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iste.

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Jazz Up Your Curriculum
Janine Lim
Imagine a week of immersive learning where educators interact with guest speakers, scientists, and peer teachers. The Jazz Workshop offers a unique blend of collaboration and constructivist learning using videoconferencing and Web 2.0.

Where’s the C in STEM?
Bill Heldman
U.S. schools offer little support for computer science, despite the ubiquity of technology in our daily lives. Explore ways to create a computer science program and build student and administrator interest.

Get Your Green On!
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The International Society for Technology in Education (ISTE®) is the premier membership association for educators and education leaders engaged in improving learning and teaching by advancing the effective use of technology in PK–12 and teacher education.

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Each year ISTE members elect outstanding educational leaders to a board of directors that governs the organization with guidance from ISTE’s strategic plan (www.iste.org/strategic-plan).

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ISTE membership is a powerful and convenient way for teachers, administrators, teacher educators, media specialists, technology coordinators, and other education professionals to connect with peers, share the challenges and excitement of teaching, and be part of a dynamic community that is leading the transformation of education.

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Linked In | www.iste.org/linkedin
The ISTE Linked In group is a profession-focused network for educators to discuss current trends, exchange ideas, and connect about career opportunities.

ISTE Wikispaces | www.iste.wikispaces.net
ISTE’s wikis are a means for members to communicate, collaborate, and participate in ISTE-related projects.

Learn more at www.iste.org

Advocacy

Advocacy Toolkit | www.iste.org/advocacy/toolkit
ISTE has compiled a collection of stories, templates, starter kits, and other resources to help you to make the case for ed tech.

U.S. Public Policy Objectives | www.iste.org/advocacy/public-policy
ISTE bases its public policy priorities on our members’ commitment to provide students with the skills and tools they need to succeed in the 21st century.

Ed Tech Action Network (ETAN) | www.edtechactionnetwork.org
ETAN provides an opportunity to make your voice heard by sending letters to national, state, and local policy makers.

Publications

Learning & Leading with Technology (L&L) | www.iste.org/ll
ISTE’s magazine provides practical ideas and forward-thinking examinations of technology use in PK–12. L&L is delivered to all members eight times a year.

Books and Courseware | www.iste.org/bookstore
ISTE’s materials are written by teachers, teacher educators, technology specialists, and educational leaders at all levels who believe deeply in the potential of technology to transform the learning environment.

ISTE Update | www.iste.org/update
ISTE’s monthly e-newsletter keeps members up to date on activities happening throughout the organization.

Journal of Research on Technology in Education (JRTE) | www.iste.org/jrte
ISTE’s quarterly, peer-reviewed journal publishes high-quality research about the trends and challenges of learning and teaching in the 21st century.

Journal of Digital Learning in Teacher Education (JDLTE, formerly JCTE) | www.iste.org/jdlte
ISTE’s SIG for Teacher Educators’ quarterly, peer-reviewed journal provides educational technology research to educators of preservice and inservice teachers.

ISTE Daily Leader | www.iste.org/conference/dailyleader
Produced onsite each year at ISTE’s conference and exposition, the Daily Leader provides attendees with the latest conference news and exhibit hall coverage.

ISTE Initiatives & Projects

ISTE Conference & Exposition | www.iste.org/conference
ISTE’s annual conference and exposition (formerly known as NECC) is the place to be for educators intent on being at the forefront of improving learning and teaching by advancing the use of technology.

NETS | www.iste.org/nets
ISTE unveiled its updated NETS for Students (NETS•S) in 2007, NETS for Teachers (NETS•T) in 2008, and NETS for Administrators (NETS•A) in 2009. The standards, now used in every U.S. state and many countries, are credited with significantly influencing expectations for students and creating targets of excellence related to technology.

Research & Evaluation | www.iste.org/research
ISTE’s Research and Evaluation Department advances learning and teaching by developing, implementing, and disseminating cutting-edge research on educational technology integration in education systems.

Professional Development Services | www.iste.org/profdev
ISTE provides a continuum of high-quality professional development opportunities keyed to the NETS and organizational development services to improve learning and teaching in PK–12 education.

Webinars | www.iste.org/webinars
ISTE offers popular webinars about strategies for integrating technology into curriculum and other schoolwide activities.
Collaboration among teachers and administrators is the key to implementing schoolwide one-to-one programs, as Tim Green, Loretta Donovan, and Kim Bass discovered after evaluating various laptop programs (see page 12). Many districts seeking ISTE’s 2010 Sylvia Charp Award for district innovation used the same professional learning community (PLC) approach to planning that Green and his co-authors discuss in their article. That approach, developed by Richard DuFour, focuses on learning—rather than teaching—collaboration, and on personal accountability for results.

Richard and Becky DuFour maintain a website called All Things PLC, All in One Place (www.allthingsplc.info). The site has an area where bloggers, such as the DuFours, find and compare effectiveness data from other PLC schools and districts and share tools and resources. There is a wealth of information on transforming schools and districts into learning communities.

A good inaugural project for a PLC would be to spend a little time focusing on the scope and sequence for technology skills as described in Green’s article, because technology has a role at all grade levels and across all subjects. It provides an opportunity for educators to practice using the TPACK model, seriously collaborate on identifying the effect technology has on their curriculum areas, and explore the pedagogy for teaching it.

There are many examples of scope and sequences for technology on the Web. Locating and using samples is a good way to ensure that we don’t overlook effective uses and tools, but this should not replace the process. PLCs that have goals for student technology knowledge and have outlined skills at each grade level are more likely to integrate technology and improve learning for all students.

A number of nominees for the annual Sylvia Charp Award exemplified this model. Each year the number of Sylvia Charp Award applications grows, and the quality of applications improves. This fact indicates to me that many U.S. school districts are achieving effective technology implementation. This year we had 75 applications highlighting school districts that have shown effectiveness and innovation in the application of technology districtwide. Districts were strong in meeting the essential conditions for ISTE’s NETS for learning. Leadership at all levels was the norm. Infrastructure, policies, and implementation plans were encouraging communication and collaboration among all stakeholders. Professional development programs were incredibly strong and included PLCs, technology and curriculum coaches, 24/7 online PD courses, and time set aside for reflection and examination of data with a focus on improving student learning.

Sandy Vaughn from Floydada School District in Texas submitted the winning Sylvia Charp Award application. You can read her article describing her district’s successful one-to-one initiative in the September/October edition of L&L.

Findings from evaluators such as Green and district case studies such as Floydada’s are helping us to build best practices and models for effective technology implementation.
Yes
Technology has tremendous potential to make students smarter, but in most schools we are crippling the technology in ways that hold students back. Is moving from blackboard to whiteboard to interactive whiteboard really progress if nothing changes but the writing surface? Probably not. Is a word processor different from writing by hand, or just easier? Technology is a tool, not a solution.

In many schools, we avoid the “teachable moment” in technology. We institute filters and walled gardens around the Internet and pretend to keep students safe, although all we are protecting them from is thinking and learning how to evaluate sources. We lock out Nings, wikis, blogs, and discussion forums, and end up preventing students from being presented with new ideas and taking part in wider discussions in the process. And no instant messaging or e-mail in schools, because they might get dis-

No
Technology is one of the most powerful tools in our schools today for developing critical-thinking skills.

Stop to think for a minute what critical thinking actually refers to. Critical thinking is the ability to carefully evaluate and think about the information presented to us. Technology—specifically the Internet—allows students to look beyond the four walls of the classroom. This means that they no longer see the teacher as the sole source of information. Students are learning to be highly critical of the information they consume, and they even analyze, fact-check, and challenge the information the classroom teacher provides, which is a significant shift toward critical thinking.

In addition to becoming better consumers of information, students are now able to use new technologies to become the producers and editors of information as well. Just letting them know that their work will be posted on the Internet can produce significantly different results.
trated! Never mind the opportunities for collaboration that we are quashing. And so we close the doors to discussions with each other and beyond the walls of the school. Better to risk inbreeding of thought than to teach students how to think for themselves.

What do we allow them to do with technology? We let them cut and paste in new and faster ways. We let them copy information from safe and approved places on the Internet or captive databases. They can type much longer papers without having to think as much about editing, as the computer will catch the spelling and most of the grammar mistakes for them.

We could use the built-in review tools and let them do peer editing, but that’s a lot of work, and it’s not on the standardized tests anyway.

We teach them how to use spreadsheets but not how to use them as powerful evaluative tools. It would take a single class to show fourth graders how to look at the same data in different graph formats using a spreadsheet, but we don’t do it. We treat the data in social studies or science classes as if it had no relevance to the tools we (sort of) teach them to use in computer class. We teach them just enough of PowerPoint to create exactly the same thing that they used to create on poster board, but not how to use it as part of a powerful centerpiece for discussion or real interactivity. At least they can make things pretty without having artistic ability. It’s not the same as a critically thought-out presentation, but it fits with the curriculum.

We could teach computer science! That’s all about critical thinking. But most schools don’t teach real computer science at all, and fewer than one in eight high schools have an AP Computer Science course. Of course, it’s not on the SAT, is it?

For most schools and students, technology has become all about making work easier and faster, which includes avoiding thinking as much as possible. To realize the potential of technology in education, we need to make some systemic changes to how we teach rather than regard technology as a magic bullet.

—Alfred Thompson is the K–12 computer science academic relations manager for Microsoft. Prior to joining Microsoft, he was a K–12 computer teacher and a schoolwide technology coordinator.

We institute filters and walled gardens around the Internet and pretend to keep students safe, although all we are protecting them from is thinking and learning how to evaluate sources.

than if they are just developing that work for the teacher. They suddenly see their work as much more important and will analyze it to a far higher level as they prepare for a highly critical global audience. Their work has meaning because they are contributing to the large community of information on the Web.

Technology also provides opportunities for students to critique their own work and that of others using various forms of wikis. They can reflect on their own learning through blogging and connect globally to gain new perspectives and learn more than a textbook could ever offer.

The problem is that technology is not always used this way in schools. Technology itself will not develop critical-thinking skills in our students. That is the teacher’s role, and although 21st-century technologies are powerful tools, it is the way the teacher chooses to use those technologies that will determine whether they help or hinder the development of students’ critical thinking skills. Therefore, teachers must plan well to ensure that students use these tools to their full potential.

Teachers who empower students to take an active part in a wiki, blog, or other Web 2.0 tools are on the right track, as these tools encourage 24/7 critical thinking. In fact, some of these tools demand that level of thought, because editing, revising, critiquing, and commenting are an integral part of their use. As students do not have to wait until they come back into the classroom to use these thinking skills, they become fully immersed in their learning and eventually become lifelong learners who evaluate information as active consumers of knowledge.

Technology provides the tools and the power to actively enhance critical-thinking skills. But for this to be effective, educators must not just sit back and expect the technology to do it all for us. We must integrate the technologies into the curriculum appropriately and teach our students to be critical thinkers through their use.

—Helen Crompton is pursuing her PhD in education at the University of North Carolina at Chapel Hill. For 17 years, she has been involved in education while working in schools in her home country of England and in the United States.

Students are learning to be highly critical of the information they consume, and they even analyze, fact-check, and challenge the information the classroom teacher provides, which is a significant shift toward critical thinking skills.
Is Technology Killing Critical-Thinking Skills?
Although the majority doesn’t fault technology for the demise of critical thinking, many respondents think schools fail to use it appropriately.

Technology Is Just a Tool
Because computers count, spell, and correct grammatical errors for students, some think practicing skills is thrown out the door. But who is in control of the way technology is used? If a driver collides with a tree, do we blame the car, or is it the user’s fault?
Sharnell J. Cox
High School Biology Teacher
Nassau, Bahamas

The History of Innovation
Greek philosophers believed books would eliminate the need to memorize and thereby weaken human intellect. Academics worried that widespread cheating would ensue and handwriting would suffer with the pencil, as mistakes could be erased. This is how cultures react to technological innovation. The fact is, critical-thinking skills declined long before schools introduced technology.
Dallas McPheeters
Educational Technology Graduate Student
Tucson, Arizona

More Sizzle than Substance
The Internet makes it easy for students to turn assignments into a game of Beat the Clock. It is too easy to find “snippets” that meet the needs of an assignment, and uncovering the “meat and potatoes” in a topic often seems less important than throwing some artificial sizzle at the audience.
Vernon Smith
Director of Technology
Socorro, New Mexico

Too Much to Do, Too Little Time
Many students plagiarize because they have too many demands on them. Do we give them enough time to formulate the essential question themselves? To write? To research? To rewrite after our critiques? I do not think technology is the issue with critical thinking; I feel it is our expectation of too much content with too little time.
Tina Hudak
Lower School Librarian
Washington, D.C.

