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EDUCATION WEEK

SPOTLIGHT

On Using Technology for Classroom Collaboration

Joshua A. Bickel for Education Week

Left: Taylor Daye, 15, takes pictures of fish in an aquarium while experimenting with a digital camera at the YouMedia Center at the Columbus Metropolitan Library in Columbus, Ohio. At center: The library is working with several cultural institutions in Columbus to increase young people's learning opportunities. Right: Chris Rogers, 16, mixes an audio project at the library's YouMedia lab.

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Public Libraries Ramping Up Multimedia Learning Mission

By Nora Fleming

Gone are the days of just dusty book spines and the sounds of silence.

Throughout the country, public libraries are extending their mission beyond loaner books and resources: They're providing opportunities for students to engage in digital learning opportunities aimed at making them college- and career-ready, often in partnership with schools.

During the past two decades, libraries have steadily added technology services, but those tended to be along the lines of providing free Internet use. Now, though, limited budgets and the growing need to prepare

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Elijah-Joel Auls, 14, plays a bass line while mixing a music project at the YouMedia Center at the Columbus Metropolitan Library.

Editor's Note: Technology collaboration means choosing the right digital tool, experimenting with new online resources, and opening the classroom to a digital world. In this Spotlight, see how you can dig deeper into your library's digital resources, integrate instruction with your student's devices, and develop out-of-school learning opportunities that connect to the world.

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students for the 21st century have pushed these venerable institutions into new roles. They are teaching technology-driven workshops for middle and high school students, providing hands-on activities for young children, and bringing their best practices into school classrooms and other institutions to share.

"Today's education landscape includes school closings, deficits, layoffs, and the elimination of arts and music programs; it's a desert of opportunities," said Theresa Ramos, the program-development coordinator at the Free Library of Philadelphia. "Libraries, in collaboration with community organizations, have to pick up some of the slack and give kids the opportunity to pursue interest-driven learning."

The Free Library, which has 54 branches in greater Philadelphia, is part of a new cadre of libraries throughout the country that are creating multimedia learning "labs" for middle and high school students, funded by $2.4 million in grants from the John D. and Catherine T. MacArthur Foundation and the Institute for Museum and Library Services.

So far, 24 libraries and museums are using the money to help establish spaces within their institutions for young people to engage in a wide range of activities, such as creating videos and designing websites. Eight libraries started their work in early 2012, and seven others joined them this year. The project is part of a larger effort by both MacArthur and the institute to expand youth offerings within libraries and museums nationally.

The learning-labs concept stems from a MacArthur-funded library project in Chicago called YOUmedia, which provides students access to digital technologies, multimedia workshops and classes, and opportunities for self-driven projects like recording and producing music. YOUmedia is now in five libraries in Chicago and a library in Miami.

"We're seeing real innovation in thinking at public libraries and museums across the country as they create relevant and positive experiences for youth in the out-of-school time space," said Amy Eshleman, the program leader for education at the Urban Libraries Council, a Chicago-based membership organization that is helping implement the Learning Labs project nationally. "This has sparked a reimagining of the role of the public library and museum as critical nodes on youths' network of learning."

The learning-labs grants only underwrite the development component of the projects; however, some libraries and museums had work underway before they received the money. Some of the grantees, like the library in Philadelphia, the Columbus Metropolitan Library in Ohio, and the Carnegie Library in Pittsburgh, have already secured additional grants from other organizations to continue and expand their efforts to other library branches and sustain the work. For some, like Columbus and the San Francisco Public Library, the projects have involved linking arms to nearby cultural institutions for support.

In Columbus, the city library system, which includes 21 branches, applied for a grant in conjunction with four other institutions—a local public radio station, the city science museum, an art museum, and a performing-arts center—collectively called "Surge Columbus: A Creative Circuit for Youth. "

Representatives of the five organizations meet at least twice a month to hash out how they can collaborate to provide more hands-on learning experiences for teenagers and encourage more to use all their resources, said Kathy Shahbodaghi, the director of early-childhood literacy at the Columbus Metropolitan Library.

