part of



their work.

#### Linda Dimarco's CORE class

"netTrekker is essentially a "missional" organization with business wrapped around it; [the project] seemed like a great fit for us," said Wilhelm.

Wilhelm said netTrekker is providing

community support, and its product, to Princeton High free of charge.

When Wilhelm told his staff about the work at Princeton, asked for volunteers, and emphasized that helping the students there would be a long-term commitment, because many kids have "enough short-term commitment in their lives." 93 percent of netTrekker's local staff—or 65 people—said they would volunteer twice a week.

Because the staff volunteers their time during company hours, Wilhelm estimates that the company spends roughly \$500,000 to help these students flourish—a price he says is worth it,

not just to see kids succeed and receive the community support they need, but also ultimately secure America's future.

"Every business has employees, and the business is concerned with the general lack of job and career readiness of high school and college graduates. There is a direct connection between the quality of our education today and the fortitude of our economy tomorrow," Wilhelm said. "Choosing to intentionally connect your business to your local school may be difficult to justify from your bottom line, but by making a difference to a child, and educator, and your local community, you are doing something that is harder, yet has greater impact, a greater good. It is worth it—even for our shareholders."

#### How CORE works

To help students and teachers better get to know one another, Sprankles and his staff developed an algorithm that divided students equitably by all four grade levels, with the intent that each CORE group would stay together, and with the same adults, until students graduate.

Using the demographics on the school's report card, every teacher has about 16 students in his or her CORE class: four seniors, four juniors, four sophomores, and four freshmen. About seven to nine of these students are black, five or six are white, two or three are Hispanic, two or three have disabilities, and half come from low-income households. Most CORE classes have at least one student whose English proficiency is limited.

Altogether, there are 100 CORE classes, and Sprankles said one of the school's biggest accomplishments is the active CORE participation of secretaries, paraprofessionals, and even security monitors.

The CORE classes last about 22 minutes each day, and topics and projects are based on the <u>Effective Schools Model</u>, which is an organizational model for schools based on 40 years of research. Princeton High uses six of the seven correlates of this model:

- 1. Clear and Focused Mission
- 2. Frequent Monitoring of Student Progress
- 3. Safe and Orderly Environment
- 4. Opportunity to Learn and Time-On-Task
- 5. High Expectations
- 6. Positive Home-School Community Relations

Because students only have a limited about of time in CORE classes for projects or competitions, the school created a structure featuring a weekly topic that is connected to or driven by the purpose of each correlate.

CORE classes are based on a six-week cycle, with each week emphasizing a different correlate of the Effective Schools Model. The schedule looks like this:

Week 1 (Mission): Getting to know you; relationship games and activities; team-building activities.

Week 2 (Safe & Orderly Schools): Conflict resolution.

Week 3 (Frequent Monitoring of Student Progress): Setting my academic goals for first semester. Week 4 (Opportunity to Learn, Time-On-Task): Organizational skills and time management at home and during the school week.

Week 5 (High Expectations): Building my four-year success plan beyond high school. Week 6 (Positive Home-School Relations): "Where I Come From" poem; my family values.

Because there are six correlates and 36 weeks in a year, each correlate is discussed about six times per year.

Wilhelm described one goal-setting activity centered on a free-throw contest: "We had a basketball free-throwing contest, and the person who won would then be blindfolded and spun around, then we'd ask them to shoot. As you can imagine, they wouldn't make the shot. We told them that this is like going through life without a goal, without aim."

Another activity that struck the CEO was the "Where I Come From" poem. Each student writes two lines of poetry about where he or she comes from, then all the lines are joined together to make a complete poem that represents the students in the group.

"It's heart-wrenching to read and to hear these students read, because you hear things like "Where I come from, men beat women,' and 'Where I come from, we are afraid of being raped." It really opens your eyes to these kids' struggles," Wilhelm said.

"You really get a sense of who your student body is, and what they're going through," said Sprankles. "Many teachers have framed this poem from the group they lead and have hung [it] on their classroom door for everyone to see. You just walk by and read these poems, and you have a snapshot of your school."

Another major project for CORE classes will be to design a smart-phone app in January. Each group will work together to design the app, as well as propose an action plan for marketing. Out

of the 100 proposals, the school will narrow them down to the top five to 10, and then the students will vote on their favorite. The winning group, with the help of netTrekker, will have its app built and put to market for 99 cents. All proceeds from the sale of the app, said Sprankles, will go to Princeton High's "Innovation Fund."

A similar project that involves student input is the opening of a new high school and a new middle school in April. Already, CORE classes are being asked to present a list of innovative concepts for these new schools.

For example, groups will be asked to present their advice for innovative curriculum and class structure.

"These kids, for the most part, have spent the last nine to 12 years of their lives in school; they probably have a better understanding of what works than we do," said Sprankles.

#### Jamie Holdren's CORE class

In December, parents will be invited to Princeton High for a parent engagement session to discuss their thoughts on these new schools.



"This is what CORE's about," explained Sprankles. "It's the first step in the broader direction to transform the education process."

For Wilhelm, CORE isn't just about prescribed activities; it's also about sharing personal experiences and bringing in others to share what they know.

For example, Wilhelm has brought in his daughter to speak to his group about what it's like being a college freshman.

"Before CORE was even officially started and I was speaking to student leaders, I met this great student, A.J., who had a lot of D-1 scholarship [offers] and was confused about where he should go. He asked me if he could call me to talk about it after school, so I gave him my cell number. We talked for about an hour and discussed his options and what I thought would be his best pick. Sometimes, it's just good to have someone to talk to who isn't a parent or teacher," said Wilhelm.

Wilhelm has stayed in A.J.'s life, and he received a "shout-out" at A.J.'s decision-making ceremony at Lehigh University in front of A.J.'s parents and photographers.

"We really can make a difference with these kids," said Wilhelm. "We at netTrekker really see this as a life commitment, and I'd be honored to attend my group's eventual graduations, and even weddings."

#### Not just fluff

Already, Sprankles said, teachers have noticed an improvement in student GPAs, and they believe it's a result of the CORE classes.

While the evaluation has been informal, because CORE is only in its first year of implementation, Princeton High administrators looked at the average GPA of CORE groups (3.0) when CORE first started, and they compared the average in-progress reports and report cards since the program's inception. According to Sprankles, the average has increased slightly.

"CORE gives students the time to reflect, and that's important," he said. "Most schools have to manage time and mandates with little time for reflection. But CORE allows these students introspection and the resources to set goals."

Sprankles said student disciplinary infractions also have dropped as a result of the CORE classes.

The CORE curriculum is constantly being re-evaluated and updated as the weeks progress, he said.

"Some activities have not gone as well as I thought, and some have done even better than I thought," said Sprankles. "Not all students embraced CORE at first, and some are still struggling with it, but that's the whole point of doing it. Many students struggle to build relationships, and we must make this a priority every day, as it is a critical skill to be successful in the 21st century. ... Change isn't going to happen overnight, and we don't expect it to, but it will happen eventually, it's just a matter of time."

As for Wilhelm and netTrekker, the twice-weekly bus rides to Princeton High are paying off in more ways than one. The company already has inspired other local businesses and agencies to support the school, said Sprankles.

For example, during each academic quarter, the school hosts a Community Partnership Breakfast that has now grown to include 75 to 100 business owners, CEOs, managers, and other community members.

For other schools looking to create something similar, Sprankles said the key to any school's success is to involve the students.

"So often in education, we [adults] love to talk with each other about what is best for the students. We often forget the importance and value of taking time to ask the customer [students] for their input and their perspective and what their vision is. I would recommend creating a process where many staff members can contribute to the development of lessons and activities. Finally, I would recommend doing as many team-building activities as possible," he said.

"Randy Wilhelm and the folks at netTrekker have set the bar for business-community-school partnerships. They have dedicated themselves to the development of our people, which is the most noble thing someone can do in public education."



# **Mobile Devices: Learning's BFF**

As mobile devices such as iPods, smart phones, and tablets proliferate throughout the tech market, prices are falling and teachers are no dummies—they're taking advantage.

Educators say that with enough funding and tech knowhow, mobile devices in the classroom help increase

student engagement, allow for access to digital learning tools, and provide 24/7 access to learning.

From specially-designed devices for math, to Apple's hottest products, educators in 2010 began to take advantage of technology's handheld helpers.

## Mobile tech: Everyone's almost doing it

According to a recent national survey, access to mobile technology in the classroom has more than tripled among high schools students in the past three years—and even more interesting, parents say they are more likely to purchase a mobile technology device for their child if it's for classroom use.

The information comes from Project Tomorrow's annual Speak Up survey and was presented at a conference on mobile learning in Washington, D.C., Oct. 29.

Focusing on mobile technology in the classroom is important, said Julie Evans, CEO of Project Tomorrow, because of a confluence of positive factors: matured technology, teacher buy-in, and low price points.

"Mobile technology has been developing for years, to the point where there's now a wide variety at low prices, and each [type of mobile learning device] can provide anytime, anywhere access. Teachers are also using these devices in their everyday life and have been using technology in the classroom to the point where they feel comfortable with mobile technology for their students," Evans said.

She continued: "And we're also at the tipping point because most students already own a mobile device, meaning that administrators might not have to spend as much on initial hardware for tech initiatives."

Evans said administrators also are considering the implementation of mobile learning devices because of parent buy-in.

According to Speak Up survey results, 62 percent of responding parents report that if their child's school allowed mobile technology devices to be used for education purposes, they would likely purchase a mobile device for their child.

Even more encouraging, Evans said, is that Project Tomorrow staff found no demographic differentiation when sifting through parent responses, meaning that parents from urban, rural, and Title 1 districts all agreed that they would purchase mobile technology devices for their children's learning.

"This gives administrators a good idea at how to better invest resources in terms of instructional technology," said Evans. "It's also good for administrators, and for teachers, to know that if they decide to use mobile technology in the classroom, they'll get parental support."

Not surprisingly, students, too, support the use of mobile learning devices in school.

According to the survey, students no longer view their schools' internet filters as the primary barrier to using technology in the classroom, as they have in years past. Instead, when asked how schools could make it easier to use technology for school work, students' responses indicated that they want to use their own mobile learning devices.

Students in middle school (60 percent) and high school (64 percent) prefer using their own cell phone, smart phone, or MP3 player, compared to laptops or netbooks (46 percent).