Nothing Worthwhile Comes Easy
Technology has made our lives easy and has taught us that life should be easy. Critical thinking is not easy, and many have not developed the skill simply because it isn’t easy. I think our increased dependence on technology may carry a large share of the blame for that.
Andrea Brown
Comment on ISTE.org homepage poll

Fast-Moving Target
Technology changes so fast that the nature of this discipline demands regular maintenance and critical thinking.

How much algebra, Shakespeare, or physics have changed in the last five years? Compare this to the exponential pace by which technology grows.
John Lanham
Curriculum and Testing Coordinator
Louisville, Kentucky

Blame It on the Digital Immigrants
Children are not learning the basics of evaluating Web information and the importance of being a responsible digital citizen. Many teachers struggle with this themselves because they are not digital natives. It’s a real problem in our public schools.
Susan Denny
San Marcos, California
Comment on ISTE Facebook page

Instructions Required
Placing a book in a child’s hands without proper guidance and attitude probably won’t cause that child to become a fluent reader. And using technology with proper explanation, intervention, guidance, and attitude does not kill critical-thinking skills.
Tammy Morris
Educational Technology Specialist
Juneau, Alaska

Correction
In the June/July ISTE News (page 9), we incorrectly listed National-Louis University’s location as Texas. NLU is in Chicago, Illinois.
ISTE Announces 2010 Award Winners

ISTE recognized its annual award winners at ISTE 2010 in June.

**Outstanding Teacher:** Karen Rose, third grade teacher, McKillop Elementary School, Melissa, Texas

**Outstanding Leader:** Dean Shareski, digital learning consultant, Prairie South School Division, Moose Jaw, Saskatchewan, Canada

The Outstanding Leader and Outstanding Teacher awards honor individuals who have demonstrably improved education through the effective use of technology.

**Outstanding Young Educator:** Julie LaChance, technology specialist, Northwest Cabarrus High School, Concord, North Carolina

**Emerging Leaders:** Adam Bellow, technology training specialist, Copiague Union Free School District, Copiague, New York; Christopher Craft, teacher, CrossRoads Middle School, Irmo, South Carolina; Andy Crozier, coordinator of digital learning technology, Grant Wood Area Education Agency, Lone Tree, Iowa; Mary Beth Hertz, teacher, Guion S. Bluford Elementary School, Philadelphia, Pennsylvania; and Lisa Sjogren, technology integration specialist, Osseo Area Schools, Maple Grove, Minnesota

The Outstanding Young Educator Award honors an educator under 35 who has demonstrated vision, innovation, action, and transformation and used technology to improve teaching and learning. Emerging leaders are young educators who are also leaders in technology integration.

**Public Policy Advocate:** John Cradler, representing Computer Using Educators, Inc., San Mateo, California

**Public Policy Advocacy Trendsetter:** Heather Blanton, representing the Virginia Society for Technology in Education, Pound, Virginia

These awards recognize outstanding leaders and mentors in advocating for educational technology policy at the local, state, regional, national, and/or international level.

**Kay L. Bitter Award for Excellence in Technology-Based PK–2 Education:** Deborah White, second grade teacher, Asa C. Adams Elementary School, Orono, Maine

The Kay L. Bitter Award honors excellence in technology-based PK–2 education.

**Sylvia Charp Award for District Innovation in Technology:** Floydada ISD, Floydada, Texas; Jerry Vaughn, superintendent, and Sandy Vaughn, technology immersion coordinator

The Sylvia Charp Award, presented by ISTE and T.H.E. Journal, recognizes district innovation in technology.

**SIGMS Innovation Technology Award, primary school winner:** Tricia Svendsen, teacher/librarian, and Anne Sullivan, fifth grade teacher, Joseph Martin Elementary School, North Attleboro, Massachusetts, for “The Literature and Engineering/Design Project”

**SIGMS Innovation Technology Award, secondary school winner:** Cathi Fuhrman, high school librarian, and Sarah DeMaria, English teacher, Hempfield High School, Landisville, Pennsylvania, for “The Adventures of Huckleberry Finn Movie Trailer Project”

The SIGMS awards, sponsored by Linworth Publishing, Inc., and Follett Software Company, honor a school librarian and collaborating teacher who have conducted an exemplary technology program extending beyond the media center.

**SIGOL Online Learning Award, first place:** Cecily Anderson, Baltimore County Schools, Baltimore, Maryland, for “The MSA Reading & Math Blast!: An Exemplar of 21st Century Learning”

**SIGOL Online Learning Award, second place:** Jennifer Garcia, Academia Britanica Cuscatleca, Santa Tecla, El Salvador, for her research on using social networks

**SIGOL Online Learning Award, third place:** Jamie-Ellen Spessard and Amanda Henley, Goochland County Public Schools, Goochland, Virginia, for their project “Let Freedom Ring”

The SIGOL awards, sponsored by the ISTE Special Interest Group for Online Learning, recognizes creative educators for their pioneering use of online networks for students in grades K–16.

Learn more at [www.iste.org/awards](http://www.iste.org/awards)
President Barack Obama recently issued a call for increased hands-on learning in U.S. schools in an address at the National Academy of Sciences. “I want you to encourage young people to be makers of things, not just consumers of things,” he said.

Obama concluded that the future of the United States depends on our ability to encourage young people to “create, and build, and invent.”

Founders established National Lab Day (NLD) in response to the president’s call to action. The first NLD celebration was May 12, 2010, though NLD projects are taking place in schools throughout the year.

NLD is a grassroots effort in participatory citizenship designed to encourage young people to become makers of things. Organizers define a lab in this context as “any place where students can explore, experiment, and test. A lab could be a laptop for a software designer, a mountaintop to a geologist, a computer link to a distant particle accelerator to a physicist, or a factory floor to an industrial engineer.”

The purpose of NLD is to inspire future innovators by pairing veteran scientists and engineers with classrooms to support hands-on projects. Educators can request assistance and resources through the NLD site at www.nationallabday.org.

Request Resources through NLD
The beginning of the school year is the ideal time to post a request for a project in your school. The NLD philosophy is that teachers know best what they need to improve their students’ hands-on learning experiences, whether it’s additional lab equipment, personal mentoring from a scientist, a visit to a working lab, tech support, internships, help with a lesson plan, up-to-date career information, help with a science fair project, or just an extra set of hands for a class project.

The NLD site will identify volunteer mathematicians, scientists, and engineers with expertise and resources that meet teachers’ needs and list them by location. A teacher with a specific project in mind can also post a description seeking specific resources. This allows volunteers to view the range of projects to which their expertise is relevant.

Obama has called on “all 200,000 scientists who work for the federal government to participate in National Lab Day and help stoke the natural curiosity of students.” Responding organizations have included federal agencies, such as the National Institutes of Health and the National Science Foundation (NSF), as well as professional associations, including the American Chemical Society, the American Physics
Association, and the National Science Teachers Association.

NLD makes use of another resource for schools at www.donorschoose.org. Teachers who create projects on the NLD site are eligible to request resources from the DonorsChoose association. A Bronx, New York, teacher established this organization to allow donors to choose school projects that they wish to support.

Find Help with Engineering Projects
Engineering Pathway (www.engineeringpathway.org) is another resource, established with support from the NSF, that provides access to a digital library of engineering resources for schools. Engineering Pathway maintains the contents of this digital library and works in partnership with the American Society for Engineering Education. This portal provides a convenient starting point to access many collections of resources related to engineering education, such as the TeachEngineering collection (http://TeachEngineering.org), which provides access to classroom-tested lessons, projects, and curricula.

The Plasma Globes and Electricity lesson plan, developed at Penn State University, is another good example of the types of resources available on the site. Engineering Pathway provides concepts and activities that support STEM education. The NLD site provides connections to resources to implement these lessons. For example, the search term plasma yields a listing for James Rome, a theoretical plasma physicist specializing in charged particle orbits. Rome is now retired from Oak Ridge National Laboratory but continues to edit a newsletter published by the Oak Ridge Fusion Energy Division. He is available as a consultant to support school projects. Similarly, a teacher could request a plasma globe teaching kit through the DonorsChoose site to secure the materials for the project.

Connect Your Classroom to the World
When the Web was first emerging, Judi Harris established the Electronic Emissary (in 1992) to connect volunteer subject-matter experts, such as meteorologists and paleontologists, with schools so that they could work virtually with students over an extended period. Harris currently holds an endowed chair at the College of William and Mary, where the Electronic Emissary (available at http://emissary.wm.edu) is the longest-established service of this type.

In the two decades since the Electronic Emissary was created, many other resources, Web 2.0 technologies, and social media have emerged to support these types of efforts. However, the goal of connecting the classroom to the world remains the same. Many resources are available through NLD projects:

Identify a lab activity. Use resources such as the Engineering Pathway to identify lab activities that extend and support this year’s curriculum.

Invite collaboration. Post the project on the NLD website to invite the participation of external consultants with expertise related to the project.

Request resources. Use your NLD project ID to request materials and resources to support the project from the DonorsChoose site.

Implement the project. You can use the Community feature on the NLD site to post events and interact with others who are conducting related hands-on activities in their classrooms.

Celebrate National Lab Day. Post a video of students carrying out the project during the course of the school year to win prizes and national recognition.

The goal of NLD is to support hands-on learning for students by upgrading labs and building communities of support for teachers who encourage project-based learning. Pulitzer Prize recipient Thomas Friedman, author of The World is Flat, cites NLD as the type of initiative needed to ensure that today’s children will be competitive in tomorrow’s world. Equally important is that these hands-on activities are engaging for students and provide opportunities for them to learn in authentic ways.
If your students are doing amazing things in the classroom with laptops, and you would like to share what you’re doing without forcing it on others—or taking a great deal of your own time—consider using a collaborative approach.

As researchers of tech implementation, we have conducted multiple evaluations of one-to-one laptop programs. Our latest district-level evaluation paid specific attention to the progression of laptop use across grade levels. What struck us was how some schools seamlessly integrated laptops for learning, but others did not. We wondered why such a difference existed among schools in the same districts. What we found was that successful schools had a clearly defined scope and sequence for how students were to use laptops, and teacher collaboration was readily apparent.

**Student Use and Teacher Collaboration**

Schools where technology was truly ubiquitous across multiple grade levels had a plan in place that outlined the software in use along with the technology skills students were learning. We found an obvious progression of laptop use that helped students build on skills learned in previous grade levels rather than simply using the laptops in the same manner year after year. For example, at schools where the initiative extended across several grade levels, students reported using programs such as AppleWorks and Pages for basic word processing in the younger grades and more advanced features, such as importing images and special effects, in the higher grades. This was also true for schools with the one-to-one ratio only in the upper grades. In these schools, the students had already learned the basic applications in the primary grades through their use of laptop carts.

We also found that teacher collaboration was obvious at those schools. In one school, where the laptop program was integral to the gifted and talented education (GATE) combination (third/fourth grade and fifth/sixth grade) classes, GATE teachers had collaboratively developed a system in
iBook laptop. The program involves second through eighth grade in one school, third through sixth in another, sixth grade only in two schools, and six through seventh in the district’s two middle schools.

Kim Bass, a second grade teacher, took part in her school’s implementation of a PLC approach. Each week, her second grade team, like all grade-level teams, met to share student data and decide how they could improve student learning and instruction. They set up norms to help them stay on track and on schedule.

During one meeting, her team shared information about math lessons that focused on telling time to the quarter hour. From their discussion about a set of math assignments, they discovered that most of their second graders were struggling with this standard. One team member reviewed the school’s website to see which math activities the students should visit to practice this skill. Others logged on to alternate math websites they use. They discovered that many students who were struggling with the concept had spent little time working on this skill.