Hanging and Geeking

But finding more money or partners may be the easier part of the process, some say; designing relevant and engaging programming that teenagers want to voluntarily participate in is a big challenge, especially as technology evolves.

All of the grant-funded learning labs are to be built on research findings indicating that young people's use of digital technology goes through three stages: "hanging out" with friends, such as on Facebook; "messing around" or experimenting with various technologies, such as playing digital games; and "geeking out" to explore specific interests with smaller groups, such as creating a multimedia video or writing a blog.

Some libraries have looked to youths themselves to guide the process, establishing youth advisory councils that make recommendations or surveying participants after workshops to gauge interest in the opportunities they've already provided. Others are figuring out next steps as they go along, observing responses to offerings.

At the Carnegie Library in Pittsburgh, students are provided options to meet different needs and interests. Educators and mentors lead workshops on weekly themes, but students also have independent-study periods where they are able to create their own projects, too.

The mission is not just to provide "fun" activities but opportunities for real learning that can provide teenagers the 21st-century skills they need, such as designing websites or creating videos, said LeeAnn Anna, the teen-services coordinator at the Pittsburgh library.

"After sitting in a classroom for hours every day, the last thing teens want to do when they come into a library after school is sit in another class," she said. "We are really trying to build digital literacy skills in an informal setting by providing something different from a structured class, using their interest as a springboard for engagement."

Although not all libraries are creating learning labs, others are still trying to ramp up their offerings to meet growing public demand, particularly that of younger generations, said Shannon Peterson, the president of the Young Adult Library Services Association, a suborganization of the American Library Association, based in Chicago. But what services to offer and how to implement programming vary greatly library to library and community to community, she said.

Libraries are creating innovative teaching methods, such as having students train other students, and enabling access to library books after hours through book vending machines, much like the RedBox DVD kiosks. They are also providing a growing array of digital resources online for home-access.

A number of libraries, such as the Detroit Public Library, are providing "maker spaces," or opportunities for the public, particularly young people, to create and build things, often using technology. Creations can range from simple crafts or woodworking to high-tech engineering projects or 3-D printing.

School Pairings

Recent findings from the Pew Research Center's Internet & American Life project indicate that young people could be driving much of the demand and interest in 21st-century libraries. The center found 16- to 29-year-olds are more likely than any other age group to see and use libraries for a larger variety of purposes—such as studying, hanging out, or learning new skills—and expect libraries to provide digital resources and opportunities for engagement. Additionally, younger visitors still expect libraries to provide traditional resources and use them regularly; 16- to 17-year-olds were more likely than any other age group to have read a print book in the past year, while adults in their 30s and 40s were the most likely to have read an e-book.

In some places, both the need and interest have inspired local libraries to work harder at building connections with the local schools.

The Institute for Museum and Library Services, for example, has provided $1.7 million to libraries in 2012 alone to help get low-income students reading at grade level, in conjunction with the Campaign for Grade-Level Reading, a collaborative effort of states, or-

ganizations, and schools to improve national reading proficiency.

And in Nashville, Tenn., the mayor's office in 2009 spearheaded an initiative to upgrade the school district's libraries with the help of the city library system. The goal, according to Tricia Bengel, the associate director for collections and technology services at the Nashville Public Library, was to encourage more students to use their school libraries, gain digital literacy skills, and develop long-term relationships with libraries that extend to the city branches.

For the Nashville project, city librarians and additional staff members developed profiles of every district school, taking note of their demographics and any specific features, such as what career academies were housed within a school and whether they had special programs like International Baccalaureate. Then they assessed existing collections, determining how well library materials matched the needs of the students in the school and academic standards for curriculum, including the common-core standards. They found most held outdated or irrelevant books and contained limited digital resources.

"If 95 percent of the student [population] at a school is African-American, Little House on the Prairie is not a relevant book for the library," Ms. Bengel said.

With the city funds, currently amounting to $1.8 million annually, librarians discarded old, irrelevant books and bought new print and audio books. They also purchased laptops and iPads for students to check out and take home. They then helped train school librarians to integrate digital learning opportunities into the school day and enabled access to the city's library collections through a linked database and courier service.

As a result, the district and city have so far seen increased circulation and use at 74 of the 128 schools, with students often checking out resources for use by their families.