Fifty-two percent of all middle and high school students said that in their "ultimate school," mobile technology would have the greatest positive impact on learning. Remarkably, even younger students in kindergarten through second grade indicated that they would include mobile learning devices such as cell phones or smart phones with internet access (42 percent), MP3 players or iPods (46 percent), or laptop <u>computers for every student</u> (52 percent) in their ultimate school.

Students said they would use their mobile learning devices mostly to look up information on the internet, take notes, record lectures, or access online textbooks.

Students also reported a desire to use mobile technology to receive reminders or alerts about homework and tests, and to communicate with their peers for collaborative work. For example, 48 percent of high school students and 34 percent of middle school students said they use Facebook and other social networking sites to collaborate with classmates on projects.

"Students are already using a variety of technologies as part of their regular school day or to complete their homework assignments, and the use of mobile technology is a perfectly logical 'next step' for them," the report notes.

#### One step at a time

Even though using mobile technology in the classroom might seem like a no-brainer to some, many classroom teachers (76 percent) continue to express high levels of concern that students will be distracted.

Another issue is digital equity, and making sure all students have access to a mobile learning device. The Project Tomorrow report details how some schools are tackling this issue—for example, some schools are "seeding" their programs by providing devices to students who might not have their own.

Infrastructure issues, such as 24/7 broadband access, also are critical for successful mobile learning programs and "will require educators to rethink a 'cookie cutter' approach to technology implementation," says the report. "Instead, educators might consider focusing on building a stable technology backbone with applications that can function reliably across many mobile devices."

Educators and administrators also must begin to think about which subjects are best suited for using mobile technology in the classroom, what kinds of applications will be best for mobile learning, and how theft, internet safety, and network security will be addressed.

The report acknowledges that, so far, there aren't many well-established models for success. However, there is "excitement, interest, and rapidly growing acceptance as the education community continues to explore a kaleidoscope of approaches and options" for mobile learning implementation, says the report.

"Innovation at this velocity can be what one educator described as 'messy.' In its early stages, teachers and administrators will need to develop comfort with ambiguity," the report continues. "Further, they'll need a clear understanding that because these devices can do many things ... the process will be unlike any innovations that have come before."

To help educators implement mobile technology in the classroom, Project Tomorrow has included best practices from five different schools, called "Mobile Learning Explorers," that are on the leading edge of mobile technology implementation.

These schools are Xavier College Preparatory in Phoenix; Paradise Valley Unified School District in Phoenix; St. Mary's City School District in St. Mary's, Ohio; Jamestown Elementary School in Arlington, Va.; and Onslow County School District in Jacksonville, N.C. Project Tomorrow's report on mobile learning, which includes these best practices, is available here.

While it's important to recognize and talk about these issues, students are already using mobile technology devices and "a whole host of other related applications and tools to implement their own vision for 21<sup>st</sup>-century learning, and they are not going to wait for the rest of use to catch up," the report concludes.

"Let's follow the lead of these Mobile Learning Explorers and pave a new path for 21<sup>st</sup>-century learning together," it recommends.

Evans said the 2010-11 Speak Up survey has been open for two weeks and will focus on digital content, such as eTextbooks, as well as how to determine the quality of digital resources and how

to evaluate these resources, how to evaluate high-quality online courses, and what technology parents have in their house for their child's education and how they evaluate these home resources.

# Mobile wireless: It's finally 24/7

This year, the big national wireless carriers will be racing to stake their claims in the latest frontier of service: ultra-fast data access through a cellular connection for smart phones and laptops, as well as for gadgets like <u>tablet computers</u>.

The companies are boosting their mobile wireless broadband speeds and revving up the marketing hype. They're moving away from talking about call quality and coverage, and focusing instead on data speeds: megabits in place of minutes.

For consumers, there are benefits in the form of faster service and cooler gadgets. Yet some of the marketing campaigns seem designed to confuse consumers about the gadgets' speed.

For education, the new high-speed mobile wireless broadband services could mean alwaysavailable broadband access, fast enough to allow for video streaming even outside the range of a Wi-Fi network—enabling true anytime, anywhere learning. But these benefits can be realized only by paying for a cellular data plan, which could prove costly for schools.

At the International Consumer Electronics Show (CES) in Las Vegas, Verizon Wireless revealed the 10 gadgets with built-in access to its new high-speed 4G wireless data network, including smart phones, tablets, and laptops. Some are to launch as early as March.

Along with Sprint Nextel Corp.'s subsidiary Clearwire Corp., Verizon is at the forefront of the move to a new network technology, designed to relay data rather than calls. Verizon's fourth-generation, or "4G," network went live for laptop modems in the last month.

The new mobile wireless broadband network is the nation's fastest. Verizon is hoping to cash in on that advantage by selling tablets and smart phones that devour data.

One of the devices, Motorola Mobility Inc.'s Xoom tablet, will come with a 10.1-inch screen and two cameras: one for video chatting, the other for high-definition videos. The Xoom will begin selling by March. Initially, it will work with Verizon's 3G network but will be upgradeable to work on the speedier 4G wireless network.

Motorola's Droid Bionic smart phone also will have two cameras, to help with video conferencing, a data-hungry task. It will be one of the first phones with a so-called "dual-core processor" that will roughly double its computing capacity. That should help with video processing.

LG Electronics Inc., Samsung Electronics Co., and HTC Corp. are bringing out similar phones for the network. And Hewlett-Packard Co. is adding 4G wireless capability to a laptop and a netbook.

There also will be two "mobile hotspot" devices for the network: small battery-powered bricks that act as Wi-Fi access points, connecting Wi-Fi-equipped computers to the 4G network.

Verizon didn't reveal what the new devices or wireless plans will cost.

Verizon's size—by number of subscribers, it's the largest U.S. wireless carrier—and the quality of its network are helping it gain traction with manufacturers.

"By deciding to go early and go first to [4G wireless], we sent a signal to the entire consumer electronics market that this technology would develop very quickly," said Lowell McAdam, Verizon's president and chief operating officer, in a keynote address at the trade show Jan. 6.

There's speculation that Verizon will get to sell a version of Apple Inc.'s iPhone this year. That would break AT&T Inc.'s exclusive hold on the most popular smart phone. But there was no talk of an iPhone from Verizon at CES.

With or without the iPhone, Verizon's new mobile wireless broadband network is pressuring its competitors to step up their offerings. AT&T Inc. on Jan. 5 said it's on track to launch its own 4G wireless network this summer. Also, it said it will start calling its current 3G network "4G," because it's been upgraded to be capable of nearly 4G speeds.

T-Mobile USA said it will upgrade its 3G network to double the possible download speeds in two-thirds of its coverage area. It started calling the network "4G" in ads last fall. It, too, revealed two tablets for its network, to launch later this year.

Sprint and Clearwire have chosen a slightly different route to 4G wireless service. They've picked a 4G technology called WiMax that was ready before Long Term Evolution, or LTE, which Verizon is using.

Now, however, WiMax looks set to be a niche technology, while the rest of the industry adopts LTE. That will hamper Sprint's efforts to get competitive devices for the network. Still, it was able to launch its first 4G phone last summer, ahead of the competition. On Jn. 5, Sprint announced it would be the first to carry a 4G tablet computer from Research In Motion Ltd., the maker of the BlackBerry, some time this summer.

The most distinctive feature of 4G wireless technologies like LTE and WiMax is that they're designed to carry data rather than phone calls. That makes them more efficient at serving today's smart phones, tablets, and other gadgets that need data access on the go. It also makes the networks cheaper to build out and manage.

They're faster than today's 3G networks, though not by much, which makes T-Mobile and AT&T feel justified in calling their upgraded 3G networks "4G." After all, they say, speed is what really matters to users.

Aside from the bump in speed, the main reason the LTE buildouts of Verizon Wireless and AT&T are significant is that they add fresh spectrum to the nation's wireless networks. That means more capacity for the growing number of mobile gadgets.

Also, both companies are using spectrum that was previously used for UHF television channels, a prime piece of the airwaves. It can cover wide areas easily and penetrate deep into buildings. (Clearwire's WiMax network uses a frequency that has shorter range and more difficulty penetrating buildings.)

Future upgrades can further boost the speed of mobile wireless broadband networks. But at some point, they will run out of room for improvement. There's a theoretical limit for how much information a certain slice of the airwaves can carry. When that happens, there will still be two ways to add capacity to mobile wireless broadband.

The government can assign more spectrum, perhaps by taking it from TV stations. But spectrum, too, will run out. The carriers can add more cell towers, but that's expensive and difficult. They can't put cell towers everywhere they'd like.

Given these limiting factors, mobile wireless broadband isn't likely to ever replace wireline connections for home and school broadband access, except possibly in rural areas where it's expensive to draw cables for high-speed connections to homes and schools.

Another reason Verizon has been aggressive about LTE is that its 3G network uses a technology that isn't upgradable to higher speeds, as AT&T's and T-Mobile's are. That's left it with a burning need for the next network technology.

Verizon Wireless is a joint venture of Verizon Communications Inc. and Vodafone Group PLC of Britain. Motorola Mobility Inc. was formed as Motorola Inc. split into two parts. The Mobility unit consists of Motorola's cell-phone business.

# Apple hooks kids on reading

With a furrowed brow and a deep breath, 9-year-old Dallis Engel pressed down on the screen of her iPod touch.

Then, she began to read.

"My brother William is a fisherman," she said, using a finger to trace words in Patricia MacLachlan's book, *Sarah, Plain and Tall*.

The fourth-grader stumbled over pronunciations and skipped words as an application recorded her voice. When she finished the passage, she glanced over at her teacher, Kelly Turcotte, and explained her next step.

"I have to listen to it and make sure it's perfect," she said. "If you sound like a robot, you have to do it again."

In Oregon's Canby School District, it's a familiar scene. While other school systems across the nation have banned personal cellular phones or mobile internet devices, the Canby School District is one of a growing number of districts that is fully embracing mobile learning technology.

During a time of steep budget reductions—employees must take 14 furlough days this school year—Canby has issued an iPod touch to every third-grader, challenging the idea that digital technology exists largely as a distraction for a plugged-in generation.

Since implementing a pilot project at Philander Lee Elementary School three years ago, the district has used about \$250,000 in state and federal grant and rebate money to purchase the iPod touches, a portable media player that connects to the internet through a Wi-Fi network.

In addition, the parent-teacher association at Lee Elementary raised about \$12,000 to buy 60 iPod touches for the school's fourth- and fifth-graders, and another parent organization pitched in about \$15,000 for 30 iPads at Eccles Elementary School.