“As a team, we decided to assign these sites as homework until this skill was mastered,” she said. “Additionally, we identified that some of our students were also unclear about the difference between a.m. and p.m. The team concluded that a project in Kidpix showing different activities that take place during a.m. and p.m. would be a great extension project for students who did not need direct practice telling time to the quarter hour.”

Four Factors to Consider
A defined collaboration, such as a PLC, can help expand your one-to-one program. To start a collaborative approach, consider these four factors which they planned technology integration into the curriculum. For example, the third/fourth grade teacher trained his students to use specific technologies. He communicated this to the fifth/sixth grade teachers, so they knew that the incoming fifth graders from his classroom would not need application instruction. Overall, we found that teacher collaboration took multiple forms but played an important role in the successful implementation at the district level.

A PLC Approach
What brought about collaboration in the example above? The district adopted Richard DuFour’s Professional Learning Community (PLC) approach to planning: a focus on learning rather than teaching, working collaboratively, and holding one’s self accountable for results.

Where a one-to-one initiative was successful at the district level, teachers met weekly as a grade-level team to share student data, reflect on student progress, and plan learning experiences. Collaboration was part of the culture, and that led to laptop implementation throughout the curriculum following a distinct plan.

Currently in its fifth year, the Laptops for Learning Program in the Fullerton (California) School District (K–8) provides students at six of the district’s 20 schools with an Apple
at your school: school climate, communication, collaboration, and progression of use.

School climate. Does your school have a climate that encourages innovation? Does your school have a core group of teachers already using laptops? If not, start small and then expand once others see the relative advantage of the innovation. Are your administrators, parents, and community supportive and actively involved? Supportive administrators and enthusiastic teachers can present a unified front to promote the expansion of the initiative. During our evaluation, we observed very different school climates. The most successful schools had administrators and parents who were supportive and involved. The support created a climate where teachers had the freedom to integrate laptops and other technologies in innovative ways. The laptops in these schools have become an integral and natural part of the teaching and learning process across content areas.

Communication. Is there a misconception of what the laptop program is, how it operates, and what educational results can be achieved (higher test scores, 21st-century skills) as a direct result of laptop use? If so, planned and ongoing communication can keep colleagues, administrators, parents, and the greater community informed. This will help others be engaged and supportive of your program. It will also allow the laptop program to do what you designed it to do—extend learning from the classroom to the home and beyond. In a time when many are wary of Internet use, open communication can help ease some of the fears about technology. A classroom webpage is a great way to communicate about the program (even to colleagues). A webpage with links to sites used during the school day will extend the learning, showcase student work, and involve parents and the community. Use every means possible to share the great things happening with your program.

Do not underestimate one enthusiastic and dedicated teacher’s power to transform a one-to-one initiative from a single classroom into a successful schoolwide program.

Welcome these new ISTE 100 Members

CTB/McGraw-Hill
Innovation is the cornerstone of CTB/McGraw-Hill’s achievement solutions, including summative and formative assessments, instructional programs, software, and services for PreK–12, adult education, and statewide testing programs. Award-winning CTB solutions include: Acuity, a comprehensive InFormative Assessment system, delivering a unique integration of assessments, reports, instructional resources, and opportunities for customization. Aligned to state standards in reading/language arts, math, and science, Acuity is administered using online, paper-and-pencil, and/or student response device (clicker) methods. Yearly ProgressPro is an online curriculum-based progress monitoring solution for Reading/Language Arts and Mathematics, and Writing Roadmap is an affordable online essay-writing mentor and scoring tool. www.ctb.com

Qatar Foundation International
QFI is a private foundation established on the principle that education can transform for the better individual lives, communities, and nations. Based in Washington, D.C., QFI’s mission is to promote education as a force that strengthens local communities; facilitates collaboration across geographical, social, and cultural boundaries; and builds a network of global citizens who communicate effectively and work together to find solutions to pressing global problems. www.qfi.org

TigerLogic Corporation
Search, Find, Create: yolink is a free, online search tool that fits into the gap between Search Engines and “Ctrl-F,” allowing students to find better information faster and then easily export the findings to Google Docs, Diigo, and more. www.yolink.com

www.iste.org/iste100
Collaboration. What type of collaboration is currently happening at your school? Is it informal, or is it more formal, such as a common preparation period? A defined collaborative approach is crucial for helping build an ethos of sharing that leads to successful laptop integration. If your collaboration is informal, start a wiki or use another Web-based tool to share ideas, websites, and electronic materials. Work toward a more formal collaborative approach. Teachers engaging in a PLC can use this time to address common goals and share how to use laptops to meet student needs. They can also use PLC planning time for professional development.

Progression of use. Does your school have a plan that outlines how students will be using laptops throughout a school year and from grade to grade? This type of document can provide structure, serve as a communication tool, and support a shared vision of a laptop program. Many districts have a technology plan in place that can provide guidance in the development of such a document. You should also use ISTE’s NETS for Students as a guide when drafting this document. You can find a chart to help with the planning process at http://groups.google.com/group/1-to-1-computing-initiatives.

We realize that every school’s context is different. Despite these differences, each school will work through the same issues as it moves to a collaborative environment where innovation adoption can occur. Helping your school move to this environment may seem like a daunting task. Do not underestimate one enthusiastic and dedicated teacher’s power to transform a one-to-one initiative from a single classroom into a successful school-wide program.

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Connecting the dots to inspired learning...

Thinking Teachers

Teaching Thinkers™

TeachersFirst.com

From the non-profit For teachers. For families. For excellence.
U.S. high schools must create robust computer science programs if they want students to be competitive in a global economy that is increasingly driven by technology. Here are a few tips to get them started.
With few exceptions, students interact with technology in one way or another every day. And yet, in most U.S. schools, the term computer science (CS) refers only to generic skills classes, such as keyboarding and computer applications. Even most Web programming classes usually teach students only how to use conventional graphical user interface (GUI) tools instead of HTML and CSS, perhaps because they are often led by teachers with no background in CS. Even worse, many U.S. high schools have dropped CS programs altogether.

The end result of this lack of focus on CS is that most U.S. students graduate into an increasingly tech-driven world with little knowledge of how it all works or any chance of contributing to the field. In fact, only 1–2% of students who apply for U.S. colleges major in CS.

Until schools bring CS out of math’s backroom and give it a place of prominence as a STEM discipline (changing the acronym to SCTEM, using the same pronunciation, but with a much different meaning), the United States will produce fewer CS majors, and CS work will continue to be outsourced to those countries that do have the CS correctly placed.

Create a Strong CS Program
I’m a former IT worker with a long background in the industry. Five years ago, I turned to teaching 11th and 12th grade computer science and game programming. The combination of my private and public sector IT experience, coupled with teaching high school, has given me the insight to recognize the roots of the issue and how it can be fixed with enough participation and effort.

CS needs to take its place alongside English language arts, science, and math as a fundamental academic necessity and be addressed as such in state standards, academic content, curricula, and educator licensing requirements.

A big part of the problem is that few educators really understand what computer science is. Administrators may be able to identify the tip of the CS iceberg, but they are ignoring the burgeoning mass beneath. It will take some detailed, hard work for school stakeholders to define the subject within the context of the overall curriculum.

To begin with, CS isn’t treated as an academic standard, but it should be. CS needs to take its place alongside English language arts, science, and math as a fundamental academic necessity and be addressed as such in state standards, academic content, curricula, and educator licensing requirements. Teaching CS actually fosters better knowledge of other academic subjects, because when it is taught properly, it drives students to want to know more about math, science, and reading so they can learn more about CS. The subjects feed off of one another.

Once administrators have a clear understanding of the complete context of CS within the curriculum, the next hurdles are creating a standalone CS program, bringing it up to today’s technological standards, and supporting it with a continuous improvement process. Because of the pace of technological change, schools must revise CS curriculum on an annual or even semi-annual basis. Administrators must be visionary leaders or have visionaries on staff who recognize and understand those changes so they can create new curricula that parallels current technologies and anticipates emerging technologies.

Why go through all this trouble? Because CS is an important career choice in U.S. society. According to a 2009 news release from the Bureau of Labor Statistics, 5 of the 30 fastest growing jobs in the United States are CS jobs, and they all require bachelor’s degrees or higher. Many other surveys as well as recent breakthroughs in graphical and holographic arenas point to an even broader increase in the need for CS.

It is hard work to flesh out a CS program. The good news is that schools don’t have to go it entirely alone, and they don’t have to build their CS programs in a vacuum.

The school should integrate computer science industry and business leaders into its advisory board and give them a voice in the CS program. This will help teachers keep up with the pace of change and shape class content around industry expectations regarding CS career paths. Students should learn, for example, what game programmers do during a workday. Do they play games? Do they write code all day long, and if so, what kind of code do they write? How do they get the art into the game? How does the game story come about? The industry tie-in is not only relevant, it’s key to student engagement and success.

Forging strong articulation agreements with community colleges will also strengthen a school’s ability to help students interested in CS understand what they need to know to prepare for college. Community colleges can allow students who have uncompleted prerequisites or who are
intimidated by the college/university setting to gently integrate into the system. This is important because postsecondary teaching environments are night-and-day different from secondary environments, and a student’s comfort level translates to better academic performance.

The next step is recruiting and/or training qualified CS teachers. It’s simply not good enough for a marketing teacher to offer a Dreamweaver class and teach a little HTML, or for a math teacher with an extra free section to teach AP Computer Science. CS has much deeper tentacles and a far longer reach than that. The teachers have to understand the nuances of the subject at a deep level.

Conventional teachers who do not have a CS background can teach CS as long as they meet the educational and occupational requirements (see the Resources section at the end of this article for the URL to a white paper the Computer Science Teachers Association released on this topic). But it will take extensive and ongoing professional development to bring non-CS teachers up to speed technically and keep them there. Principals can’t simply assign the program, toss a how-to book in the door, and expect teachers to be successful. That leads to content that is elementary and unsatisfying, and students won’t get anything out of the course.

Collaborate for Curriculum

Conventional CS can be a boring subject. Students will have a hard time getting interested in subjects such as binary trees and linked lists, classes and objects, TCP/IP, and the OSI model without some colorful, fun hook by which to teach them. Game programming turns out to be one such hook, but there are other ideas for teaching CS that work equally well. High-touch and hands-on labs and assessments linked to real-world project outcomes are the elements that make students want to learn.

It is vital that administrators and teachers understand that CS is more than the Web and more than programming. The CS whole is the sum of the parts, but not just computer parts; it’s also made up of math, art, science, and English language arts, particularly when it comes to today’s interactive media environments, including social networking sites and games.

For one thing, CS is an intensely graphical world that requires students to foster a healthy knowledge of both 2D and 3D graphics as well as animation environments. It’s also a world of story and literature. So it’s not enough for a teacher to show a student how to write a program. She must also help the student flesh
out program concepts in a graphical environment in a way that is pleasing to the eye, easy to understand and manipulate, and rich in allegory and metaphor. In fact, in many cases, students must use the complete literary construct, including a protagonist, antagonist, plot, conflict, increasing stakes, and so forth.

Schools that integrate CS at the highest levels of their mission statements find that professional learning communities and work teams naturally assemble to discuss amalgamated curriculum and assessments. They want their students to be successful, and they soon find out that CS students will need more than just the black box of programming to find success in the industry. Good school leaders set out to find and assemble teams that are able to play off of one another’s strengths to get to the greater goal of a holistic student. It’s no longer just about English language arts or history or art or mathematics. In this case, it’s about using CS to integrate a story into a program, game, or social networking site by using the tools of the trade in addition to all of the underlying academics that make the story complete.

I have seen this firsthand in my game programming classroom at Warren Tech, a career and technical education high school in Lakewood, Colorado. Students learn how to program in C++, C#, and Adobe’s ActionScript 3.0. At the same time, however, we work on the idea of story. They learn that they must put a good story into a console-based (DOS-like) application to create a game that is both fun and playable. I stress that story is not just one element of a game, but the most important element.

Once they have thoroughly polished a story and made sure that it is interesting and consists of the proper constructs, we start to think about how to describe the story in a graphical world. They learn to think about color, 2D versus 3D, speech prompts, visual hints and cues, and Easter eggs. They’re still dealing with the same old story, but now they’ve brought it into a visually satisfying place. And, along the way, I’ve had an opportunity to help the students learn how to manipulate the tools they need to turn their visual stories into games.