Other cities regularly inquire about how they can replicate the model in their communities, Ms. Bengel said.

"The old model for libraries, where we waited for kids, families, and community partners to come to us, is quickly becoming outdated," Ms. Peterson said. "One of the responsibilities of the 21st-century librarian is to reimagine what the library walls are and move outside of them, knowing what's happening in our schools and be able to speak the language of schools."

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Picking the Right Device for the Right Moment

By Benjamin Herold

In Cindy Nguyen's first-period psychology class at Lewisville High School in north-central Texas, digital devices are everywhere: During a recent lesson, 28 students were using 17 school-issued iPads, two student-owned tablets, seven smartphones, and one of the classroom's five MacBook Air laptops.

It's the new face of learning in the rapidly changing Lewisville Independent School District, which is in the process of giving all 53,000 of its students access to "the right device at the right time," part of a so-called "1:X" initiative that began last spring. District officials are currently seeking to trademark the "1:X" name, which is also referred to as "1-to-many."

Ms. Nguyen, a senior at Lewisville High, summed up the changes: "First, they gave us our phones back. Then they gave us iPads. Now, everything is online."

Experts say the 1:X initiative is rare, positioning this district in suburban Dallas as a potential trendsetter in the rapidly changing world of digital K-12 education.

As it is, more than 2,000 schools around the country now provide each student with their own digital device, according to the One to One Institute, a Mason, Mich.-based nonprofit providing support for districts implementing 1-to-1 computing programs. Many more schools employ a variety of digital technologies that may or may not fit together coherently.

But the idea of a coordinated strategy to provide students with access to a variety of devices from which they may choose depending on the task at hand is a potentially powerful new development, said Douglas A. Levin, the executive director of the State Educational Technology Directors Association, or SETDA, based in Glen Burnie, Md.

"In the professional world, the idea of different devices for different jobs is already a normal way of doing business," Mr. Levin said. "It's unrealistic for schools to think there's going to be one killer device that's going to do all things for all types of learners in all subjects."

To date, Lewisville's 1:X initiative has included introduction of a bring-your-own-technology program; the purchase of $19.1 million worth of iPads and laptops; $23 million in districtwide technology-infrastructure upgrades; and extensive training for staff, students, and parents.

Superintendent Stephen F. Waddell said it's all part of a new look at the district's approach to teaching and learning.

"What really matters is the kind of work students are doing," Mr. Waddell said. "We want to see our kids doing work that involves projects, cooperative and collaborative learning, and inquiry, and we believe that utilizing digital resources will help that happen."

Culture Shift

However, the type of learning Mr. Waddell described is not taking root evenly in all classrooms, according to district officials.

The district's new laptops, intended to allow students to do in-depth projects and create multimedia content, have so far not been widely used. And Lewisville's districtwide computing network, now being upgraded, is experiencing growing pains.

There are also questions about the long-term sustainability of an initiative financed in large part by bonds.

But two weeks into the new school year, hundreds of Lewisville students who had just received tablets were already using multiple devices to access and share information and assignments, work in groups, conduct experiments, and prepare presentations.

Though the Lewisville community tends to be conservative, said Lewisville High Principal Jeffrey Kajs, most have embraced the 1:X initiative. "I love the 116 years of how things have been done at this school," Mr. Kajs said. "But I also have three young kids, and I know what their education needs to look like."

Just down the road from Lewisville High stands a water tower emblazoned with a tribute to the school's biggest point of pride: its Fighting Farmers football team, which won the Texas 5A state title in 1993 and 1996.

Football is still king in Lewisville, but the district's student body—now 31 percent poor and 51 percent African-American, Hispanic, Asian, or multiracial—is undergoing a major academic and cultural makeover driven largely by technology.

This year, eight of Lewisville Independent's 65 schools, as well as all district students in the 4th, 7th, 9th, and 10th grades, are involved in the second phase of the 1:X initiative. So far, the district has purchased 19,300 iPads, 3,880 MacBook Airs, and 1,887 MacBook Pros. The goal is to give every student and teacher access to multiple devices by 2016.