The choice of equipping third-graders first was intentional, according to Joseph Morelock, the district's technology coordinator. The third grade is the first to take state tests, and administrators are eager to help students pass math achievement standards that recently have been raised.

In presentations, Morelock has shown that several classrooms using the iPod touches generated better test scores than the district average. He looks at iPod touches and other mobile learning devices as unparalleled tools that can be used in nearly every class.

"Every kid now has [his or her] own dictionary, calculator, graphing calculator, [and] connection to the internet," he says.

Turcotte and other teachers say the devices enthuse students, giving them the opportunity to practice multiplication using animated games, listen to books on iTunes, or record their own reading voices.

"These are the kids who hated reading, but now there are all these things you can do on that iPod Touch," said Turcotte, who heads a language arts class for struggling fourth-graders. "Suddenly, they feel like readers."

Students also learn at a comfortable pace, she said. Now, they can go back and practice a word or a math problem they've missed, minus the embarrassment.

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For their part, third- and fourth-graders mostly praise the goofy multiplication games, which have students play tic-tac-toe or combat aliens.

Engel says books become more exciting with the iPod touch. Students often research settings of books on the internet or listen to book recordings.

"There are all these sound effects," Engel said. "It makes you want to keep on reading and to know what happens next."

As budget cuts continue to loom, public perception has become an issue for schools dealing with dozens of flashy digital tools. But Superintendent Jeff Rose defended the move to expand Canby's iPod program, saying the money comes from grants and rebate dollars that cannot be used for teacher salaries.

Besides that, he said, the school board had made the decision a few years ago to maintain its edtech investment: "In some ways, it jump-started this idea that technology needs to be somewhat of a funding priority."

Canby's emphasis on using technology to improve teaching and learning began with former Superintendent Deborah Sommer, who <u>in 2006 was chosen</u> by *eSchool News* as one of its Tech-Savvy Superintendent Award winners.

The district's efforts at infusing technology in the classroom are attracting notice. Districts from as far as Alaska and Hawaii are looking to tour Canby's classrooms, and Apple recently named Canby's technology innovation grant project an Apple Exemplary Program for 2010-11.

Even with many districts looking at multimillion budget gaps next year, Morelock would not be surprised if Canby parents and educators pour more money into ed tech.

"People like to bet on a winner," Morelock said. "When they see kids doing well and kids getting excited about school, they want to get on board."

## **Proof: Smart phones can increase math scores**

Two years ago, public high schools in North Carolina began an education technology pilot to determine whether smart phones, in conjunction with curriculum resources, could be leveraged to increase student math comprehension. Now, teachers are saying that not only have math test scores increased, but <u>student achievement</u> has increased in other subject areas as well.

The program, called Project K-Nect, was designed to create a supplemental resource for secondary at-risk students to focus on increasing their math skills with the help of mobile smart phones. Ninth graders in several public schools in North Carolina received smart phones to access supplemental Algebra I content aligned with their teachers' lesson plans and course objectives. The phones and service are free of charge to the students and their schools, thanks to a grant provided by Qualcomm as part of its <u>Wireless Reach initiative</u>.

Student smart phones have 24/7 internet access, which students can use at home or at school, and they have full access to both the K-Nect curriculum, as well as features such as instant messaging (IM), video and chat capabilities, and calculators.

"Everyone thought this program might just last a semester," said Suzette Kliewer, a math teacher at Southwest High School, one of two high schools in Onslow County, N.C., participating in K-Nect, "but it's lasted for three [school] years now. It's been approved for this upcoming year, too."

Project Tomorrow, a national education nonprofit organization that provides consulting and research support to school districts, government agencies, and businesses about key trends in education, was asked by Digital Millennial Consulting (developer of K-Nect) to assess the program's efficacy.

Project Tomorrow released a report of its findings earlier tis month. The report presents the views of 78 students and four teachers who participated in the program between August 2009 and January 2010.

Project Tomorrow found that by using smart phones as part of the program, students are more successful on their North Carolina End of Course assessments, along with many other positive effects. Data were collected through on-site classroom observations, focus groups with students (pre- and post-semester), interviews with teachers (pre- and post-semester), and interviews with principals and technology coordinators.

K-Nect students are "more likely to achieve proficiency in Algebra and Algebra II than [other] students in their school, district, or state," says the report.

Overall, a greater number of K-Nect students at Southwest High School demonstrated proficiency on the End of Course exams in Algebra (91 percent), Geometry (90 percent), and Algebra II (81 percent).

Likewise, the report says more Dixon High School students achieved proficiency in Algebra (93 percent) and Algebra II (81 percent) than in the district or state as a whole.

#### Student using a K-Nect smart phone

Geometry K-Nect students at Dixon (65 percent) also

were more likely to demonstrate proficiency on their End-Course-Assessments than students in a comparable class without smart phones (40 percent).

End-of-course assessment data and AP Calculus results for the 2009-2010 school year will be available later this summer.

"We're extremely optimistic about the findings and what they mean for the future of smart phones in the classroom," said Julie Evans, chief executive officer for Project Tomorrow. "Students improved their scores in math by an average of 20 percent, and this technology and wireless internet access ensures the equitable delivery of engaging instruction, bridging the persistent digital and achievement divides."

She continued, "Project K-Nect and this report have significant new implication on how, when, and where we engage students in a learning process."

#### A day in K-Nect

According to Kliewer, who's been working with K-Nect since its inception at Southwest High School, the report by Project Tomorrow is not a glowing review of technology simply for technology's sake: K-Nect has helped students discover their interest in learning—including her own son.

Kliewer teaches a majority of the K-Nect classes, and her husband teaches honors classes. This past fall, she taught geometry honors, which looped into Algebra II honors in the spring.



Students in the 2009-10 classes were mostly in 10<sup>th</sup> grade, with about six to seven freshman and the rest sophomores, for totals of around 25 to 26 students per class. These students will now loop into fall pre-calc and spring AP calculus (continuing with K-Nect) for the 2010-11 year.

Each class is 90 minutes long, and each class is a semester-length class.

According to Kliewer, students who come in the K-Nect program are "average" in math, and many are not on the college track. The high school is also near a military base, so students come and go.

"Students are chosen to participate in the program if they're struggling," said Kliewer, "and because K-Nect pushes them to achieve more, we try to put them in the program. But since many of the entry-level classes develop into honors or higher levels in second semester, students can opt in or opt out."

The curriculum—developed in conjunction with Drexel University and the University of Florida—mainly consists of problem sets based on real-world examples.

"The first class taught was Algebra I, and we really wrote the curriculum as we went along," said Kliewer. "Now we have established problem sets for each class; however, we're still in the development process for Algebra II and Geometry."

A typical day for Kliewer begins with her teaching a concept and then asking the class to complete three to four warm-up exercises. Sometimes students collaborate on the solution, and sometimes they work independently; all students then IM Kliewer their answers.

"When class first begins in the semester, it takes a few tries for students to catch on for the problem sets. I walk them through a few, but they catch on quickly and don't require much assistance by the end of the semester," she said.

Kliewer explained that some days students might be asked to go outside to record video examples of a concept and then explain it to the class.

"At first, the videos and explanations weren't detailed," said Kliewer, "so part of the learning process in K-Nect is learning through teaching. Students have to understand a concept in every way to be able to teach their peers. This is a large part of what contributes to the positive effects we've seen in the program."

Because students are allowed to keep their smart phones at all times, K-Nect included MobiControl, a device management solution, to keep tabs on what students were messaging with the phones.

According to Kliewer, students are told that their phones can be monitored.

"They're only allowed to use their phones for school-related conversations. IM is also restricted to students and teachers that are part of K-Nect. At any time, K-Nect teachers, school administrators, and even Shawn Gross [who manages the project] can look and see what a student is doing. Because students know this, they tend not to disobey the rules."

Kliewer said there have only been a few minor infractions.

"The students consider it quite a privilege to be part of this project and are very respectful of the opportunity," explained Evans. "They know that most kids don't have the ability to use a smart phone within instruction in this way, and they don't want to go back to classroom instruction the 'old way.' The learning environment facilitated by the devices—engaging, interactive, and self-directed—is therefore a very strong motivator for appropriate use; maybe the best motivator."

Even though phone truancy is minimal, Kliewer's school does not allow students to access their personal cell phones on campus.

"At first this was daunting to me, because I didn't know how other teachers not part of K-Nect would react to students having smart phones," said Kliewer. "But the other teachers and administrators have seen what the students can do as part of K-Nect and the educational benefits of phones, and they've been very receptive."

In fact, Kliewer says that some teachers now use the K-Nect program model and let students use their personal phones to record videos and text answers, and more, during class as part of their classroom exercises.

Kliewer also has begun to allow students to use their personal phones as part of her non-K-Nect classes.

"If students don't have video capability, or data plans, I just work around it," she said. "Cell phones are infectious; they're not going away, so we might as well use them."

Kliewer's school has just approved K-Nect for the upcoming school year, where Kliewer will teach Algebra I in the fall and AP calculus in the spring.

As the program continues through the years, more and more classes are being added as part of K-Nect to both high schools.

#### **Great extras**

Kliewer says it's not just better scores that K-Nect has had an effect on; it's teaching, too.

Project Tomorrow found that teachers rely "more on facilitation and less on direct instruction, encourage students to talk with and teach each other, and create relevance for students by creating assignments that help them see math in their world outside of the classroom."

Teachers also use more internet-based tools to manage their classes, and they transfer their newfound skills to other devices.

For students, not only are they more proficient in math, but they feel more successful as well (85 percent).

"K-Nect tools and environment help students gain confidence in their math abilities, as they become more comfortable learning math (94 percent), talking about math (82 percent), and explaining their solutions (85 percent)," said the Project Tomorrow report.

When compared with other students, the report found that K-Nect students (61 percent) also have a greater self-perception that they are succeeding academically then their peers (39 percent) and believe that they are being better prepared for success (55 percent) than other students (45 percent).

Nearly 75 percent of the K-Nect students report taking additional math courses, and more than half say they are thinking about careers that require math.

Project Tomorrow plans to track the progress of these students as they enter post-secondary schooling as well.

"If I had to give one reason why this program is working, it's because of the expectations placed on students," said Kliewer. "When kids know we expect them to work hard, to do their best, and to succeed, they want to—and they do. We just have to give them the tools and encouragement to do so."



students.