Other subjects also come into play. Suppose, for example, the story talks about a cannon firing. To create an accurate scene, students need to understand the equation of the ballistics of a cannon and scientific ideas, such as the coefficient of friction and velocity versus acceleration. The desire to make the story right drives students to want to know more about the math and physics of the story. A student recreating the board game Battleship needs to understand matrix math. Another student working on a whirlwind wants to know about the Coriolis effect, and so on. The same applies to the historical accuracy of a subject as well as possibly its anthropology, sociology, and ethnology.

Can I personally teach all this stuff? No! I rely on coaches and other teachers to help me round out the teaching model. For example, the mathematics coach might come in and give a half-hour miniclass on logarithms. It is this notion of teamwork and a team attitude toward teaching CS that fosters great advances in student achievement across a plethora of subjects—not just CS.

Schools that seriously integrate CS at the important, vital level it needs to be find that students want it, are good at it, and can be successful at it. On the flip side, if schools fail to introduce full and robust CS courses in high schools, they will do a disservice to their students, colleges and universities, and industry. With that in mind, we need to begin to work together to take back the ground that CS has lost and move forward into new terrain as collaborative educators.

Resources
“Ensuring Exemplary Teaching in an Essential Discipline” by CSTA: http://csta.acm.org/ComputerScienceTeacherCertification/sub/TeacherCertificationRequi.html

Warren Tech High School: www.warrentech.org

Bill Heldman is a former long-time IT professional as well as the author of more than a dozen technical books and numerous articles for technical publications. These days, he teaches teenagers how to make video games, writes curriculum, and collaborates to better the public secondary teaching environment.

Help ISTE revise its Secondary Computer Science Standards!
Give us your feedback through the survey at: www.iste.org/compsci-refresh
The Jazz Workshop offers a unique blend of collaboration and constructivist learning using videoconferencing and Web 2.0.
Autonomy, passion, risk, innovation, listening. Five themes that are key to good jazz music are also the essential characteristics of the grassroots collaborative learning community Ken Conn, Bennie Tschoerner, and I began in 2005. The funny thing is, our workshop, 123 VC: Jazzing Up Your Curriculum with Videoconferencing, got its name long before I stumbled on a leadership lecture two years ago illustrating that the necessary ingredients of jazz music are the same as those required for a successful business environment. It dawned on me that our workshop also operates much the same way as a jazz quartet.

What It’s All About
The Jazz Workshop, as it has come to be known, is a unique blend of collaboration and constructivist learning using videoconferencing and Web 2.0 tools. Each summer it draws about 400 participants—mostly teachers, technology facilitators, teacher librarians, and videoconferencing coordinators—who convene in 20 locations across three countries and five states. Facilitators who have attended the workshop in the past as participants host the workshop at each of the sites, and lead facilitators, who have several years of experience with videoconferencing and at least two years of experience facilitating the workshop, organize the event.

The goal of the Jazz Workshop is to teach participants how to integrate videoconferencing into their curricula. We have embedded Web 2.0 tools in the workshop so that learning to use them is incidental. In addition, we hope participants will begin to collaborate with teachers in other states or countries when designing their own videoconferencing lessons.

How It Works
The workshop is broken up into four components:

Simulations. Participants play the role of students experiencing popular videoconferencing formats, such as Read Around the Planet, a celebration of reading; Monster Match, a descriptive writing exchange; MysteryQuest, a geography game; and ASK, a literature-based program in which students interview an author or specialist.

Guest speakers. The guest speakers include videoconferencing content providers from zoos, museums, and other organizations that offer quality lessons to schools.

Small-group time. This is when four to six teachers from two locations plan a videoconferencing collaboration that meets their curricula goals.

Training. Throughout the week, participants learn to implement videoconferencing and other collaborative tools in their curricula.

Very little direct instruction occurs in a Jazz Workshop. Instead, participants are engaged in learning experiences where they apply existing knowledge to a task and learn from each other as they accomplish the assignments together. They might prepare and present geography clues to the teachers-as-students at the other locations, conduct Internet research to find locations presented by the other sites, write questions to interview a Vietnam veteran, or solve math problems with teachers at their location or one of the other sites.

What Participants Learn
Some participants come with few technology skills, whereas others are experts at integrating technology into the curriculum. Throughout the workshop,
participants may learn PowerPoint, polish their e-mail skills, and be exposed to collaborative tools, such as Google Docs, Skype, blogs, and Flickr. Whether newcomer or master at integrating technology, they all have an opportunity to expand their skills.

During small-group time, leaders emerge who may have more experience with videoconferencing and integrating technology into the curriculum. These leaders assist and mentor the other teachers as they write collaborative lesson plans together. By the end of the week, participants have built learning communities of teachers in two different locations.

Throughout the school year, the participants often collaborate on videoconferences, including the formats they learned during the summer workshop. Sometimes they implement the projects they wrote together, and other times they create new collaborative videoconferencing projects. In some cases, participants host the Jazz Workshop at their locations the following year, continuing the cycle of learning, collaborating, and sharing.

Learning within the community is enhanced by the continual introduction of newcomers. The newcomers provide inexperience. Their involvement encourages reflection. Their contributions polish our practice. In this way, even the lead facilitators’ participation is peripheral in that the community is constantly changing, growing, and learning.

How the Facilitators Fit In
To support this workshop, each of the five lead facilitators mentors a group of three or four facilitators. The lead facilitators organize the activities, delegate tasks—such as leading a simulation or preparing materials—and coach the other facilitators. They all pitch in to prepare for and deliver the workshop. This way, the newcomers have access to the veterans, which enhances their learning.

Before the big event, we hold several meetings to walk through each part of the workshop. During the workshop, new facilitators may lead sections with the lead facilitators on hand in case questions arise. After each day, the facilitators debrief with their lead facilitator. As we discuss how the day went, they all learn, reflect, and refine their training practice. Throughout the Jazz Workshop, everyone contributes to the improvement of the event.

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<th>Monday</th>
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<tr>
<td>1 hour</td>
<td>Local Web 2.0 and Videoconference resource instruction</td>
<td>Simulations of collaborative videoconference formats, such as Read Around the Planet, Monster Match, Math Marvels, MysteryQuest, and the ASK program (four locations meet together for simulations)</td>
<td>Group presentations</td>
<td>Grand finale celebration</td>
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<td>1 hour</td>
<td>Lunch and local instruction</td>
<td>Guest speakers from zoos and museums that offer videoconferencing content (eight locations meet together for guest speakers)</td>
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<td>30 min.</td>
<td>Local reflection time</td>
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<tr>
<td>1 hour</td>
<td>Small-group planning time with groups created across state borders (four locations split into 8–12 point-to-point videoconferences)</td>
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<tr>
<td>30 min.</td>
<td>Reflection blogging</td>
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Collaboration Tools to Get You Started

Here’s a list of tools you’ll need to begin videoconferencing:
- H.323 or IP room-based videoconferencing system
- Skype for facilitators’ back-channel chat and participants’ chat to support their small-group planning meeting via videoconference
- Google Docs for facilitators to share files and for participants to write lesson plans
- Flickr to share photos of the workshop and to enhance the feeling of learning together across the distance
- 123vc.wordpress.com, a blog to reflect on learning
- Twitter to continue the conversation throughout the school year

Join the Gang

Thinking about participating in a Jazz Workshop? Begin by reviewing the website at www.123vc.org to see the tools and technologies we use. You will need access to a training facility with the ability to do at least two H.323 videoconferences.

You should be ready to contribute, and not just host the workshop at your site! You can find the participation application online at www.123vc.net.

You can also use this format as a template for your own training. What technology integration workshop wouldn’t be enhanced by connecting to another set of educators in another state or country?

Use your Web 2.0 personal learning network to recruit a colleague or two. Start small by connecting your workshops via videoconferencing and Web 2.0 tools for only part of the workshop. Use our materials if you wish, or develop your own. We strongly suggest creating and sharing materials with a Creative Commons license to facilitate greater learning and participation in the wider educational technology community. You will find that your participants benefit from breaking down the walls of the training room and will therefore find it easier to see how to break down the walls of their classrooms.

Learning within the community is enhanced by the continual introduction of newcomers. The newcomers provide inexperience. Their involvement encourages reflection.

The Lead Facilitators’ Role

A new facilitator is often overwhelmed with the complexity of the workshop and the details that must be attended to. The lead facilitators start by giving new facilitators simple tasks, such as preparing an introduction to a simulation or debriefing a simulation using an existing PowerPoint overview. As new facilitators gain skills, they begin to contribute knowledge, handouts, and resources to improve the quality of the workshop. As they learn the components of the Jazz Workshop, they learn the culture of the workshop, the ways we integrate videoconferencing in the curriculum, and the foundational beliefs of constructivist learning and collaboration.

In the first year of facilitating the Jazz Workshop, the newcomers get the big picture or broad view of what it is all about. After they understand how the workshop operates, the facilitators compare notes and learn professional development techniques from each other. Web 2.0 tools, such as Skype chat, facilitator blogs, and Twitter, contribute to the circulation of information and knowledge within the Jazz learning community.

The professional development model of the Jazz Workshop would not be possible without the collaborative technologies that connect us. In addition, we sometimes meet each other face to face at conferences, where we strengthen those relationships. The benefit to our participants is an incredibly diverse and engaging workshop.

Janine Lim has been coordinating videoconferencing for 22 school districts in southwest Michigan since 1999. She is a cofounder of Two Way Interactive Connections in Education (www.TWICE.cc), and she teaches online classes about using videoconferencing. Read her blog about videoconferencing at www.vcoutonalim.org.
In the span of five years, the staff and students at Council Rock School District in Pennsylvania won three Energy Star Awards, saved more than $7 million, and completely changed the culture of the district. How did we do it? With very little effort on our part, actually.

We are the ninth largest district in Pennsylvania and serve about 12,500 students. We have approximately 1,400 employees and 18 buildings spread out over 72 square miles. In 2005, our relatively new superintendent decided to invest in a program to reduce the district’s energy costs. He gathered a group of administrators, facilities staff, and teachers to solicit ideas about energy conservation.

The facilities manager recommended bringing in an expert to evaluate consumption and suggest ways to cut costs. The teachers recommended a conservation campaign in the schools.

Both courses of action made a huge difference.

**Getting Students Involved**

The teachers went back to their schools and formed environmental action clubs (EACs). They asked for student volunteers, and each school identified a single goal for the year. The goals ranged from planting trees to recycling efforts.

Initially, these groups started with one or two students. They met with their teacher advisers and planned their projects. But what started as a small group quickly spread to the entire school. One EAC, for example, decided to take on a recycling project. They contacted their local refuse collector to get special containers for glass, plastic, and paper. Next, they taught the custodial staff, teachers, and students how to separate their recyclables. They linked this conservation effort back to the classrooms, where they discussed the environment, biology, and weather.

The response from the students was overwhelming, and soon the movement to recycle spread into the community. Local business owners said many of the students they hired were driving them to reduce energy consumption as well. There was a cultural shift within the district. Our motto became “Get Your Green On.”

**Looking for Energy Hogs**

On the facilities side, we hired an energy consulting firm for a five-year contract. Consultants were to be on-site full time during the first three years but would gradually turn the program over to school officials in the final two years.

They calibrated the heating, ventilating, and air conditioning (HVAC) units so that they opened and closed properly and established some monthly reporting procedures. They began...
publishing a monthly newsletter on the district website to report energy savings across the district and at individual schools.

During the first meeting with our consultant, he told us that the biggest obstacle he usually found in schools was getting all the systems (HVAC and others) on the network. Fortunately, we had recently upgraded our network using Cisco switches, so connectivity was not a problem.

**Developing Policies**

As we embarked on this plan, we knew that each dollar we saved was a dollar that we could allocate elsewhere for school programs or reinvest into technology or other solutions. But getting from point A to point B required a very structured process. The first step was establishing a policy at the board level. Using best-practices models from around the country, we developed a policy that established:

- Appropriate temperature ranges for classrooms, gyms, and auditoriums (both when occupied and when unoccupied)
- Appropriate lighting throughout the schools
- Appropriate use of personal equipment, such as coffee pots and mini-refrigerators

Next we determined specifically who in each building was responsible for which parts of the policy. At the building level, the EACs and their advisers reviewed the policy and figured out how to implement it. Once the groups developed their school-wide plans, they shared them with the entire staffs and student bodies of each building and began to track the progress.