Superintendent Waddell said the purchasing is driven by the prominence of mobile computing devices in all walks of life.

"We see highly fluid, highly collaborative work environments that are becoming more and more creative," he said. "We want our kids to be ready for that."

Like many other districts, Lewisville decided that Apple's mobile products were the best fit; a recent survey by Interactive Educational Systems Design Inc., a market-research firm, found that 80 percent of district technology officials used or planned to use iPads in their schools over the next two years.

However, Lewisville officials also recognized that effective implementation of a large-scale device purchase would require dramatic improvements to schools' technology infrastructure.

In little more than a year, the district has added more than 4,500 wireless access points on its 65 campuses, laid 265 miles of copper cable, upgraded its firewalls and filters, improved bandwidth to at least 7GB for all schools, restructured its IT support team, and streamlined the replacement of outdated school computers.

"Those are exactly the types of things districts should be looking at," said Richard Kaestner, a consultant with the Washington-based Consortium for School Networking, or CoSN, a professional association for school system technology leaders.

"When you add all these devices, you need to understand your network capacity, break it down into its component pieces, and figure out where your bottlenecks are likely to be," Mr. Kaestner said.

Also key, said Mr. Waddell, have been efforts to engage parents, community members, and teachers in developing the district's larger strategic plan. The 1:X initiative, he said, "is really rooted in the long conversations we had about the kind of learning we think kids need."

The results are evident in Lewisville High's once-staid library, transformed into a university-like student center. As a steady stream of students line up at the new coffee shop, dozens sit around tables, surrounded by an array of digital devices.

During a recent lunch break, junior Janae Hart read a paperback copy of Slaughterhouse-Five while scanning analyses of the book on her iPad and looking up word definitions on her smartphone.

"Just getting ready for class," she explained.

Taking 'Baby Steps'

While there have been some big changes inside Lewisville's classrooms, the implementation of the new instructional approach that the 1:X initiative is meant to spur is proceeding unevenly.

But one of the bright spots is Rebecca W. Delozier, a nine-year-veteran teacher who has been experimenting with online and "flipped" lessons for years. Ms. Delozier is now in the process of putting her entire biology curriculum on iTunes U, a course-building app for managing digital class content.

During a recent lesson on animal behavior, she used her district-issued iPad, iTunes U, and a digital tool called AirServer to project information for her students onto the classroom smartboard.

In pairs, the students set to work developing infographics about such topics as sexual selection. At one point, 15 students used 11 iPads, two classroom laptops, and six personal smartphones.

Unlike some districts that have bought devices, curricula, and software applications as part of a single bundle, Lewisville Independent expects teachers and students to personalize their devices with the tools they like best.

It's part of a larger philosophy that puts priority on "authentic engagement," said Penny Reddell, the district's associate superintendent for learning and teaching.

"There are a zillion different ways to make learning fun," Ms. Reddell said.

Some teachers, such as Ms. Delozier, were well prepared to take advantage of the new combination of freedom and technology.

A self-described computer geek, Ms. Delozier said she now uses her district-issued tablet to grade almost all student work. If a student chooses to complete an assignment the old-fashioned way, she said, "I'll take pictures of the papers and grade the pictures."

Ms. Delozier appeared unfazed by district-twide network problems early this school year. She helped students shift to laptops when their tablets had difficulty connecting to the Internet and to personal smartphones when they needed to bypass the filters that block access to many sites on district-owned devices.

Confronted with similar network challenges, though, Dawn Chegwidden's environmental science class bogged down. After an extended delay, students ended up using their devices to search for basic information needed to complete paper worksheets.

The Right Device at the Right Time

Officials from the Lewisville Independent School District in suburban Dallas say the goal of their "1:X" initiative is to provide all 53,000 students with access to multiple digital devices, depending on the learning task at hand.

• iPads:
Lewisville so far has purchased 19,300 iPads to be given to students. District officials say the tablets can be used for accessing, organizing, and sharing content, assignments, and files; taking notes; conducting basic research; collaborating with teachers and other students; utilizing a variety of educational apps; and creating multimedia content. District surveys found that teachers believe that 80 percent to 90 percent of the work required of their students can be done on tablets.