# **Print's Worst Nightmare**

With school budgets continuing to face cuts, multiple eReading devices on the market, and an increase in student use of technology, districts and states contemplated replacing heavy, and often costly, printed textbooks with digital versions; many versions that now cater specifically to

From eTextbook database Blio, to national mandates on eReader accessibility, students may not have to lug heavy books to class much longer.

## The iPad is so last season

Despite all the <u>buzz about Apple's iPad tablet</u> and how it could be useful for reading electronic textbooks, a new software program on the way might hold even more promise for education.

<u>Blio</u>, a free eReader program, allows users to read more than a million electronic books on nearly any computer or portable device, with the ability to highlight and annotate text, hear the text read aloud, and more.

Blio was announced at 2010's Consumer Electronics Show (CES) in Las Vegas and is the brainchild of education technology pioneer Ray Kurzweil, creator of <u>Kurzweil Educational</u> <u>Systems</u> and a range of assistive technology products.

Perhaps the software's most impressive feature is that it can support the original layout, font, and graphics of any book in full color, its creators say. It also can support embedded multimedia such as video and audio, and readers have the ability to highlight, annotate, and share information.

Blio is backed by Baker & Taylor, one of the world's largest publishers, as well as Elsevier, Hachette, HarperCollins, Random House, Penguin, Simon & Schuster, and Wiley. Blio users have access to more than 1 million books altogether, its makers say—including a large selection



of current bestselling titles.

#### **Example of a Blio textbook**

Lisa Galloni, partner relationship manager for Blio, said the software has had tremendous support from publishers because it can preserve any book's original layout and graphics.

Its flexibility is appealing as well, Galloni said.

"Because it's not attached to any one device like a Kindle, it's not restrictive," she said.

As a user downloads eBooks, these are permanently stored in a personal virtual library, Galloni said. The entire library seamlessly migrates to up to five devices per user, any of which can be mobile.
"What's great about it is that since all these devices are synched, you can read seamlessly," she said. "Say I am reading a textbook on page 23, and then I leave my computer and decide to read on the bus via my iPhone. When I click on that book, it will still be on page 23."

Because all texts are stored virtually, all of the user's highlights and annotations are saved as well.

Users also reportedly can:

- Create a personalized list of reference web sites, for one-touch lookup of highlighted phrases;
- Adjust reading speed and font size;
- Translate to or from English in an embedded translation window; and
- Insert text, drawings, audio, images, or video notes directly into the content. These are saved and can be exported to create lists or study materials.

Another feature that could prove useful for assistive and language learning is Blio's read-aloud function. A synthesized voice can read texts aloud using text-to-speech functionality, synchronized with follow-along word highlighting, so a user can look and listen at the same time.

Amazon.com's popular Kindle eReader also includes text-to-speech capability, but in a concession to publishers, Amazon requires users to turn on this functionality themselves. Turning on this feature of the Kindle currently requires users to navigate through screens of text menus, which is a problem for users who are visually impaired.

In June 2009, the National Federation of the Blind and the American Council of the Blind joined a blind Arizona State University student in suing the school for its use of the Kindle in a pilot project, alleging that the device's inaccessibility to blind students constituted a violation of federal law. The parties <u>settled the lawsuit</u> in January, in part because Amazon said it was working on making its Kindle eReader more accessible for the visually impaired.

Other features of Blio reportedly include the ability to open a book in 3-D "book view" for realistic page-turning, a "text-only" mode for optimal page display on small screens, the ability to display dual pages or tile multiple pages, the ability to enlarge text without distortion, and a high-resolution display.

Blio's makers say the software will allow users to read eBooks on computers and mobile devices running Windows, Macintosh, Linux, Android, Symbian, Windows Mobile, and the iPhone operating system. Supported eBook formats include XPS, PDF, and ePub.

Downloading the software will require a computer running Windows 7, Vista, or XP, Windows Media Player 10 or higher, and at least a gigabyte of system memory. Galloni said a version of the software for Mac users will be available later this spring.

A full list of system requirements can be found<u>here</u>.

#### How it compares

A key advantage of Blio is that it doesn't tie users to a single proprietary eReading device like the Kindle or any of its competitors. That means schools can use whatever computers or mobile devices they or their students already have to make electronic textbooks available to learners.

Blio also might be a more attractive option than other computer-based eReading software, such as the <u>Amazon Kindle for PC or Stanza Desktop</u>.

Though both the Kindle for PC and Stanza are free, Blio reportedly offers thousands more books than either of these platforms, and it is touch-capable, works with Windows 7, and has readaloud and translation capabilities—all features lacking in these other programs.

A chart comparing Blio's features with those of other eReader devices and programs can be found<u>here</u>.

Besides offering multiple study tools that will allow students to interact with their textbooks, Blio includes a library model that will enable students to borrow or rent certain electronic texts for a month or a semester at a time, Galloni said.

"I've looked at Blio, specifically in regard to foreign language instruction, and I am really impressed," said Ryan Layman, an assistant professor in the English Language Program at Kanazawa Institute of Technology in Japan.

"Extensive reading has been widely touted in our field as a means for learners to build their language abilities, and Blio makes [texts] even more accessible to them. Its multimedia features, the vast amount of content, and the fact that it—and much of that content—is free provides ... learners with a multi-functional learning tool at no to minimum cost."

While Blio appears promising for schools, Layman said, it also holds promise for independent learners.

For example, the software's read-aloud function "can be used to check pronunciation of unfamiliar words as well as for listening practice, and multimedia features allow for deeper

comprehension of the material. Study tools such as sticky notes, highlighting, and bookmarks provide more functions for learners to engage in student-centered learning."

The Blio "looks incredible and feature-rich; however, without the context of a device, it is hard to compare," said Anthony David Adams, founder and editor of <u>DetentionSlip</u>, an education blog. "For example, I love my Kindle 2 because it is simple, easy on the eyes, and reads like a book. On a PC, however, this looks to be a superior product for reading books."

# State drafts eReading list

Following up on their plan to encourage the use of free, open digital textbooks among the state's schools, California education leaders on Aug. 11, 2010, released a list of resources they have determined meet state-approved standards for high school math and science classes.

State Secretary of Education Glen Thomas worked with State Superintendent of Public Instruction Jack O'Connell and State Board of Education President Ted Mitchell to develop the list over the past few months.

The "Free Digital Textbook Initiative Report," facilitated by the California Learning Resource Network (CLRN), outlines how open high school math and science textbooks submitted under the first phase of the initiative measure up against the state's academic standards. The state received 16 digital textbooks to review, with 10 meeting at least 90 percent of the standards and four fully meeting the standards. The reviewed resources are available for schools to use this fall.

"California's Free Digital Textbook Initiative was created to provide students, teachers, and parents [with] access to free digital high school textbooks that meet California's rigorous content standards," the report reads.

"It is important to note that, while the digital textbooks in this report were reviewed for alignment with California's content standards, social content review criteria were not applied during this phase. Thus, a textbook's inclusion in this report does not in any way constitute an endorsement by the state of California."

The report urges districts, schools, and teachers to conduct their own reviews to determine whether the resources meet their needs.

Researchers used content standards adopted by the California Department of Education in 1997 for high school math courses and in 1998 for science courses. Submitted texts were reviewed to determine whether the materials fully or partially meet or do not meet state board-adopted content standards.

For example, when looking at calculus materials, reviewers were looking to see if students would be able to gain knowledge of both the formal definition and the graphical interpretation of continuity of a function. In earth science, researchers looked for evidence that students would learn the thermal structure and chemical composition of the atmosphere.

"California's Digital Textbook Initiative gives school districts high-quality, cost-effective options to consider when choosing textbooks for the classroom–not only during these difficult economic times but in the years to come," said Gov. Arnold Schwarzenegger. "This represents an important step toward embracing a more interactive environment that leverages technology to meet the changing academic needs of California's students."

State officials plan to review digital textbooks for other academic subjects in the coming months.

# eTextbook, meet LMS software

As digital textbooks become more common on higher-ed campuses, providers are making it easy for professors to share textbook notes and resources with students through their class learning management system (LMS) software. The latest provider to do so is Follett Higher Education Group, which announced May 19, 2010 that a new standards-based system would integrate its eBook material with popular sites such as Moodle, Sakai, and Blackboard.

Educators who use textbooks supplied by Follett's <u>CaféScribe</u>, which also brings students together through social networking to form online study groups, can take detailed notes in the web-based format, pointing out the most important lessons to students and fellow faculty.

Until recently, those notes couldn't be shared on a college course's LMS, where students go to see class assignments, chat with peers and faculty members, and watch class videos online.

Now, college students will be able to see CaféScribe notes posted by their professors on their LMS web site, and they'll be able to go directly to the notes via hyperlink, "automatically placing the notes in the context of the eBook and vice versa," said Bryce Johnson, director of eTextbook solutions for <u>Follett</u>, which is based in Illinois and serves 1,600 campus bookstores nationwide. "Students will not experience this as two software environments, but instead as one learning experience."

Johnson added: "Our whole desire here is to bring [CaféScribe eBooks] into the online environment. We want to bridge that gap between LMS and [electronic textbooks]."

<u>Flat World Knowledge</u>, a New York-based publisher of open electronic textbooks, also allows educators to link digital books to their LMS sites, pinpointing a certain chapter or lesson if needed, said Eric Frank, Flat World's president. And educators who use <u>CourseSmart eBooks</u> have "the ability to access CourseSmart content from within an institution's various campus systems," Heather Shelstad, the company's director of marketing, said in a statement.

Bringing the two online platforms together, Follett officials said, required the company to adopt the <u>Learning Tools Interoperability</u> (LTI) standard created by <u>IMS Global Learning Consortium</u>, a nonprofit group leading the push for standards-based school technology.

The LTI standard, according to IMS's web site, allows for "mash-ups of applications within the learning system or portal," reduction in support costs for colleges and universities, and protection from "poorly written proprietary tool integrations" that can affect LMS sites.

Frank of Flat World Knowledge said the company does not use the LTI standard, "not to say that we won't sometime in the future," he added. Flat World's eBooks can be "embedded as Flash objects" in the most commonly used LMS software, such as Blackboard and Moodle, he said. Flat World books reportedly are used by professors at some 900 colleges and universities.

Rob Abel, CEO of <u>IMS Global Learning Consortium</u>, said connecting LMS sites to digital textbooks would save students the extra step of jumping back and forth between CaféScribe eBooks and their Moodle, Sakai, or Blackboard LMS.