This is where the students in the EACs became the movers and the shakers. They monitored the building progress and reported the findings to their peers. They inspired their teachers and other staff members not only to embrace the concepts but to change their behavior in ways that moved the program forward. Often it was small things—such as convincing teachers to turn off the lights when exiting the classroom or planting trees and flowers in the common areas—that ultimately made the difference.

On the district front, the next challenge was establishing benchmarks. Using guidelines from the U.S. Environmental Protection Agency, we determined what we would measure and how we would report it. We set goals for the first year and established when to revisit them. We also clearly identified who was going to be doing what, when they were expected to do it, and how it was going to be reported. Then we published the plan on our website.

**Getting Recognition**

The effort fostered competition between buildings, which drove the program faster than we originally anticipated. We had expected seeing slight savings each year; we did not believe that we would receive Energy Star recognition by our third year (see “Energy Star Rating” on page 26). The plan became a living document that evolved as our level of understanding and experience grew. If something wasn’t working, we changed it. It also provided the opportunity to celebrate our successes.

**Turning Off Computers**

IT jumped in to do its part. The obvious first place to look for energy conservation was the data center. Most data centers are fixed in size, and once the usual suspects—HVAC systems, server size, and power supplies—have been addressed, many IT departments stop looking for savings. But according to the Energy Star website, the best places to realize energy savings is at the building level, where the technology is dispersed. We used two different tools—EnergyWise from Cisco and Ghost from Symantec—and saved the district approximately $100,000 per
**Energy Star Rating**

Energy Star is an energy performance rating system developed by the U.S. Environmental Protection Agency. The ratings, on a scale of 1–100, are used to compare the energy efficiency of similar buildings and industrial plants.

Buildings that get a rating of 75 or higher may qualify to be designated as an Energy Star facility. Schools interested in participating in the recognition program can register to use the EPA’s free online Portfolio Manager (www.energystar.gov/istar/pmpam) to determine how well the school is doing compared to similar schools.

Portfolio Manager is an interactive energy management tool that allows building officials to track and assess energy and water consumption. For more information, visit the Energy Star website (www.energystar.gov).

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**Turn Off to Save Money**

Wattage x Hours Used Per Day / 1,000 x Cost Per Kilowatt Hour = Total Cost

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**Assuming a typical PC averages 133 watts per day, this is how we calculated the cost to power a PC:**

8-hour workday x 133 = 1,064 watts
16 hours rest x 65 = 1,040 watts
Total daily usage = 2,104 watts, 2.104 kWh
Average kWh rate of $0.15
Average power consumption charge = 2.104 x 0.15 = $0.32
Average annual cost: $115.19

The annual cost of leaving the district’s 2,000 computers on all the time is about $230,388.

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**By turning the PCs off at the end of the school day, we saved an average of 12 hours per PC. Here’s how we calculated the savings:**

12 hours x 65 watts x 365 days = 284,700 watts per year
284,700 watts per year / 1,000 = 284.7 kWh per year
284.7 x $ 0.15 = $ 42.71 per year, per PC

$42.71 x 2,000 PCs = $85,410 annual savings

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**Here is how much we saved by shutting down access points and VoIP phones when not in use:**

**Access Points**

211 APs at 15 watts per unit x 24 hours = 75,960 watts per day
$11.39 per day (for all 211), or $4,159 per year

12-hour shut down each day = $2,079 per year in savings

**IP Powered Phone**

265 phones at 5 watts, or 120 watts per day
$4.77 per day (for all 265), or $1,741 per year

12-hour shut down each day = $871 per year in savings
year. Once you understand the calculations, it's easy to see how quickly you can save money.

We started with desktop management. At that time, we were leaving our PCs on all the time so we could do our updates and refreshing during nonschool hours. Even when we were not installing updates, the PCs were left on, so that on a typical workday, the PCs were on but not used for an average of 12 hours. With normal use, a PC can gobble up about 250 watts; in hibernate mode it uses about 65 watts. A laptop uses anywhere from 15 to 45 watts, a 17” CRT monitor uses 80 watts, and a 17” LCD monitor consumes 35 watts. The easy cost-saving approach would be to turn PCs off when they aren’t being used (see “Turn Off to Save Money”).

We didn’t stop there. We have an extensive wireless presence in each of our buildings as well as a VoIP phone system. EnergyWise is a product included in the operating system for some Cisco switches. It allows users to turn Power over Ethernet (PoE) devices on or off. Because our access points (wireless antennas) and phones are PoE devices, I can shut them down when they aren’t needed (see “Turn Off to Save Money”).

I used the U.S. Environmental Protection Agency’s calculator to determine the equivalent in greenhouse gas savings realized by our improved energy efficiency. I discovered that turning off all district PCs, access points, and IP-powered phones during nonschool hours is the equivalent of planting 10,740 trees, taking 80 cars off the road, and powering 54 homes for a year. Although your savings will vary, I hope our experience has given you some ideas about things you can do when you get your entire school or district motivated to get their green on!

**Resources**


Saving Electricity: [http://michaelbluejay.com/electricity/computers.html](http://michaelbluejay.com/electricity/computers.html)

University of Pennsylvania Information Systems & Computing: [www.upenn.edu/computing/provider/docs/hardware/powerusage.html](http://www.upenn.edu/computing/provider/docs/hardware/powerusage.html)


U.S. Environmental Protection Agency website: [www.epa.gov/RDEE/energy-resources/calculator.html](http://www.epa.gov/RDEE/energy-resources/calculator.html)

Matthew J. Frederickson is the director of information technology for the Council Rock School District in southeastern Pennsylvania. He has an MBA from LaSalle University and a MS in Learning Technologies from Drexel University.

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greater access to excellent education
How can you engage students and trick them into learning math? We did it using an instructional video game called DimensionM by Tabula Digita.

It’s no secret that kids love games. Today’s popular titles, such as World of Warcraft, Halo 3, The SIMS, and Assassin’s Creed, foster learning and critical thinking. They are increasingly complex, and they require players to invest a lot of time learning both the mechanics of the game and the storyline. Many players spend countless hours devising new strategies to improve their performance. Educational games use motor skills, attitude, verbal information, cognitive strategy, and intellectual skills. What more could a teacher ask for?

Playing DimensionM

DimensionM is a highly interactive, first-person-oriented, 3D video game that is similar to popular commercial games, such as Halo and the Unreal Tournament series. The player assumes the role of a college student who lands on a deserted island that was once home to a military biotechnology facility. Experiments on this island have gone awry, and the player must solve various situational dilemmas to escape. Mathematics instruction and practice are integrated into the story line of the game. The player must master certain pre-algebra and algebra skills to progress.

The game features a calculator and a journal, which allow players to review the game dialogue as well as the math concepts. At the close of each mission, the player takes a quiz, which is integrated into the game’s story line that includes both multiple-choice and short-answer questions about the mathematics concepts encountered in the mission. The scores from the quiz and game play are combined to calculate an overall mission score. The player is then rewarded with a gold, silver, or bronze medal.

Introducing the Study

We used DimensionM with 28 middle school students at a rural school in North Carolina. Each student voluntarily enrolled in an innovative remedial course called Virtual Math, which was designed to bolster the scores of students in grades 6–8 who scored below proficiency on the state math exam. The class met 2½ class periods per week. At the beginning of the Virtual Math course, we had students play the game’s Tutorial and Xeno Island missions.

The Tutorial mission acquaints players with basic navigation in the game world and introduces them to built-in reference tools, including the journal, mission objectives, and math concepts.

The Xeno Island mission addresses the concepts of prime numbers, even and odd rules, and perfect squares. Students begin the mission on Xeno Island behind a locked gate. To unlock the gate, the students must use their “visors” to locate shells on the beach that have a prime number associated with them. In the second phase of the mission, the students must use their visors to locate spider-like robots that can broadcast a radio signal to a nearby console that controls a second locked gate. Students see a variety of even and odd expressions over the robots. In the third and final phase of Mission 1, students must find a way to cross a chasm to a control station on the other side. The only way to accomplish this is by activating a bridge by collecting power cells nearby that have numbers associated with them that are perfect squares.

We gave students two hours to work through the Tutorial and Xeno Island missions. Students who completed the orientation or the mission early were allowed to play again to improve their overall scores. The course tutor provided technical assistance and encouraged students to use the game’s built-in journal and mathematics resources.

Students continued to progress through DimensionM’s missions, with each class involving about 50 minutes of game play and 25 minutes of debriefing and instruction.

Assessing Results

Before playing the game for the first time, students completed an eight-question pretest that included ques-
In Mission 1, students must cross a chasm to a control station on the other side.

Mathematics instruction and practice are integrated into DimensionM’s story line. Students preferred playing video games at school rather than at home. Students said their favorite video games were Guitar Hero, Madden Football, Mario games, and the Need for Speed series.

We discovered that students were willing to take a trial-and-error approach to covering the learning objectives for the Xeno Island mission. These questions, written in multiple-choice format, were similar to those integrated into the game play and addressed the concepts of identifying prime numbers, evaluating even and odd expressions, and identifying perfect squares.

After students completed Xeno Island, they took a posttest on the same math concepts. The students made significant gains in their overall achievement. Math scores increased from 46% correct on the pretest to 63% on the posttest. Students showed the greatest improvements in the concepts of prime numbers and perfect squares, yet they still struggled with perfect squares, averaging only 38% correct on the posttest.

**Surveying Students**

Students also answered questions—before and after they played the game—about their attitudes toward video games and using games for learning math. They responded to 10 questions with ratings from strongly agree (scored as 4) to strongly disagree (scored as 1) and a question about their favorite game.

Overall, students said they were better at video games than mathematics, and they believed that video games were easier to learn than mathematics. Students believed that video games could help them with their learning, and they preferred playing video games at school rather than at home. Students said their favorite video games were Guitar Hero, Madden Football, Mario games, and the Need for Speed series.

We discovered that students were willing to take a trial-and-error approach.

**Student Performance by Math Concept**

<table>
<thead>
<tr>
<th>Math Concept</th>
<th>Pretest Percent Correct</th>
<th>Posttest Percent Correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime Numbers</td>
<td>25%</td>
<td>60%</td>
</tr>
<tr>
<td>Even and Odd Patterns</td>
<td>84%</td>
<td>83%</td>
</tr>
<tr>
<td>Perfect Squares</td>
<td>18%</td>
<td>38%</td>
</tr>
</tbody>
</table>

**Video Game Survey**

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like math.</td>
<td>2.54</td>
</tr>
<tr>
<td>I like playing video games.</td>
<td>3.71</td>
</tr>
<tr>
<td>I am good at math.</td>
<td>2.61</td>
</tr>
<tr>
<td>I am good at video games.</td>
<td>3.57</td>
</tr>
<tr>
<td>Math is easy to learn.</td>
<td>2.54</td>
</tr>
<tr>
<td>Video games are easy to learn.</td>
<td>3.29</td>
</tr>
<tr>
<td>A video game about math would be fun.</td>
<td>2.82</td>
</tr>
<tr>
<td>A video game can help me learn math.</td>
<td>3.18</td>
</tr>
<tr>
<td>I would play a video game about math at home.</td>
<td>2.64</td>
</tr>
<tr>
<td>I would play a video game about math at school.</td>
<td>3.25</td>
</tr>
</tbody>
</table>
The students’ success was noticeable not only to us, but also to other teachers who were not directly involved in the study.

The math coach, Greg Goble, said students who took the Virtual Math class were inching ahead of students in the regular math class. “Because they need to know the math to advance in the game, they’re willing to learn it,” Goble said. “It’s building their confidence, and it’s putting them ahead in their regular math class.”

After three weeks of game play, the course tutor, Judy Joseph, said she had noticed an improvement in students’ performance. The highly immersive nature and exciting game play of DimensionM was effective in engaging students and teaching them mathematics concepts. DimensionM increased middle school student achievement in mathematics, and students were more upbeat about math.