• MacBook Airs:
To date, Lewisville has purchased 3,900 MacBook Airs for classroom use. District officials say the laptops can be used to conduct in-depth research; write and edit longer papers and assignments; participate in large group projects; and generate more complex multimedia content. The laptops also guarantee access to technology for students who opt out of receiving their own tablets and serve as backup devices for when the tablets have trouble connecting to the Internet. In practice, the laptops have yet to be fully utilized in most classrooms.

• Smartphones:
Lewisville also permits students to bring their own smartphones and other personal digital devices to school for classroom use. District officials say that smartphones can be used for quick look-ups and other simple research; generating basic multimedia content; receiving alerts and reminders from school staff; and as a back-up for when the district-owned tablets and laptops have trouble accessing the district's network. In practice, personal digital devices are also a way to bypass the district's security filters.

Source: Lewisville Independent School District

"Sometimes, you have to do baby steps," Ms. Chegwidden said.

To help bring teachers along, Lewisville has adopted a "tiered" approach to professional development. All 2,000 school staff members involved in the program have received basic training on how to use the devices. This summer, 665 of those teachers took additional classes on the Mac operating system and iLife software.

In addition, 65 of the district's most advanced teachers volunteered to participate in a seven-day xCamp, led by officials from both Lewisville Independent and Apple, that focused on how to get students creating content with the new devices.

"We find the bright spots, then do a lot of encouraging for them to work with their fellow teachers," Ms. Reddell said.

Flexible Road Map

District officials emphasize that the 1:X initiative will evolve.

Already, the district has tweaked its plans: After extensive classroom walk-throughs and teacher surveys last spring, officials found students were not using the new laptops as extensively as anticipated. In response, the district purchased fewer laptops this year and moved from a classroom-based to a cart-based model for some of its phase-two schools. This will allow for a comparative study to be used to guide decisions at the end of the school year.

Mr. Levin of SETDA said he finds that encouraging.

"Kudos to them if they can step back and say, 'This is a longer-term commitment and vision we have, and we're not getting locked into one approach,'" he said.

Such flexibility is paramount when it comes to paying for 1:X long term, said Mr. Waddell, the Lewisville superintendent.

Bonds have been used to pay for iPads and most infrastructure upgrades, Mr. Waddell said, but money for laptops, training, and support personnel has come from reallocation of existing resources.

District officials, he said, are also positioning themselves to pounce in the event that the Texas legislature provides greater financial incentives for school districts to adopt digital instructional resources.

"There will be a combination of things we do to sustain it," Mr. Waddell said of the 1:X initiative. "We have a road map for that, but we'll change our route as we go."

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STEM Academy's Reach Spans Illinois

By Liana Heitin
Aurora, Ill.

The prestigious Illinois Mathematics and Science Academy, a residential public high school here, serves a small slice of the state's students—650 carefully selected 10th through 12th graders who have demonstrated talent in math and science. However, the school's impact goes well beyond its contained, suburban campus.

The state-funded academy runs a growing number of outreach initiatives, including after-school, summer, and professional-development programs, which school leaders say reach more than 10,000 students across the state every year.

In fact, it now operates three field offices, in Chicago, Belleville, and Rock Island. The offices provide local support to schools administering the outreach programs, and hold workshops and summer programs themselves.

One of IMSA's best-known initiatives is the fusion after-school program, in which top-performing middle school students, mainly in underresourced areas, get a taste for the academy's hands-on approach to math and science.

Given that the Illinois academy's demographics skew heavily Asian and white—with only 14 percent of students from low-income families—IMSA administrators emphasize that a key goal of fusion and other outreach programs is to help make the campus more diverse.

The fusion classes are team taught by one math and one science teacher, who get training and mentoring, as well as a wealth of curricular materials, directly from IMSA.

Through the fusion program, students tend to get their hands dirty, building catapults or making electricity from jam and Jell-O. Math teacher Joe Matuch, from C.F. Simmons said fusion gives him a chance to introduce students to real-world problem-solving, which can be tough to incorporate into the regular school day.

"They learn by experimenting in the sense that they test their ideas and see what happens," he said.