"Traditional bound books are to classrooms as eTextbooks are to learning management systems," Abel said. "Higher-education institutions need to integrate these resources to create a seamless educational experience for students."

Students who use the <u>CafeScribe eBooks</u> aren't limited to contact with their professors and fellow students. Any student from any campus in the world can share content and study notes with any other student if they're using the same web-based textbook, according to an April 21, 2010 announcement from Follett Higher Education Group.

CaféScribe eBooks are used on more than 850 college campuses, according to the company's web site.



# Server in the Sky

Virtualization not only saves space by eliminating the need for physical servers, it allows for shorter set-up time for new servers, and increases energy efficiency.

Be it for a greener footprint, or simply to save time, schools

and districts across the country are going virtual.

# Teachers: Make your virtual dreams come true

Moving from the current use of desktop and laptop computers to a Virtual Desktop Infrastructure (VDI) creates many possibilities for teaching and learning.

Imagine the possibilities if teachers could gain improved access to new software, software updates, and web-based resources that support teaching and learning. With VDI, when a division approves software for use, then teachers could gain access to the software overnight. This access could be provided to teachers throughout a division, or to particular groups of teachers, such as high school science teachers or elementary art teachers.

Divisions might even be able to approve additional software because the ease of deploying the software does not require significant human capital. Teachers could better use web-based resources because of better access to current versions of plug-ins.

Imagine the possibilities if teachers could use the resources of the division network anytime, anyplace, and from any device with browsing capabilities.

Teachers, regardless of time and location, could easily view and update files that are stored on the division network. This includes grade book files, even if the grade book is not web-based. Teachers, regardless of time and location, could use the software on the division network. For example, teachers could view textbook software on the division's network. Even if they are not at school, teachers could use the software that they use in their courses, even if it is not loaded on the computer they are using.

Teachers would no longer need to use thumb drives to carry files to and from home, school, and other locations. Even if the division uses a PC environment, teachers could use Mac computers to access the files and software on the division's network.

Imagine the possibilities if students also had expansive access to the network. Students, regardless of time and location, could easily work independently or collaboratively to view and update their work that they have saved on the division network. Working from home or elsewhere within the parameters of licensing agreements, they could also use the software that previously could only be used at school. They could also access their library's catalog of resources to identify and reserve materials.

#### Information technology staff members

Imagine the possibilities if information technology (IT) could easily update the desktops of computers throughout the division. Software would be deployed throughout the division or to particular groups of students without having technicians touch each computer. It would be much easier to manage the use of hundreds of applications throughout the division and to accommodate a mix of software that require different plug-ins. IT would have fewer worries regarding whether adding new software would break the fragile infrastructure of a computer's operating system. No longer would individual computers need to be dedicated to particular uses because of an inability to use multiple products on the same computer.

The power of the computer on a teacher's desktop would be less important for the user's experience because VDI provides equal capacity for users.

Historically, IT staff members have many worries regarding older computers. Will an older computer run Windows Vista or Windows7? Will an older computer run Office 2007 or Office 2010? Will an older computer have the processor speed to run multimedia? With VDI, IT staff members and users would have fewer worries about older computers because the computers would just be portals to the virtual environment. This would allow a division to lengthen the computer replacement cycle or at least be happier with the current computer replacement cycle.

#### Realizing the possibilities with VDI

With VDI, students, teachers, and other staff members are connected to their division's network through a private internet cloud. A user is no longer tethered to a specific computer in a specific school with a standardized configuration of software, blind to their needs and interests.

Individuals and groups have unique profiles of access to instructional software, administrative tools, and data. Furthermore, with VDI, they have the freedom to securely access applications anytime, anyplace, using any device with browsing capabilities.

#### **Instructional implications**

The York County School Division (Va.) has created a VDI and provided access to the VDI to secondary staff members. We anticipate providing access to elementary staff members by the end of the 2010-2011 school year and we are developing plans for student VDI access. VDI will support our use of technology to engage students in rigorous learning experiences. VDI will help us tap into students' interest in digital tools as a means to higher <u>student achievement</u>.

With the initial implementation of our VDI, teachers have immediately expressed appreciation for the ability to connect to the division's network anytime, anyplace, and from any device. We have only just begun to take advantage of the possibilities of VDI!

# Virtualization: Fatter wallets and bigger smiles

Why buy new computers, when you can hook up a simple device to a monitor and create the same experience through desktop virtualization—while potentially saving thousands of dollars on hardware, energy bills, and tech support? That's the question that is driving the enormous growth in virtualization among schools across the United States and worldwide.

School IT directors who have tried virtualization say most users can't tell the difference when they're working on a virtual desktop instead of a regular PC.

The Wantagh Union Free School District on Long Island, N.Y., adopted a desktop virtualization model when confronted with the prospect of having to replace aging computers in its elementary school classrooms. "We had 10-year-old Dells and were really due for a refresh," says Technology Director Don Murphy.

Instead of buying new PCs, the district purchased X series devices from NComputing Inc. of Redwood City, Calif. Wantagh elementary schools typically have five computers per classroom. With desktop virtualization, Murphy only had to purchase new PCs for teachers. Students use a monitor, keyboard, and mouse–along with the X550 device–to share computing power from the teacher's PC.

"This was the most seamless way to move to a virtual experience," Murphy says. "We didn't have to invest in servers. And with the energy savings, the project will pay for itself in a few years."

NComputing Chairman and CEO Stephen Dukker calls the company's ability to provide lowcost computing power to schools "one of those inflexion points in education, comparable to the time in the 1980s when PCs were gaining ground."

NComputing's products are based on the fact that today's computers are so powerful, most applications use only a fraction of a PC's capacity. NComputing taps into that unused capacity by enabling up to 30 users to take advantage of a PC's computing power for as little as \$70 per additional user. (That doesn't include the cost of a monitor and keyboard.)

According to NComputing, districts that switch to its desktop virtualization products can save up to 70 percent on hardware, 75 percent on maintenance, and 90 percent on energy costs when compared with a traditional technology rollout.

#### Worldwide growth in virtualization

Those benefits are fueling enormous growth in desktop virtualization. Dan Griggs, an analyst with CDW-G, says predictions for sales growth range from 8 to 10 percent for 2010.

Dave Podwojski, director of government, education, and health care for Citrix Systems Inc., estimates desktop virtualization is a \$23 billion industry worldwide, which includes all customers, not just the education market. "Desktop virtualization is growing dramatically," he says. "It's really becoming the way almost everyone is using computers." He says Citrix has sold its products to more than 400 school districts in the United States.

NComputing's share of the K-12 market has more than doubled in a year, from 7 percent in 2008 to 15 percent last year, says Dukker. "We're about to cross over into having 1 million workstations in U.S. public schools," Dukker says. For a company that started shipping desktop devices to the education market in 2006, "this is quite a remarkable success rate."

But U.S. sales make up less than half of the company's sales figures. NComputing has sold more than 2 million units in 140 countries, reaching 10 million students. While computers were introduced into U.S. schools long before the schools had internet access, in the developing world, it's all happening concurrently, Dukker says.

Two years ago, NComputing installed 160,000 workstations in Macedonia, one for every K-12 student in the country. In 2008, the company provided 55,000 workstations serving 2 million students in Andhra Pradesh, India, and will provide another 11,000 there this year.

Another player in the virtual desktop market, Userful Corp., based in Calgary, is selling more of its products to schools overseas than in North America. The company has sold half a million workstations, and its products are in 10,000 schools worldwide–the vast majority in Brazil and South Africa, as well as a few dozen schools in the United States, says Marketing Manager Sean Rousseau.

The company's Userful Multiplier software for Linux, which costs \$69 a seat, allows up to 10 users to share a single PC. Each user has a monitor, mouse, and keyboard attached to a host computer via a USB connection.

And Wyse Technology's sales of its thin-client products to K-12 schools have grown 400 percent in the last three years, the company reports. It now counts some 200 school districts among its customers.

New developments in virtualization technology

NComputing recently added a new series of devices to its virtual desktop products: the U series, which allows up to nine workstations to connect to a PC via a USB port. It's expected to be priced under \$100 per user.

The U series joins the company's X series (about \$70 per seat), which uses PCI cards and cables to connect a host computer to up to five workstations in the same room, and the Ethernet-based L series (starting at \$149 per seat), which can support up to 30 users connected to a PC or up to 200 users connected to a server with its vSpace software. Later this year, NComputing plans to roll out a new version of the L series, the L300, with a chip that allows high-definition multimedia over broadband.

NComputing's NClient, a new software program due out this spring, will let users access their virtual desktop space on a laptop, a home computer, or anywhere through the internet via a local network or wireless connection. A price hasn't been set yet, but Dukker says it will be "substantially under \$30."

NComputing is partnering with LG Electronics to produce network monitors with NComputing devices built in. Already, 50,000 to 60,000 monitors (available in 17- or 19-inch models) with the X series built in have been sold for less than \$200 apiece. LG monitors with the L series are expected to be available in April.

In November, NComputing announced an agreement with Microsoft to align with Microsoft's new Multipoint Server 2010, a new Windows operating system that allows multiple users to connect to a single host computer via their own monitor, keyboard, and mouse. NComputing will develop new versions of vSpace to take full advantage of Microsoft's system, Dukker says.

Meanwhile, Wyse Technology, based in San Jose, Calif., announced new versions of its thin clients and desktop virtualization software in January. The new Wyse X90cw ultra-light mobile thin client gives students and teachers access to their virtual desktop from any location with internet access, with all data stored on central servers to ensure security.

Wyse thin clients for students, about the size of a hardcover book, are connected to a teacher's console via Ethernet cables, allowing the teacher to control what is on students' desktops. Tech support, including upgrades and maintenance, is centrally managed.

The devices can be used on their own or with Citrix, VMware, or Microsoft's Multipoint Server 2010. With Multipoint Server, student workstations are connected to the host computer through a direct connection via a USB cable or video card, says Microsoft spokesman Ben Skoch, allowing

teachers to "monitor students' work and provide an individual learning experience for each student."

Other new developments on the way soon include "built-in redundancy for disaster recovery" and "greater capabilities [for helping] districts during pandemic situations," says Griggs of CDW-G. For example, he says, virtualization will allow students at home to have full access to their classroom environment. He also says schools are likely to see enhanced graphics for programs such as AutoCAD, without expensive hardware or software components.