DimensionM can be used in classrooms to teach students, especially those struggling with math. With the emphasis on game play, students tend to be less anxious about their academic performance, allowing them to focus on the concepts.
Listen to Echoes

It’s always fun when teachers or students share postcards that their friends or family sent from far-flung locations. It’s equally entertaining and educational to see photos and video shot in distant lands or historic spots. And now there is a free site called Woices (http://woices.com) that allows anyone to attach “echoes,” or audio recordings, to a location on a world map.

Although the site is relatively new and not heavily populated, it has more than 3,500 sound bites that range from history lessons and personal memories to walking tours and first impressions. There’s even music and other distinctive sounds. The echoes can be linked to geographic locations or landmarks. Some are fictional accounts placed at famous settings of a well-known novel, poem, or story.

Foreign language students can find authentic examples of dozens of world languages and listen to specific dialects and accents. For example, your students can listen to variations of Spanish spoken in Mexico, Spain, Ecuador, and many other countries.

If your students are studying the culture of a region or country, they can also find music or historical accounts of an area. For example, click the Explore tab and zoom in on the country of Kazakhstan in Central Asia. If you click on the echo marker in the center of the country, a list will pop up on the right. You’ll find one entry called Lagarta Blues, which is a song posted by a user in Shalqiya, Qaraghandy, Kazakhstan. Click on that entry in the list and it will bring you to a page that shows the title of the echo, the date it was recorded, the user name of the person who posted it, the language it was recorded in, and a short description. If you like what you hear and want to find more echoes from the same user, click on the user name, and you’ll find other echoes that person submitted.

Like most Web 2.0 sites, visitors can comment, share, or download an MP3 file.

Once you get a feel for some of the echoes that have been posted, the next step is to have your students create some. Students can record snippets of research about a landmark or a poem about a place, or talk about their favorite location in their hometown or vacation destination. The possibilities are endless.

—Diana Fingal, L&L senior editor, and Scott Meech, ISTE intern

Tip

Share Resources Quickly by Installing Diigolet

Problem: How can you bookmark, organize, and share numerous resources each day using Diigo? It takes me forever to do this.

Here’s a solution: One of my favorite things about Diigo (www.diigo.com) is how easy it is to bookmark, add, and share resources to the various personal lists I have created or groups I belong to within this bookmarking tool. By installing the Diigolet, a super bookmarklet, into the toolbar, you can quickly bookmark, annotate, highlight, and add sticky notes to online resources. Diigolet also gives you the option of saving links to the lists you have created within your library or sharing them with the groups you belong to within Diigo. Every morning I go through all of my Diigo group e-mails and then use my Diigolet to bookmark these into my lists or share with my groups. It is quick and fun!

Shannon McClintock Miller is the district teacher librarian and technology coordinator at Van Meter School in Van Meter, Iowa. Find her blog, The Van Meter Library VOICE, at http://vanmeterlibraryvoice.blogspot.com.
Put that Research Project in a Box

Ah, the research project. That ubiquitous assignment continues to haunt high school history students. In my first year as a student teacher of AP U.S. History, I’ve had the chance to see firsthand the arduous process of choosing a topic, developing a thesis, gathering resources and evidence, revising an outline and introduction, and building a coherent, focused argument. I certainly remember with grudging appreciation my own experience with historical research and argumentation, timeless skills that should remain a central element of the history curriculum. But I’m surprised at how little the process has changed since my high school days, especially in terms of organization and presentation.

Say No to Tattered Index Cards
Although Internet resources and Google searches have significantly altered the nature of research—students no longer have to spend all of their time in the library stacks—the handwritten index card remains the preferred method for gathering evidence. Sure, they might look nice and crisp at the beginning, but over the course of a semester, the shine wears off. Easy to misplace and hard to revise, the index card organizational scheme seems antiquated and tedious. And, quite frankly, it makes history seem like a total drag—not exactly the sentiment that I want to inspire as a teacher.

But some new digital alternatives are both practical and engaging. In my search for a Web 2.0 tool that would be applicable for teaching social studies, I stumbled upon Museum Box (www.museumbox.e2bn.org), an innovative tool designed for history classrooms but easily adapted to any discipline.

Museum Box gives students the tools to build an argument or describe an event, person, or historical period by placing items in a virtual box. This tool offers students and teachers a myriad of options for research projects, interactive presentations, collaboration, and organization. Museum Box can act as a virtual file cabinet, with separate drawers for audio files, video clips, images, PDFs, Word documents, PowerPoint presentations, original text, and website links. Teachers can devise complex lesson plans with multiple source materials, neatly organized and labeled for easy access. Students can use Museum Box to catalog their research, allowing for constant revision and addition.

Use Artifacts to Illustrate Your Point
Developed by The Abolition Project (www.abolition.e2bn.org), Museum Box was inspired by the story of British abolitionist Thomas Clarkson, who worked tirelessly in the 18th century to raise awareness about the horrors of the transatlantic slave trade. Recognizing that artifacts and pictures influenced public opinion in ways that mere words could not, Clarkson visited ports and toured trading vessels bound for the African coast, collecting evidence in a specialty box. One artifact in particular, the Brookes Diagram, which illustrated the appalling conditions under which African slaves were “packed” and transported across the ocean, deeply affected the public and remains an important piece of historical evidence for teaching about slavery.

Keep All Class Projects in One Place
So how does Museum Box actually work? The first step is to register your school through the Teachers Area link on the homepage, a process that can take up to five days. A site administrator will contact you to approve your application. Once you are officially registered, you can either add student accounts manually or ask your students to sign up on their own.

From the homepage, students should follow the Start link to create their own museum boxes. An empty project template will appear, with compartments for various artifacts, spaces for titles and descriptions, and options to add images, text, sounds, videos, files, and links. By clicking on the Save link at the top of the page, students can easily create a login name and password. Don’t forget to tell your students...
Museum Box gives students the tools to build an argument or describe an event, person, or historical period by placing items in a virtual box.

to choose the name of their school from the drop-down menu, so you can access their boxes.

To add artifacts, students can click on an empty box to bring up a six-sided cube. Let’s say a student wants to insert an image on the front of the cube. If he presses the Images button at the bottom of the page, a gallery will pop up. The student can either select an image from the Museum Box gallery or toggle to the Your Images tab and upload his own files. Students can follow the same procedure to add video, audio, text, and URLs.

When students have finished adding artifacts, they can turn in their museum boxes using the Submit button in the upper right corner of the screen. From the teacher administrator page, you can review students’ boxes, make revisions or suggestions, and either approve or send back for revision, depending on the nature of the assignment. You can also delete boxes if they contain inappropriate material. If you want students to be able to view each other’s museum boxes, simply approve their submissions, and their projects will appear in the public gallery, easily linked from the homepage by pressing the Museum Boxes button at the top. You can search for individual boxes or narrow the list to specific schools.

For private assignments, the submission function is an easy way to provide feedback and suggestions. You can also send messages to students as you review their work.

Students Can Work Collaboratively

Rather than relying on index cards, the students in my classroom might use one cube per supporting argument, with each of the six sides reserved for a particular piece of evidence from a book or journal article.

Or perhaps you have asked your students to engage in a historical debate. Each side might work collaboratively on one museum box, with the teacher regularly providing advice and guidance through messaging and revision. Time capsules, debate prep, and autobiographies are just some of the possibilities for authentic learning experiences and performance assessments using Museum Box.

Museum Box is not a perfect tool. Some kinks are yet to be worked out, particularly the video upload feature and the lack of a Back button for easier navigation to the homepage. But generally, this tool is easy to use and, as an added bonus, does not allow outside advertising. Most important, it provides a forum to explore a range of source materials that will strengthen arguments and engage students with different learning styles and interests.

Historical research is a complex process, full of false starts and dead ends, with the occasional treasure trove of discovery. We tell our students that their investigations will take them in unexpected directions, that they will constantly modify their arguments, and that new and better evidence will inevitably surface. So we should provide them with the tools to make the entire process easier. Museum Box is one of many new Web 2.0 tools that can facilitate deeper, more meaningful learning experiences.

—Stella Gorlin is a master’s student in secondary education at the University of Michigan in Ann Arbor and a student teacher of AP U.S. History at Pioneer High School.
As technology integration specialists at Hatboro-Horsham School District in Pennsylvania, we wanted to build a curricular environment that would foster critical thinking and creativity. We embarked on a path to create a hands-on learning experience for our fifth graders that would emphasize scientific inquiry.

Our district owns 24 acres of land, known as the Jarrett Nature Center (JNC). The land has a wide range of natural ecosystems, including a pond, a woodland, a wetland, and a meadow, offering a wealth of opportunities to study the environment. Any type of outdoor space that provides at least one ecosystem can be equally effective.

Using project-based learning and Understanding by Design methodologies, we posed to students the following essential question: “Why is it important to preserve the earth’s natural environment?” We then gave them a real-world problem to solve:

A builder is planning to remove a part of the JNC. Your job is to research and determine what effects this would have on the natural environment.

First, students paired up to create questions that would launch their research. They posted their questions to a blog and later discussed which ones to pursue for their project. The questions that consistently appeared were posted on a WebQuest for all fifth graders to view. These were:

- What plants and animals (and other living things) live in the JNC?
- What do the animals at the JNC eat (the food chain)?
- What are the ecosystems in the JNC?

With the above questions in mind, students divided into groups and ventured out into the JNC. One person from each team carried a backpack loaded with a NOVA 5000 laptop computer, a digital camera, a magnifying glass, a microphone, and a timer. Students worked in their teams to make journal notes and document the living and nonliving things in each ecosystem of the JNC. Team members took turns using each piece of equipment at each ecosystem.

Returning to their technology classes, students then created multimedia tours using Photo Story 3. They organized their photos, wrote detailed descriptions, narrated their stories, and used music to create a focused, multisensory story about their trip.

We evaluated the multimedia projects based on an 18-point rubric, which stressed organization and structure of the story as well as whether the ideas were well developed.

Students continued the project by researching one organism and its related ecosystem at the JNC. The students wrote persuasive letters to the Horsham Township Commissioner stating their viewpoints about the impact of a fictitious company, PaveItAll Inc., bulldozing the ecosystem they were studying.

The letters referred not only to the obvious—the benefit that oxygen provides in maintaining natural environments—but also to the medicinal benefits of specific trees, the human pleasure of eating apples and berries that proliferate in the JNC, and the possible extinction of animals due to the loss of their habitats.

When they had finished their projects, students posted all of their findings on a webpage. Through the fictitious letters they wrote to the township planning commissioner,
the comments they left on the class blog, and the Photo Story journals they created, all of the students demonstrated active participation, blossoming inquiry, self-motivation, and student ownership of a project.

Throughout this authentic, hands-on experience, students were building their higher-level thinking skills, while they learned to organize their thinking and present their ideas and knowledge in meaningful ways. Students developed personal strategies that worked for their particular styles of learning while being guided to question, observe, test, research, and recommend solutions.

This project meets ISTE’s NETS for Students for identifying authentic problems, developing significant questions, analyzing a problem, and recommending a solution. It also meets state content standards for ecology, reading, writing, speaking, and listening.

The students used a wide assortment of technology, including video cameras, online research, digital-editing software, and digital cameras. The students learned to assimilate information, assess its relevance, analyze it, and make an informed recommendation. The project is continually evolving based on the needs and feedback from its users—the students.

Just as learning is a lifelong process, we believe that learning to think scientifically is as well. Plant the seeds of scientific thinking using technology and the resources of nature.

Resources
Hathboro-Horsham Wiki: http://sciinqthru.naturetechnology.wikispaces.com
Jarrett Nature Center: www.hathboro-horsham.org/406712024104744/site/default.asp
Photo Story 3: www.microsoft.com/windowsxp/using/digitalphotography/photo/story/default.mspx
WebQuest: www.Webquest.org

—Kathleen M. Krupa and Carmela Caratola
Knowles are technology integration specialists for Hathboro-Horsham School District in Pennsylvania. They were 2009 MAGPI Fellows engaged in developing advanced network applications within the K–12 community for the district and 2008 Pennsylvania Keystone Technology Integrators.