The Illinois Mathematics and Science Academy was established nearly three decades ago as an independent, state-run agency with two legislative charges: to offer a challenging education for students gifted in stem and to "stimulate further excellence for all Illinois schools in mathematics and science." The goal was essentially an economic one—to prepare a workforce of engineers, researchers, and computer programmers that could serve Illinois.

Legislative Charges

The academy relies largely on state aid to support the boarding school and outreach efforts, and received $17.7 million for the previous fiscal year. But it also gets money from private donors, including foundations, businesses, and individuals. A wall of plaques in the lobby shows six-figure-plus grants from the Grainger Foundation, AT&T, and Toyota USA, among others.

In November, YouTube co-founder Steven Chen, an alumnus, donated $1 million to help the academy build an open-space startup incubator, which is intended to bring students and community members together for collaborative entrepreneurialism.

Eric R. Brown, a high school biology teacher from Evanston, Ill., who sits on the board of trustees at IMSA, said the state aid and private gifts serve a larger goal for Illinois.

"Most people who know about IMSA respect and understand that it's not money going toward the gifted, it's money invested in stem education across the state," he said.

To walk into IMSA's main building is to face a slew of evidence that the school is meeting its first charge—providing a challenging education. Presentation posters from the 11th and 12th graders' independent research projects line the walls, describing studies of hyperbaric oxygen therapy and baseball sabermetrics. Schedules read as if pulled from a university coursebook, with classes like Organic Chemistry and Microbes and Disease.

On Wednesdays, the majority of students leave campus to conduct research or intern at places including the Argonne National

Laboratory and the University of Chicago. Some students do their self-led work in a laboratory on the premises, equipped with a $100,000 DNA sequencer and several $30,000 microscopes.

"It's better equipment than people see at 300-level college courses," said Judy Schepler, the school's coordinator of student inquiry and research.

Self-direction and inquiry are at the heart of everything IMSA students do, said Catherine C. Veal, the academy's interim president.

"We promote group work, collaboration, and problem-solving—like the real world," she said. "It's ultimately about [students] helping generate new knowledge, not about understanding knowledge that already exists. ... How do we break kids out of learning and into doing?"

During classes at IMSA, students typically sit at octagonal tables rather than desks, and the rooms do not have a clear front or back.

Jake Akstins, a senior, said students are encouraged to learn on their own and from each other, rather than waiting for the teacher to lead. For Donald Dosch, a biology teacher at IMSA, this kind of instruction is preferable to lecturing, which he said he'd be expected to do at a university.

"Class time is not where I do my best teaching," he said. "It's when students come to my office and we can sit down" with a specific problem and have a discussion.

The fusion after-school program currently serves about 3,000 upper elementary and middle school students each year who've been selected for their talent and motivation. A "professional field services" team, housed in a wing of IMSA, is working to expand the program, and others, to even the state's most remote school communities.

In 2012, the program received national recognition, when Change the Equation, a coalition of business leaders promoting improved stem education, added fusion to its selective database for potential funders. The fusion curriculum and its more than 60 hours of material—based on the Common Core State Standards in math, and a recently developed set of common science standards—are written by dedicated IMSA staff members.

fusion schools pay $800 for the curriculum and teacher training and are responsible for the remaining costs, such as teacher pay, bus transportation, and snacks. Dora Phillips, the academy's director of statewide educator initiatives, estimates those costs total $8,000 per year.