#### Software and server virtualization

Schools and colleges that use server or software virtualization from such companies as VMware and Citrix Systems also report significant cost savings.

With software virtualization, instructional software resides on servers rather than individual PCs, while the operating system remains on the client computer. This approach allows IT staff to install, manage, and troubleshoot applications from one central location, rather than work on individual computers.

With server virtualization, as many as 10 or more "virtual servers" can run on one physical server. A "hypervisor" allows multiple operating systems to run concurrently on users' PCs.

Software and server virtualization are often integrated with desktop virtualization.

For example, Sun Microsystems' Sun Ray, a device attached to a thin client that plugs into a network, runs on software from Citrix Systems, based in Fort Lauderdale, Fla. Northern Arizona University has about 600 "seats" with Sun Rays, about 80 percent of them in computer labs, which are used in conjunction with a virtual server system, says Technology Director Richard Toeniskeotler. He likes Sun Rays because they don't produce heat, use less energy, are not susceptible to viruses, require little hands-on support, and "give us tremendous flexibility in what users see."

It's easy to change operating systems, Toeniskeotler says. For example, one group of students can come to a lab and use Windows XP, while the next group can work in Windows 7 on the same machines.

Toeniskeotler identified a few drawbacks to a virtual server system. "Because you're running off a server room, you need a good-quality network to make it work. And it's not the best [solution]

for people with a lot of high-end graphics needs," like Photoshop or video editing, he says. "But it is ideal for people with basic needs."

He adds: "A lot of people think they will save a tremendous amount of money the first year" with server virtualization. "That isn't true. You will have to spend a lot the first year to upgrade your server room, but you will save in subsequent years." Servers run about \$6,000 to \$10,000 apiece.

But "you no longer have to swap out PCs every three to five years," he notes. The Sun Rays are about \$300 each with educational pricing, he says, and they should last six to 10 years.

Charles Kanavel, director of technology for the Campbell Union High School District in San Jose, Calif., says desktop virtualization with workstations physically attached to a host works fine in an elementary school classroom, but server virtualization is better suited to a high school where students move from class to class.

Campbell installed 50 XenServers and 500 XenDesktops from Citrix. XenServer is an opensource server virtualization platform that turns traditional servers into multiple servers. Its benefits include reduced cooling requirements, less energy consumption, and easier server management, says Citrix's Podwojski.

XenDesktop (the most basic version costs \$4 to \$9 per student) uses "thin app" software, rather than a physical thin-client device, to deliver a virtual desktop to any computer, even one so old it can't handle one of the newer operating systems, as well as a BlackBerry, tablet, or any device connected to the internet or a local-area network, Podwojski says.

"It gives you the freedom to work wherever you want," he says.

That's a key advantage for Kanavel, who says Campbell students can log in from home or a public library and access the same virtual desktop and all the educational resources they have at school. And that has led to better grades, he maintains.

For example, students in an AP statistics class can access the MiniTab charting software from home, allowing them to create a chart in two minutes, while doing the same work with a pencil and paper would take hours. Also, because homework is saved on the virtual desktop, Kanavel says, students don't have to remember to bring it to school. "It levels the playing field for students from middle or lower-income families who don't have access to the latest hardware and software," he says.

Campbell uses Windows XP, but the system can use any operating system. The district provides different virtual desktop configurations tailored to different classes. For example, a class on graphic design might have programs such as Photoshop and Adobe that are not available to other classes. All programs are managed in one centralized place.

All seven of the district's schools have some degree of virtualization, says Kanavel–and he expects the district to be 100-percent virtualized within three years.

In Pennsylvania, the Western Wayne School District turned to virtualization after funding from a state Classrooms for the Future grant dried up and the district was looking for a cost-effective way to sustain its one-to-one technology program, says Network Administrator Brian Seaman.

The district installed a server virtualization system from Palo Alto, Calif.-based VMware Inc. along with Wyse thin clients. In addition to saving money on hardware, software, and energy, "we've been able to cut down on our Microsoft licensing fees because we are no longer using all of our computers at the same time," Seaman says. Because there is overlap on the district's 200 workstations, he only needs 100 copies of Windows XP.

The University of Texas in Austin is using VMware View and Microsoft's Softricity software to provide 600 virtual desktop "seats" in computer labs, with plans to add hundreds more. "We dropped it in on the stealth; people didn't even know" they were using virtual computing, says IT Director Robert Gloyd.

"Based on students' electronic IDs, you can tailor the operation delivery and provide various flavors of operating system, such as Linux or different versions of Windows," Gloyd says.

Virtualization allows the university to offer "capabilities that wouldn't otherwise exist," he says. Before, students using the university's software were restricted to the lab; now, "they can use it anywhere with internet access." The university provides students with a certain amount of disk space, and students can purchase more if they need it.

For Gloyd, a key advantage is that data can't be stolen; all of the information is on servers in a "huge data center."

#### **Centralized IT support**

Schools typically have limited budgets and understaffed IT departments, and "having to physically go to a school to fix a PC is expensive and time-consuming," says Raj Mallempati, director of product marketing for VMWare's desktop solutions.

Centrally managed desktop virtualization lets IT staff upgrade operating systems, install and update software, and fix problems remotely. Mallempati says virtualization is particularly suited to K-12 education, because a district's schools often are spread out geographically and PCs are subject to a lot of wear and tear as groups of students repeatedly cycle in and out of computer labs.

Desktop virtualization "gives us more control, and it's reduced our work orders," says IT Director Lee Bennett of the Dougherty County, Ga., school district, which is in the midst of a project to install 5,000 NComputing devices.

The district is using L series devices to connect each PC host to five workstations in classrooms and seven in computer labs. Before, the district was using old CRTs, which take up a lot of space and use a lot of power, Bennett says. The replacement cycle for those machines was coming up, so the district had to buy new PCs anyway.

The Wantagh, N.Y., school district used to have "a tremendous amount of hardware support issues" before switching to desktop virtualization, says IT director Murphy. "That has dropped dramatically."

And teachers now have the capacity to use streaming video and multimedia presentations, which they couldn't do before on the old computers. Even accessing the web is faster now, he says, adding: "The teachers are thrilled. And the students don't even know they're not on a real computer."

The district uses Windows XP, and Murphy says 90 percent of its software works well with the NComputing devices, including Microsoft Office, Kidspiration, and Inspiration. Some older, proprietary instructional software doesn't work as well, he says, but the district is moving away from those programs and relying more on web-based programs anyway, so that's a non-issue.

Pepperdine University in Malibu, Calif., has 110 NComputing devices, including a mix of X and L series units. Thomas Hoover, director of instructional technology support, prefers the flexibility of the L series, which offers students computer use and internet access in the university's Sandbar Café, even though "the PC host machine is several buildings away."

And when you install new software, you're installing it for all users on the network simultaneously. "That makes it a lot easier to manage," he says.

When the university surveyed students about their experience with desktop virtualization, 87 percent weren't even aware they were using it, Hoover says. Thirty-eight percent said their

experience with the computers in labs or other locations around campus was about the same as the previous year; 53 percent said their experience was better or much better, and 9 percent said it was worse or much worse.

Students who need access to high-end engineering software or graphics might not be satisfied with the quality on virtual desktops, Hoover says, but Pepperdine is a small liberal-arts school that doesn't need those types of applications very often–and neither would most school districts.

### **Cost savings**

"We chose virtual desktops purely for the cost savings," says Hoover. When he started looking at various options last April, he decided against server virtualization because you need to buy a back-up server, so you don't end up saving that much. "The beauty of NComputing is we can use it with a regular machine; you don't need anything fancy," he says.

The language program in the International Studies department wanted to refresh its aging computer lab, but the cost of purchasing new PCs would have been \$28,000. Using a virtual desktop model brought the cost down to \$6,600, Hoover says. And desktop virtualization requires much less tech support.

For the Wantagh district, which uses the less expensive X series, Murphy estimates he spent about \$1,800 to \$2,000 to equip a classroom with six workstations with the devices and monitors, compared with \$3,600 to \$3,800 if he had to buy new PCs.

Dukker calls NComputing's ability to provide a virtual desktop for \$70 a "disruptive force that redefines the economics of computing." For the past four years, he says, people like Nicholas Negroponte, founder of the One Laptop Per Child initiative, have been trying to develop computers for less than \$100 without compromising on quality, he says, "but it can't be done. If you want all the functions, you need to spend at least \$400."

With cloud computing, where applications and operating systems are accessed from the internet, "all you need at your desk is a virtual desktop device and a monitor. Your desktop becomes a cloud workstation," he says.

Dukker predicts companies will begin to offer schools third-party IT services over the cloud. He says this is already happening in the United Kingdom, where schools are buying service agreements for remotely hosted IT services with fees set per workstation, per year. "This is one way cloud computing will manifest itself in education," he predicts.

The Campbell school district, which uses Citrix, spent \$300,000 to virtualize 500 desktops and 50 servers. That includes the physical devices and licenses for operating systems and other software. Licensing prices vary from vendor to vendor, depending on the number of users or other factors.

But the district saved about \$500,000 the first year by not having to spend \$250,000 on new PCs and \$300,000 on new servers. And that doesn't include the long-term savings realized by not having to replace computers under a four or five-year refresh cycle. "The long-term maintenance and replacement cost savings are huge," Kanavel says. He estimates the district will save \$4 million over eight years.

Additional "soft dollar savings" are realized with virtualization because IT staff can be more effective if they don't have to spend as much time on hardware maintenance and software support, Kanavel adds. With IT support centrally managed, "my staff [are] more effective, and we can get more done." Energy use has declined about 30 percent, partly owing to a centrally managed system that turns off all the desktops at night.

#### 'A no-brainer'

Brick Township Public Schools in Ocean County, N.J., started switching to virtualization in its elementary schools about three years ago, says IT Director Leonard Niebo.

Each classroom had about five IBM computers that were five, seven, or even 10 years old. "We couldn't get enough money to replace all of them," Niebo recalls. After learning about NComputing's devices at an ed-tech conference and testing a demo unit back in New Jersey, he ordered 300.

"We were originally going to do a four-year plan to replace the computers; we got it done in 18 months," Niebo says. The compressed replacement schedule also solved the "equity problem" that arises when people complain about some classes getting new computers while others are stuck with old ones.

Now the district has more than 1,000 NComputing virtual desktop devices. The large majority are X300s, and the district is starting to replace them with the 350 series, which Niebo says is a bit more robust for applications like Photoshop. That would be particularly helpful for a high school graphics class where students create logos and brochures for local businesses.