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Conquer the Blank Page in the Classroom

In the English language arts classroom, there is no greater bully than a blank white page. It stares students down and reminds them that writing demands they do the impossible: pull something out of nothing. Thanks to science classes, students know this is impossible—so why bother?

English teachers understand that learning to fill that white void with language is necessary for students to develop the ability to communicate with others while understanding and expressing their own individuality. That’s really why we bother.

But how do we encourage our young writers to stand up to that menacing bully and fill the page? Enter Piclits (www.piclits.com), a Web 2.0 tool that gives students prompts for writing, be it a picture or a bank of seemingly random words. The idea behind Piclits is to offer students the infinite possibilities of a blank page but suggest starting points to avoid the intimidation factor.

On the Piclits homepage, young writers can get a writing prompt by selecting a photo. It can be a person, car, baseball glove, animal, landscape—anything really. A picture of a scared kitten could, in the student’s mind, give birth to a protagonist in an epic adventure about standing up to the terrifying bulldog next door or trigger a memoir about a pet. A picture of a mountain under an overcast sky could lend an ominous setting to an epic mystery or provide a solemn and serious mood for a poem.

If the picture fails to evoke an idea, the student can choose another. If the picture is not enough, the young writer may pull in words from a word bank. Seeing an image paired with a few words can fire countless synapses and bring focused ideas that can serve as a starting point.

The problem with the blank document is that there is no limit to the possibilities, so it is hard to find one idea to take and run with. Matching a picture with random words can “trick” a student writer into thinking there is a finite number of paths to take, making it easier to just choose a direction.

One great feature of Piclits is that it allows users to save their work and come back to it later. Peers can even comment on each other’s pieces and develop a writing community. Additionally, students can share work through a blog, MySpace, Facebook, or another networking site. Not only does this allow students to share creativity and inspiration, it helps them develop writing skills communally.

Students will be able to teach and learn from each other. Through this communal aspect and individual practice on the website, Piclits is naturally able to differentiate instruction.

Young writers can work at their own pace, whether the student is stringing words together or using the images for inspiration in writing a complete narrative or poem. Piclits can get writers over their fears and uncertainties in the classroom and inspire students to welcome the blank page.

—Adam Saligman graduated from Washington University with a bachelor’s degree in literature and writing and recently completed an MA with certification at the University of Michigan. At that time, he taught 10th grade English at Thurston High School in Redford, Michigan.

—Leah Armelagos completed the University of Michigan’s Master of Arts with Certification program in June and now teaches at Covenant House Academy in Detroit, where she seeks to inspire the writer in every student.
The challenge for technology integrators is to connect students’ academic needs, staff development requirements, and hardware and software resources. Implementing effective strategies as an integrator is vital for making a difference in schools. Here’s what I encourage my staff to do:

**Develop goals and make them SMART.** Align your goals with your school improvement targets and your own professional growth. The SMART (specific, measurable, attainable, relevant, and time dependent) method will define a clear direction to enable you to focus on opportunities for school success and professional growth.

**Establish timeframes to meet your objectives.** Planning your time is the key. Timeframes can be an amalgamation of short, medium, and long terms to meet the school and district goals. Here are three timeframes to consider in planning, implementing, and evaluating the process:

1. *Long term* (up to two years) means striving for small steps to achieve a large return.
2. *Medium term* (one year) means striving for reasonable steps to achieve a practical return.
3. *Short term* (six months) means striving for immediate steps to achieve a direct, yet effective, return.

**Manage your workflow.** Once the school year begins and you have planned goals and timeframes, some tasks and activities may become a challenge. Make sure to prioritize. Remember, everything that comes your way is not a high-priority goal. Steven Covey, author of *The 7 Habits of Highly Effective People*, states that every activity we do during the day can be put in one of four quadrants. Take the time to list tasks and activities and observe where you have placed them. If you placed the majority of the tasks and activities in Quadrant I, you could be diminishing your effectiveness.

To successfully juggle various projects and daily activities, use tools such as Microsoft Outlook, Microsoft Project, or Officer Organizer. Schedule classroom integrations, trainings, and school-related activities to help pace your workflow.

**Be flexible.** There will be unexpected tasks to integrate into your day. Also, for every classroom integration or modeling, schedule planning time. Maintain a balance of classroom integrations, staff trainings, and technical support. And don’t forget to carve out some time for record keeping, which you need for data analysis. Schedule professional growth and learning time for classes, workshops, online learning, and conferences to improve your knowledge base.

**Know your strengths and skills.** Focus on your greatest assets, skills, and knowledge. Marcus Buckingham, a leading expert on personal strength and author of *Go Put Your Strengths to Work*, emphasizes the importance of concentrating on your talents, skills, and knowledge to elevate your effectiveness on the job. He contends that you must stay clear, make the most of your strengths, ignite opportunities from needs, speak up, and build strong practices.
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Can You Find the Truth on Google?

I am old enough to remember doing research in junior high using the Readers’ Guide to Periodical Literature. The rows of green hardbacks lining library shelves contained an index of every article published in nearly every U.S. magazine imaginable. These volumes would point you to articles on sports legends, advancements in science, the current events of the day, or anything else a teacher might assign a student to write a report about. Later, as a young reporter, I used to flip through tattered index cards in the newsroom library to find out about past events and then read about them on rolls of unwieldy microfilm.

Today, students have access to all those resources and more at their fingertips. But are they better informed? Will they be more equipped to think critically and find creative solutions to problems?

Tom Whitby, who writes the blog My Island View (http://tomwhitby.wordpress.com), contends that students need more than just information. In his post “To Tell the Truth,” he says it’s imperative that we teach students to make intelligent choices about issues that affect the lives of all citizens:

Technology has given us the ability to store and access a huge amount of information, which continues to grow exponentially. The information, however, is both correct and incorrect, both true and false, both fact and fiction. If we are to be considered good educators, we need to be able to instill in our students a desire to strive for the truth. They need to be able to determine what information is of value.

Here’s a smattering of excerpts from the two dozen comments posted:

The current media news entertainment industry in this country is a compelling reason why we need to set our sights on a Renaissance model in which our learners become thinkers, not recallers. —Pam

I try to teach my students to always look for the other perspective, to seek to understand how the losers or the “bad guys” rationalized their ideas and choices. I want them to understand complexity. —Hadley Ferguson

The Web generation is used to receiving their information in very small tidbits. Typically, to uncover truth a person needs to delve deeper and read more in depth. This skill is what is missing. The students have the capacity to find the truth, but they lack the desire, and in some cases, the ability, to read comprehensively. —Daddy Moose

Students need to learn how to address the perspective of the source. For example, The Economist is an excellent source of information, but one should know that it swings rightward. It is as important to know where they are writing from as it is to know if they are credible or not. —Michelle Rogers-Estable

Most of [my high school English students] are satisfied with a simple “I got it off Google,” and crinkle their noses in disgust when I send them back for more information. They don’t want to think because, for one, they don’t know how, and, for another, they don’t see the importance of it. Mucking about in morally gray (or, let’s face it, even flat-out wrong) is fine if it’s all you’ve ever known. —Jo Hawke

It was an article about YouTube that prompted a similar concern from Bill Ferriter, who writes The Tempered Radical blog (http://teacherleaders.typepad.com/the_tempered_radical). In his post “Read this: YouTube hits 2 bn daily downloads,” he laments:

Today, no one needs to ask for permission to have a voice. And while I love that freedom—heck, 10 years ago I never would have had 1,200 people listening to my thoughts about teaching and learning—it also means that the quality controls that once provided a measure of assurance that the content we were consuming was semi-reliable are now completely gone.

Chris Fritz took issue with that notion:

If anything, the Internet is helping people stand up and say, “This is ridiculous! Let’s turn off the TV and think for ourselves. Let me know if you think I’m wrong, provide alternate points of view, question my data, offer something better, and in that way, we’ll continue the conversation and reach a greater understanding.” It’s the democratization of knowledge.

Diana Fingal is the senior editor for L&L. She has been writing for and editing periodicals for more than 20 years.
Robots are an exciting way to learn or teach about science, technology, engineering, and math. It’s also a great way to build teamwork, leadership, and problem-solving skills.

Robot kits exemplify the phrase “some assembly required,” but that’s all part of the fun. Kits can have hundreds of plastic and metal parts along with a number of electronic components, including servo motors, battery packs, and microcontrollers (the robot’s brain). Some kits can be assembled into more than one type of robot. The Robo TX Training Lab, for instance, comes with 310 parts, and you get to choose which of its 11 models—everything from a forklift to a lawn mower—you want to construct.

Kits are often modular, allowing you to buy a box of additional parts to add functionality to your robot. One example is the Mindstorms Education Base Set that uses the Tetrix Building System, a platform that includes an assortment of wheels, gears, motors, and aircraft-grade aluminum connectors.

All of the robots featured here are programmable. Some even come with graphical software that makes it easy for beginners to generate code. Fischertechnik’s Robo Pro, for example, uses a flowchart utility that translates building blocks into machine language.

A few kits employ a microcontroller that will work with multiple programming languages. The VEX Protobot works with easyC, ROBOTC, and MPLAB.

Most robots receive code from a desktop computer or laptop connected by a USB or serial cable, but other technologies allow data transfer without wires. The LEGO Mindstorms NXT can receive commands remotely using Bluetooth technology, the PicoCricket uses infrared reception, and the Protobot can be radio controlled.

Robotics kits often include a few basic sensors, and many manufacturers sell an assortment of others that you can add on. Sensors are the eyes and ears of the robot and can even enable it to guide itself based on data it collects from the environment. Some kits include distance, light, sound, touch, and even color sensors as standard hardware.

Programmable robotics kits can be expensive, especially if you want to outfit an entire classroom. Manufacturers sell basic kits that are more affordable, but be aware that these often do not include the key components, such as a microcontroller and programming software, necessary to create a fully functional robot.

—Paul Wurster

### Robot Kits

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<th>Company</th>
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<td>INEX</td>
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<td><a href="http://mindstorms.lego.com">http://mindstorms.lego.com</a></td>
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<td>Playful Invention Company</td>
<td><a href="http://picocricket.com">http://picocricket.com</a></td>
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<td>VEX Robotics, Inc.</td>
<td><a href="http://www.vexrobotics.com">www.vexrobotics.com</a></td>
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<td>Model</td>
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<tr>
<td>Robo TX Training Lab</td>
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<td>MicroCamp-Mega8 v2.0</td>
<td>$150</td>
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<tr>
<td>Mindstorms NXT</td>
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<tr>
<td>Mindstorms Education Base Set with Tetrix</td>
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<tr>
<td>BOE-Bot</td>
<td>$160</td>
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<tr>
<td>PicoCricket</td>
<td>$250</td>
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<tr>
<td>VEX Protobot Kit</td>
<td>$200</td>
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Teaching with Digital Video
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Everything you need to bring lessons to life with digital video in science, social studies, language arts, and math.

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Step-by-step instructions, implementation ideas, and lesson plans show how you can use Google applications to transform communication, collaboration, and creativity in your school.

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Learn from one school’s experience integrating a 1-to-1 laptop program.

“From Fear to Facebook should be required reading for schools looking to figure out how to optimize technology to enhance teaching and learning.”
—Jim Steyer, CEO and Founder, Common Sense Media

Available in October
Web 2.0 How-To for Educators
The authors of the bestselling Web 2.0: New Tools, New Schools! expertly lead you through Web 2.0 applications to help you and your students connect, create, and collaborate.

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WHAT’S new

World Book’s Early World of Learning is a new Web-based resource for developing literacy skills for children in preschool through early elementary school. It includes three interactive learning environments that offer a wide range of activities to help strengthen phonics, vocabulary, and comprehension. Readers from diverse backgrounds narrate the stories. Teachers can download many of the stories and songs as MP3 files for students to access later. Activities include printable resources in both English and Spanish. An Education Center provides alignments to state curricula and reading assessments.

MORE INFO: www.worldbookonline.com/training/world_of_learning

NBC Learn has launched a website called Finishing the Dream, which chronicles the history of the civil rights movement. It includes more than 100 stories from NBC News archives and will include special broadcasts of four Town Hall events on the subject. Material includes documentaries on significant events over the course of 60 years, including the Montgomery bus boycott; the assassination of Martin Luther King Jr.; the integration of Central High School in Little Rock, Arkansas; the Freedom Riders; and more. The content provides an opportunity for community leaders, teachers, and students to discuss the impact of the civil rights movement and to consider related modern issues that affect people today.