NComputing "offers a lot of bang for the buck," Niebo says, which means the money saved on technology can be put to use elsewhere in the schools. "Every \$80 saved in IT costs equals one textbook," he says. "And there are no moving parts on these things, so they're hard to break."

The district also replaced all its old CRT monitors with flat panels, which use less energy. Niebo estimates the conversion to virtual desktops is saving the district about \$20,000 a year on its energy bills.

Brick Township also virtualized its servers, using a grant from Microsoft to obtain a Hyper-V platform, which is part of Windows Server 2008. That allowed about a dozen servers to run on a single host machine, eliminating about 26 servers.

Before, the district had been spending about \$2,600 annually to power and cool each of the 53 servers in its data center. Niebo says server virtualization has resulted in savings of \$30,000 just in electrical costs and has reduced rack space by about 50 percent. He estimates server virtualization will eliminate another \$80,000 in hardware replacement costs.

"For the life of me, I can't figure out why more districts aren't doing it," Niebo says about virtualization. "It's a no brainer."

# Schools leave fewer footprints

Schools across the country are finding that investing in energy-efficient technology has an economic benefit as well as helping to save the environment.

"We're estimating saving about \$30,000 per year, and that's [mainly] by consolidating servers," said Paul Romero, executive director of technology at Rio Rancho Public Schools in New Mexico.

CDW Government LLC (CDW-G) surveyed 756 technology professionals for its 2010 "Energy Efficient IT Report" and found that three-quarters of respondents are working to reduce energy use in their IT operations. If current energy use rates don't change, greenhouse gas emissions from data centers will outweigh those from the airline industry by 2020, the company warns.

"The power usage in the data center is ever increasing, especially with rising energy costs," said Mark Lafferty, director of strategic solutions and services for CDW-G. "That seems to be the most popular place to review your energy strategies."

The ability to bring down costs while improving efficiency and helping to save the environment inspired Romero to pursue energy-use changes in his ed-tech department.

"We looked at it as a good project that could do both very effectively and efficiently," said Romero.

Romero said that the heat generated by a large number of ed-tech systems cause schools to waste money on air conditioning as well.

"We're going to really look at energy efficiency as far as projectors [go]. Instead of getting a regular bulb that creates a lot of heat, we're looking at LED lights so we don't have to cool the classroom," said Romero. Romero's goal is to continue to reduce his district's servers down to a point where every twenty servers can be replaced by a single unit.

"There's been a lot of over-capacity for a long time," added Lafferty. "I think with the onset of virtualization, you're getting more efficiency through fewer servers. With the consolidation there, you gain the benefit of not needing to cool and to power as many servers."

Lafferty encouraged other schools to map out their own ed-tech energy use.

"Utilize some of the tools that are available, either from the EPA or the Department of Energy, to really get a take on what you have and what your energy consumption looks like," he said. "[Then] build a strategy to address those needs."

CDW-G suggested the following strategies to cut back on energy use in ed-tech departments:

- Deploying more power-efficient core switches;
- Replacing edge and workgroup switches with more power-efficient switches;
- Using the network as a platform to manage and reduce energy use;
- Adopting 10GB Ethernet, Infiniband technologies;
- Reducing storage area network infrastructure by implementing Fiber-channel Over Ethernet (FcOE); and
- Moving to top-of-rack models for access layer switching.

CDW-G found that of those organizations already actively trying to manage their energy use, 56 percent have reduced their annual annual IT energy costs by at least 1 percent.

Data centers currently account for 1.5 percent of the total U.S. energy consumption, which accounts for \$4.5 billion a year, according to federal figures. The Environmental Protection Agency has predicted that that amount will nearly double within the next five years.



# Just Say 'No' to Bullying

Devastating student suicides and many more unfortunate incidents occurred in schools, and between students and faculty, through bullying and cyberbullying in 2010.

Because of these incidents, schools and districts began seeking advice on how to prevent many kinds of bullying, and even the federal government stepped up to issue

guidance. 2011 will surely be the year in which anti-bullying curriculum and anti-bullying policies will be implemented across the country.

# Bullying's trial in federal court

The U.S. Department of Education (ED) is warning schools: Tolerating or failing to adequately address ethnic, sexual or gender-based harassment could put them in violation of federal anti-discrimination laws.

After several high-profile cases of bullying, ED is sending letters to schools, colleges and universities across the country on Oct. 26, 2010 reminding them of their federal obligations.

Russlynn Ali, assistant secretary for civil rights, said ED was responding to what it senses as a growing problem within schools.

She said the Office for Civil Rights (OCR) had received 800 complaints alleging harassment over the last fiscal year, and that reports from the field indicate an increase of harassment against certain groups — including gays and lesbians, as well as Muslim students after the 9/11 attacks.

In September last year, 18-year-old Rutgers University student Tyler Clementi committed suicide after his roommate secretly webcast his dorm-room tryst with a man, police said. The roommate and another student have been charged with invasion of privacy, and authorities are considering whether to add a hate-crime charge.

In January, a 15-year-old Massachusetts girl, Phoebe Prince, took her own life after being relentlessly bullied by her classmates, prosecutors said. Six teenagers have been charged.

"Certainly the unspeakable tragedies over the past several weeks contribute to our sense of urgency, and it's important that the public know there are things schools and universities can and should be doing," Ali said.

OCR has issued similar guidance letters to educators in the past. But this is the first time the agency is addressing all statutes, not just those protecting against gender or sexual offenses, and in the context of bullying and harassment, Ali said.

The letter also clarifies protections for students of religious groups and gay and lesbian individuals.

While the laws the OCR enforces do not protect against harassment based on religious or sexual orientation, there are protections for students from religious groups that share ancestry or ethnic characteristics, as well as gay, lesbian, bisexual and transgender students based on gender stereotypes.

Tolerating, not adequately addressing, encouraging or ignoring harassment based on race, color, disability, sex, or national origin can indicate the violation of civil rights statutes.

Education Secretary Arne Duncan sought to assure students that action will be taken.

"No one should ever feel harassed or unsafe in a school simply because they act or think or dress differently than others," Duncan said. "To every student who feels threatened or harassed, for whatever reason, please know that you are not alone. Please know that there are people who love you. And please know that we will protect you."

ED will hold technical assistance workshops for schools early this year.

# Duncan: We can't ignore this elephant in the classroom

Calling attention to one of education's fastest growing problems, Education Secretary Arne Duncan on Aug. 11, 2010 spoke at the nation's first "Bullying Prevention Summit" to incite a call to action, as well as invite government officials, behavioral experts, and education organizations to brainstorm scalable solutions to bullying in classrooms nationwide.

"This is the first real collaboration between government agencies to help combat the growing issue of bullying," said Duncan. "Why these agencies haven't come together before today is a good question. We're hoping this summit will be the first step in creating a sustained effort against bullying in schools."

The two-day summit, being held at the Washington Hilton Hotel in Washington, D.C., is intended to help <u>school leaders</u> and government officials pool their knowledge on bullying and then turn this knowledge into plans for action.

In his opening speech, Duncan said that bullying is not a fad, but rather a problem that, if left unattended, will escalate.

According to the federal Education Department (ED), in 2007 one in three students in middle or high school reported being bullied. Nearly 3 million teens said they were physically abused by their peers, and 1 million teens reported their property stolen or damaged by bullies.

"People say the phrase 'gateway drugs'; well, I see bullying as 'gateway behavior' that later in a student's life can lead to high school dropout, drugs, and criminal behavior," Duncan said.

"Along with physical abuse and bullying in the school, students are now also reporting an increase in cyber bullying and bullying through 'sexting," he added.

"Our inability as adults to stop bullying in Chicago schools is a failure that haunts me," he said. "One of the biggest steps we're taking at the department is to identify research on what works best to combat bullying and helping to support those tactics and programs."

#### What the experts are saying

Dr. Philip Rodkin, an associate professor of child development in the Departments of Education Psychology and Psychology at the University of Illinois at Urbana-Champagne, spoke at the summit and shared some insight on the issue.

According to Rodkin, many people believe that bullying is just an act of aggression, but it's important to understand that aggression and bullying are two different beasts.

"Aggression is more of a personality trait, where bullying is a learned action, usually resulting from an unstable home environment or from having experienced bullying by another," explained Rodkin.

"Bullying is about social capital, not just physical power—it's a relationship of control," he added.

According to Rodkin, many schools aren't actively combating bullying because teachers already have enough on their plates.

"Schools need to ask every student, 'Are you being bullied, and if so, by whom?' They really need to formally and objectively know the social dynamic of their school; yet, so often, administrators and teachers don't take the time to know, because they either consider the problem to be outside the school's jurisdiction or have more pressing concerns, like standardized testing."

"Excuses like 'kids will be kids,' or 'this is not an education issue,' or 'oh, it was just a bad joke,' are not acceptable," said Duncan. "The culture of bullying has been shrouded in myth and misunderstanding for far too long."

By asking students about their peer social ecology, Rodkin said, schools and parents will begin to answer important questions, such as "Who is accountable when one child is being abused by another?" and "Are we modeling positive values and moral behavior around children?"

"Schools need to cultivate an environment of trust and accountability for their students," said Duncan. "Victims of bullying aren't 'tattletales;' they're being responsible. We, as adults, must also present consistent and sustained model behavior for children."

Rodkin said another issue that parents need to monitor is cyber bullying.

"Aggression is a contagious behavior that operates through social networks, both in school and outside of school," he said.

According to research conducted by Dr. Sameer Hinduja, associate professor in the School of Criminology and Criminal Justice at Florida Atlantic University, co-director of the Cyber Bullying Research Center, and another guest speaker at the summit, approximately 15 to 35 percent of students have been victims of cyber bullying.

Research also shows that 10 to 20 percent of students have admitted to cyber bullying others; girls are as involved, or more involved, than boys; and involvement seems to peak in middle school (grades 6-8).

#### What to do now

"A testament to how badly bullying can affect someone is by how adults can recount, even decades later, with vivid feeling and detail, how they were bullied by someone in school," said Duncan. "Bullying leaves scars that may never heal, thanks to its culture of silence and shame."