MORE INFO: www.nbclearn.com/finishingthedream

American Dream by MultiEducator, Inc., is an iPhone/iPod app that contains nearly 500 important documents in U.S. history. Included are 480 speeches, 90 Supreme Court decisions, and numerous audio recordings. Each document includes notes explaining its importance. Documents are searchable and can be shared freely by e-mail. The app costs $2.99 and is available in the Apple iTunes store.

MORE INFO: www.multieducator.net/formulator/American.html

Biz Kid$ is a new public television show designed to teach children basic financial literacy. The lighthearted program created by the producers of Bill Nye the Science Guy covers personal finance topics, such as credit, saving, budgeting, investing, and charity. Free lesson plans are available online for each show. The program will air on public television stations around the United States. Check your local listings for dates and times.

MORE INFO: www.bizkids.com

ISTE is releasing a new book this month. From Fear to Facebook by Matt Levinson is an insider’s view of the journey from peril to possibility with digital media in school communities. It tells the story of the cultural shift happening in schools with technology and provides a roadmap for navigating this sea change with buy-in from key stakeholders.

MORE INFO: www.iste.org/bookstore

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MORE INFO: www.bizkids.com

Intern Brady Cline compiled this information from press releases sent to the L&L editorial office. The L&L staff does not review the products and resources, and they are offered here without recommendation. Send press releases to products@iste.org.
Realityworks has released a series of business education simulations for high school students. The simulations apply key business concepts taught in class to a series of three online games to test students’ knowledge of successful business strategies. Students create their own products and companies, and then they participate in simulations, including The Business Game, The Entrepreneurship Game, and The Finance Game. Some simulations can be completed in as little as 45 minutes, and others can be spread over an entire semester.

MORE INFO: www.businessedsims.com

Knewton has released a new online SAT preparation course that uses adaptive learning technology to create personalized practice questions. The course includes 25 hours of live instruction, weekly virtual office hours, and thousands of practice questions. The new course costs $290 and comes with a guarantee to raise scores by at least 150 points.

MORE INFO: www.knewton.com/sat

Study Island, a producer of Web-based standards mastery materials, has released a series of Advanced Placement products designed to help students succeed on AP exams. The program is simultaneously accessible to all students and can be used on any computer with an Internet connection. The package costs $15 per student (15-student minimum) and includes one full-length practice test, free-response question prompts, and rigorous content that is customized to College Board specifications. The test preparation materials are available for U.S. history, English literature and composition, English language and composition, calculus AB, and calculus BC.

MORE INFO: www.studyisland.com

Teacher Created Resources has introduced a two-book series called Internet Literacy. Written by middle school teacher Heather Wolpert-Gawron, the books use a simple common-sense approach and humor to address the new Internet literacy skills that today’s students must learn. Internet Literacy, Grades 3–5, and Internet Literacy, Grades 6–8 sell for $13.99 each.

MORE INFO: www.teachercreated.com

Through an expanded partnership with Scholastic Media, Discovery Education Streaming users now have access to children’s television programs Maya and Miguel and WordGirl. In addition, Discovery has added more than 100 full-length audio books from Scholastic Audio to augment elementary language arts lessons. Popular series, such as Goosebumps and Clifford the Big Red Dog, and children’s literature classics, such as The Velveteen Rabbit and The Night Before Christmas, are available for instructional use.

MORE INFO: www.discoveryeducation.com/products/streaming/streaming.cfm

STI’s InformationNOW has added new “Go Green” features to its education data management software. The new features provide a paperless communication platform for teachers and parents. Customizable portals offer quick access to a wide range of student data. Parents can choose to have report cards, school notices, and other communications pushed to their own InformationNOW portal page. Go Green supports RSS feeds, making it easy for parents to integrate school notices into their existing tools. InformationNOW is a Web-based integrated system offering student data collection and analysis.

MORE INFO: www.sti-k12.com
The National Academy of the Sciences has launched a new website that gives an overview of the U.S. energy system. **What You Need to Know about Energy** covers four main topics: energy uses, sources of energy, the cost of energy (in terms of the environment, national security, and sustainability), and energy efficiency. The site has easy-to-navigate content and links to source material, and it includes an energy quiz, a glossary, and a source library. The site’s producers are also developing curriculum-based materials for high school and middle school classrooms. Two special features—Our Energy System and Understanding Efficiency—are designed to actively engage visitors and enhance their understanding of energy, including what it is, how we use it, and ways to conserve it.

**MORE INFO:** [www.needtoknow.nas.edu](http://www.needtoknow.nas.edu)

**Speak & See** is a new suite of speech-recognition tools aimed at supporting those with disabilities or learning challenges. The software also provides text-to-speech technology and a bilingual dictionary, making it suitable for English language learners. The software bundle includes applications to navigate the computer, create e-mail and documents, read documents aloud, and magnify parts of the screen for easier viewing. Nuance’s Speak & See Suite consists of Dragon NaturallySpeaking 10 Preferred by Nuance and three applications developed by Claro Software. The suite of tools costs $250. Educational discounts are available.

**MORE INFO:** [www.nuance.com/naturallyspeaking/products/bundles/speak-and-see.asp](http://www.nuance.com/naturallyspeaking/products/bundles/speak-and-see.asp)

**Brainchild** has announced a new program to provide personalized multimodal instruction during lessons. With the **Brainchild Academy Concept**, students work through three stations: online diagnosis, assessment, and lessons; StudyBuddy handheld lessons and practice; and supplemental worksheets. This allows students to be fully engaged and supported while the teacher is occupied helping other students. The website tracks student progress toward meeting state standards and provides lessons to help students raise their scores. The handheld StudyBuddy device offers an interface similar to a gaming device, which can be used cooperatively or in self-study mode. Modules for language arts, math, and science are available.

**MORE INFO:** [www.brainchild.com](http://www.brainchild.com)

**GradeCam Online** is a new website that allows teachers to easily transform paper-based tests into computer-scored tests. Multiple-choice tests can be scanned and uploaded to the GradeCam website, where the test is then automatically scored. Results are available instantly and can be easily integrated with electronic grade books. Teachers can quickly collect data on student progress without spending time marking, recording, and analyzing results. GradeCam has partnered with textbook publishers, such as Illuminate Education, so that publishers’ testing materials are fully compatible with the system. GradeCam Online is available for as little as $1.50 per student per year.

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Helping Teachers Tap the Knowledge of the Crowd

Lisa Thumann was working alongside her dad selling stocks and bonds and expecting to take over his business one day when she finally mustered the courage to leave it all behind and chase her lifelong dream of being a teacher. In addition to working in finance, she had done marketing, ad sales, and magazine design—not the kind of professions that normally segue into teaching careers. But they did give her the computer skills that allowed her to step right in to tech integration.

Today she is a senior specialist in technology education with the Center for Mathematics, Science, and Computer Education at Rutgers University in New Jersey. She provides professional development to public and private schools in New Jersey, and she runs the 21st Century Learning Initiative, a comprehensive professional development model that she created nearly three years ago.

“I believe in sustained professional development with in-class coaching and mentoring,” Thumann says. “Gone are the days of the one-day workshop.”

Or at least she wishes those days were gone. The fact is, some schools still request one-off trainings, and she does provide them. But she makes a point of enriching those lessons with opportunities to learn more through social bookmarking, microblogging, and the development of professional learning networks (PLNs).

She prefers, however, a more robust approach. That’s why she not only teaches educators tech integration skills, with an emphasis on developing PLNs, but she also spends time in their classrooms.

“Those students love having someone come into the classroom to work with them and their teachers,” Thumann says. “The teachers love being part of a community that is always there. Everyone who is part of the initiative takes from it what they need or want and gives what they can.”

The payoff for Thumann is the aha moments that educators have when they discover the possibilities of ed tech. One such moment occurred when a seventh grade teacher recently reflected on something that one of her students said. The teacher left this comment on a Ning that Thumann manages: “It made me realize how far we’ve come this year in terms of technology—not only that we use it regularly in the classroom now, but how much it’s influenced our students, enhanced their understanding, engaged them, and encouraged them to seek out ways to use technology for their own benefit.”

“That moment will stay with me,” Thumann says.

Thumann joined ISTE in 2005, when she attended NECC for the first time. She was hooked from the start.

“What I have learned from those I have met both in person and virtually through ISTE is invaluable,” she says. “Also the ISTE publications help keep me up to date and focused on what’s important in ed tech, and the NETS help me explain to administrators and educators why they need to make sure their curriculum includes digital technology and collaboration tools.”

Thumann makes no attempt to hide her enthusiasm for Twitter, Nings, and other tools that connect teachers, and she enjoys sharing her knowledge and experiences on her blog at http://thumannresources.com. She likes to illustrate the value of these tools with a story about her first year as a teacher, when she worked in a building where the rooms were air conditioned but the halls were not. Teachers stayed in their rooms, with the heavy doors closed to keep the rooms comfortable.

“You were in your room with the doors closed all the time. I never heard anyone walk by. The only time you ever talked to someone was when you passed them in the halls,” she recalls. “There was no Twitter and no social networking. If I had had those social networks back then, I would have been such a better teacher. Instead of starting from a blank slate, I would have had all the knowledge of the teachers who came before me.”

—Diana Fingal is senior editor of L&L.
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Heather Hurley
Member since 2006

www.iste.org/members
What is computational thinking, and what skills would a student exhibit as a computational thinker? In April, a group of educators and researchers met to explore these questions.

Academics have vigorously debated these questions since 2006, when Jeannette Wing of Carnegie Mellon University wrote and published *Computational Thinking*, which outlines her viewpoint that "ubiquitous computing is to today as computational thinking is to tomorrow. Ubiquitous computing was yesterday’s dream that became today’s reality; computational thinking is tomorrow’s reality."

ISTE and the Computer Science Teachers Association (CSTA) took up the challenge to define computational thinking as something that can be understood, valued, and implemented by K–12 teachers. The project, funded by the National Science Foundation, will include the development of prototype resources that teachers can use to implement computational thinking in their classrooms.

The group that met in April agreed on many things:

- Students need computational thinking skills to be competitive in today’s global knowledge economy.
- The foundational skills of computational thinking can be introduced in elementary school, and students can progressively build higher-order skills throughout high school.
- Educators can and should teach computational thinking within computer science courses and beyond, across all disciplines.

So what does computational thinking look like? In some cases, teachers are already facilitating computational thinking with their students but don’t recognize it as such. For example, in the younger grades, a teacher might focus students on sequencing, collecting, and analyzing data or developmentally appropriate algorithmic thinking. In the upper grades, students may explore open-ended, inquiry-based problems that require a tolerance for ambiguity or confidence in dealing with complexity.

For many, recognizing how to apply computational thinking in math or science is a much smaller leap than applying it to language arts, the social sciences, or humanities. In language arts, for example, applying computational thinking can include performing a linguistic analysis of sentences. Identifying patterns for different sentence types can be components of data collection and analysis. Using similes and metaphors can exemplify abstraction, and using a spell checker can illustrate automation.

As ISTE and CSTA work with K–16 educators and education leaders as well as specialists at district and state levels to refine the definition of computational thinking, we will be identifying target audiences, messages, and prototype resources. The April meeting kicked off the discussion and was followed by a session at ISTE 2010 to get feedback on an operational definition and brainstorm resources that would help teachers implement this kind of learning across a variety of curriculum areas. A practitioners workshop, slated for November, will bring together a group of teachers, curriculum developers, and staff developers to write prototype resources for implementation in K–12.

Principal investigators Leslie Conery from ISTE and Chris Stephenson from CSTA are collaborating on a joint project for the NSF called “Leveraging Thought Leadership for Computational Thinking in the K–12 Curriculum.” NSF recognized their expertise and leadership in bringing together educators from K–12 with computer scientists to explore and build consensus around this concept.

ISTE and CSTA recognize the exciting potential this project has to meet our respective missions and help bring about the systemic change to develop tomorrow’s students into strong computational thinkers.
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