According to Dr. Catherine Bradshaw, associate professor in the Department of Mental Health at the Johns Hopkins Bloomberg School of Public Health, the public health sector has multiple levels of bullying prevention and response. These strategies include:

- Individual: interventions and counseling for children who bully and are bullied.
- Classroom: lessons to foster social-emotional skills and competencies, effective communication, and strategies for preventing bullying; effective classroom management.
- School-wide: a system of positive behavior support; a common set of expectations for positive behavior across all school contexts; involvement of all school staff in prevention activities; effective supervision; clear anti-bullying policies.
- Family: strategies for supporting children involved in bullying; open communication to promote disclosure of bullying; constructive role for parents in bullying prevention.
- Community: awareness campaigns that encourage intervention and prevention; community involvement in prevention activities and programs.

"There also needs to be a seamless system of support in schools," said Bradshaw. "You can't just have a separate program for each individual problem; otherwise, teachers will become overstressed and implementation will be faulty. Instead, social-emotional learning, bullying prevention programs, student services, school mental health programs, suicide prevention, special-education assessments and referral, and effective classroom management all need to work together. This way, not only will bullying be prevented, but a host of other issues [might be addressed as well]."

Dr. Susan Limber, a faculty member within the Institute on Family and Neighborhood Life and Professor of Psychology at Clemson University, was sick and could not attend the summit;

however, Bradshaw presented Limber's suggestions, citing ways schools can take action against bullying.

According to Limber, there are 67 anti-bullying programs in 42 states, but only a few states require implementation of these programs.

"State laws on bullying require that school officials establish and enforce policies against bullying in public schools, but these policies vary in definitions and requirements," said Bradshaw.

These state programs can include policies that call for reporting on bullying incidents, an investigation in these incidents, parental notification, discipline for children who bully, training for teachers, and prevention strategies.

Duncan said that while severe cases of bullying that lead to criminal offenses must be punished, a school's code of conduct should not be all punitive; instead, schools must reward good behavior, too.

"Many bullying cases, especially in regards to race, sex, and disabilities, can violate civil-rights laws, and, in some severe cases, violate state and federal laws; however, it's not my intention to try and lock up our nation's youth. Instead, we have to prevent bullying from ever happening and/or escalating to that extreme," he said.

Limber's research suggests that many schools are implementing faulty policies, which include zero tolerance policies, conflict resolution and peer mediation, group treatment for children who bully, and short-term solutions.

Zero tolerance policies mean suspension or expulsion for students, which often leads to a deadend road for bullies, and many teachers are hesitant to report this behavior because of the harsh consequences," said Bradshaw.

Limber also suggests that conflict resolution is not adequate, because in many cases bullying is not the result of a conflict between students, but rather aggressive abuse sustained over a long period of time.

She also suggests that group treatment for bullies can actually unite them together in their bullying, and short-term programs or solutions are not adequate, because bullying is not a short-term problem.

Instead, Limber suggests these 10 best practices:

- 1. Focus on the school's social environment.
- 2. Assess bullying through formal assessments.
- 3. Garner staff and parent support.
- 4. Have a representative team coordinate efforts.
- 5. Train all staff.
- 6. Establish and enforce rules and policies.
- 7. Increase adult supervision in "hot spots."
- 8. Intervene consistently and appropriately.
- 9. Focus some class time on prevention.
- 10. Continue efforts over time.

Duncan said his experience as superintendent of the Chicago Public Schools taught him that after-school programs are a great way to curb bullying.

"Most school violence happens after school ends," he said. "By providing structured, positive activities after school, schools are reducing the number of wandering kids on the streets."

The federal government is channeling money to programs that will engage students in learning, as well as after-school programs in the most at-risk schools, as part of the Elementary and Secondary Education Act (ESEA), Duncan said. Programs that involve parents also will be funded.

Duncan suggested that schools should have safety metrics, just like schools have metrics in academic performance.

According to Duncan, federal agencies also will begin talks with teacher preparation programs and education schools about the issue of bullying prevention.

"We're ... going to begin surveying students and parents to get their suggestions for how best to combat bullying," he added.

"The bottom line is, if students are bullied, there will never be equal education. Without an environment and culture of safety, without preventative measures, and without best practices, students will not only suffer emotional scarring, but may become disinterested in learning and drop out of school. We can't continue to let this happen. It's not just a 'big city' problem, it's a national epidemic."

Duncan said that in three to four years, he hopes ED will have the research on bullying and school safety necessary to help scale a handful of anti-bullying programs to states.

# Steps to bully bullying

There are new and revamped laws in many states that address K-12 bullying and cyber bullying. In Massachusetts, the state has one of the most comprehensive and far-reaching laws in the country. As in many states, K-12 teachers in Massachusetts have new responsibilities to respond to, report, and address bullying and cyber bullying. Here at the Massachusetts Aggression Reduction Center (MARC), we've developed 10 tips to help faculty cope with what can seem an overwhelming task.

#### 1. Keep "responding" and "reporting" separate in your mind.

What behaviors do you have to report for possible formal discipline? Also, how should you respond when you see inappropriate (possibly bullying or definitely bullying) behaviors? Always respond by making it clear that you are disturbed by what you saw. Should you respond to a behavior that you might not normally report (such as laughter at a child's expense)? The answer is yes. Remember that even if it's not a "reportable" behavior—respond to it. Ignoring even mild bullying behaviors is essentially the same as endorsing them.

#### 2. Focus on the small stuff.

It's useful to understand the difference between "gateway" behaviors and blatant bullying. Gateway behaviors facilitate or reinforce bullying—they make disrespect seem normal (which facilitates bullying) or even rewarded (like laughing along with a bully). The difficulty is that there are usually no solid rules against gateway behaviors, so adults often ignore them. But research shows us how toxic they can be. In 2009 and 2010, MARC researchers found that it was the gateway behaviors that dominated victim reports.

Focusing on the small stuff means understanding that we need to educate kids about the impact of even small behaviors and react when we see them happening. How to respond? Explain that even small behaviors really affect others. Tell the child that you don't want to see behavior that might be interpreted as rude, and instruct the child to stop. Make it a classroom rule. Then, repeated instances become insolence towards you—which is a possible matter for school discipline.

#### 3. The cyber stuff: Approach and coach.

Although kids are comfortable with technology, they are not necessarily knowledgeable about it—don't confuse the two. We all need to talk with kids about technology. Don't worry about how much you know or don't know. Ask kids what's happening online with them. Ask them to

tell you (or show you) what they're up to online. And keep in mind that even if you might not know how to do a particular thing, you do know that even online they should watch what they say and be civil to others. Don't hesitate to make that message loud and clear.

#### 4. The Rumor Mill is still the leader in social problems.

Online and offline, rumors today fly at an incredible rate. In our research, bullies tell us that spreading rumors online is the by far the most common thing they do to others. So if we do anything to stop bullying, let's be sure to focus on the rumors.

#### 5. Talk to kids about how to handle things when they get mad at each other.

Kids today often vent electronically when they're mad, instead of trying to resolve the problem. Faced with the choice between a difficult face-to-face conversation, versus the ease of venting online, they might often conclude that it makes more sense to go electronic. The problem is that by doing so, they usually escalate the conflict instead of resolving it. In bygone days, kids didn't need to be coached on the benefits of talking face to face when they're upset—but today they often do. In our research, girls particularly showed a tendency to do this.

#### 6. Don't neglect elementary school students.

Both bullying and cyber bullying start young. Although we tend to neglect these topics until middle school, the fact is that the seeds of bullying are sown at a young age. And that includes cyber bullying: In a study conducted in 2008, the Corporation for Public Broadcasting found that 72 percent of all first graders used the internet at least once a week during the summer. Anecdotally, at MARC we have seen cases of cyber bullying involving second graders.

The good news is that young elementary students are very willing and able to internalize rules about behavior. Thus, it is important to teach them that being a good person on the computer is just as important as being a good person on the playground. MARC offers a curriculum on bullying and cyber bullying for grades K-5. You can read about it on our web site and request a copy online.

#### 7. To get the kids to report, you must connect with them emotionally on some level.

We're not saying you should be best friends with your students; only that your students need to know that you care about them and their welfare. Kids today are still reporting bullying to adults at very low levels. Boys particularly, in our research, are not reporting to educators. Why aren't kids reporting? More than 80 percent of the boys and girls in our research revealed that when

they did report, no action was taken as a result. They took a big risk in "telling," but as far as they knew, nothing was done.

Of course, confidentiality laws (both federal and, in many states, local) prohibit educators from telling a person specifics about any action taken against another student. But these laws don't prohibit you from telling a student, "We're not ignoring your report. We are working on it," and that's exactly what reporters need to hear.

#### 8. Girls might need particular attention, socially.

In our research, male cyber bullies tended to attack strangers, acquaintances, or kids who were friends long ago. Girls, on the other hand, tended to attack their friends or those with whom they were recently friends. This is a finding of particular concern, because it means that girls are attacking the very foundations of their social support.

Adolescence is a time when kids are learning how to form the long-term friendships they will depend upon as adults. So be aware of the girls you teach: They might need your help in learning to appreciate and protect their social infrastructure—not attack it.

#### 9. Take a moment to reinforce patient, kind, and friendly behaviors.

We all know that the carrot works better than the stick. When you notice a child being particularly good-hearted—especially in a potentially difficult situation, like when helping a classmate understand something, or sticking up for another child—be sure to let them know that you personally appreciate and admire their behavior. Better yet, use a classroom recognition system for the students who behave so well.

#### 10. Enlist the kids in your efforts.

Although adults can be key players, it's the kids themselves who are the ultimate arbiters of their group's social behavior. Ask your students what kinds of bullying problems they notice, and what rules they believe should address those problems. Then sit back and watch them enforce their own rules with enthusiasm!

The Massachusetts Aggression Reduction Center is an academic center at Bridgewater State University in Massachusetts. We offer K-12 schools in Massachusetts free programs and services by running a training program for graduate and undergraduate students in higher education. Everyone benefits: Future educators receive unique field training, and K-12 schools receive high-quality, no-cost programs and services. Our web site (www.MARCcenter.org) offers many

free downloads, games, tips, and curricula for all schools, and parent downloads that are available in English, Spanish, and Portuguese.

# **Resources and Bibliography**

**Resources** (In alphabetical order)

2009 Speak Up Survey

<u>Blio</u>

**CafeScribe** 

California's state-adopted academic content standards

**Department of Education** 

DetentionSlip

Follett Higher Education Group

Free Digital Textbook Initiative Report

Kurzweil Educational Systems

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Project K-Nect

Project Tomorrow

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## <u>About</u>

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