After-School Inquiry

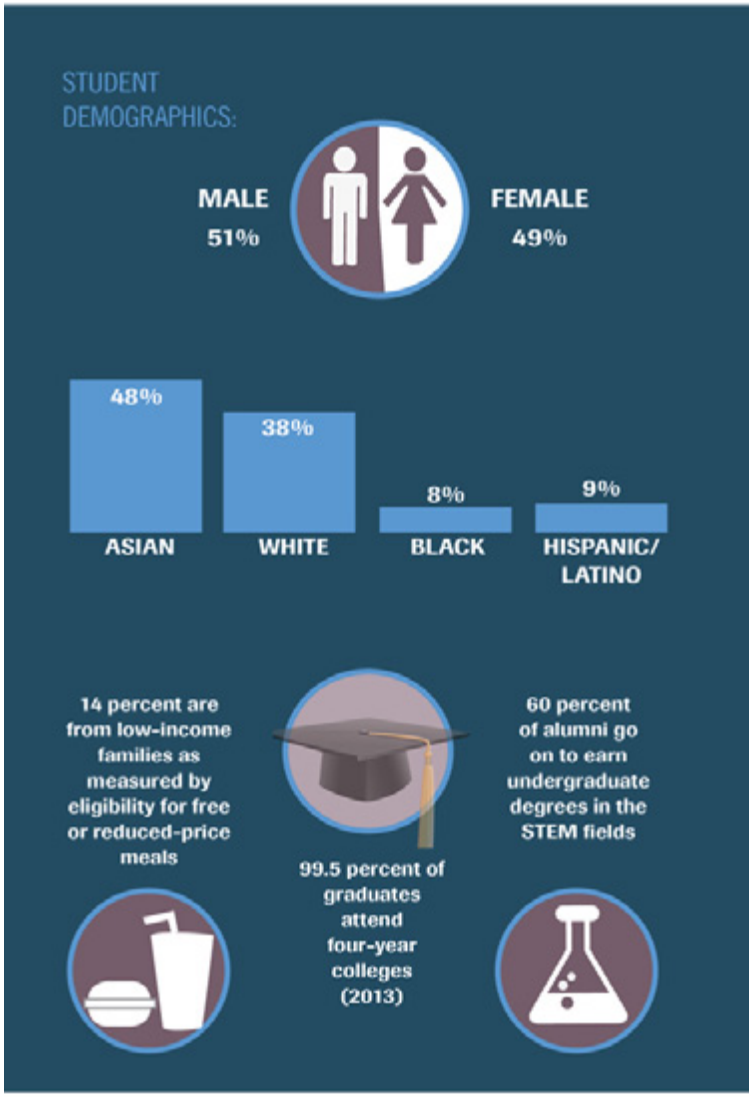
About four miles from IMSA, at C.F. Simmons Middle School, where a quarter of stu-

ILLINOIS MATHEMATICS AND SCIENCE ACADEMY

ENROLLMENT: 650 students

GRADES: 10-12

HISTORY: Founded in 1985 by Gov. James R. Thompson, with help from Leon M. Lederman, a renowned physicist who later became a Nobel Laureate.



LEGAL STATUS: The Illinois academy is technically not a school but a state agency, and therefore does not have to abide by the same regulations as public schools, such as state testing and seat-time requirements.

COST: Lodging, tuition, books, and meals are free, but the academy imposes a yearly student fee on a sliding scale, from $360 up to $2,870 for 2013.

TEACHER QUALIFICATIONS: Every teacher at the school has a master's degree; about half hold a doctorate.

MISSION STATEMENT: "[T]o ignite and nurture creative, ethical, scientific minds that advance the human condition, through a system distinguished by profound questions, collaborative relationships, personalized experiential learning, global networking, generative use of technology, and pioneering outreach.

SOURCES: Illinois Mathematics and Science Academy; *Education Week*

dents are English-language learners and 90 percent come from low-income homes, 25 fusion students stay after school once a week for hands-on stem enrichment lessons.

On a recent winter day, participating students at the school were working on a lesson about "secret communications," learning the basics of computer coding and encryption.

The computer lab where they did the "Caesar's Cipher" activity had no heat that day—in fact, half the school hadn't had any during an historically frigid week—but students were immersed in figuring out the online game and seemed unfazed.

When asked why they participate in fusion, for which they had to apply, several Simmons students said they planned to eventually enroll at IMSA, the state's selective boarding school, which is tuition-free.

In truth, though, the requirements for entering the academy are steep, and only a third of those who have the credentials to apply—impressive sat scores, essays, recommendation letters, and parental support—will be accepted.

Mr. Matuch, the school's fusion math instructor, has been involved with IMSA since he began teaching. While in college, he lived at the academy for summer trainings with the Golden Apple Scholars, a program that prepares Illinois candidates to teach in high-need schools. IMSA faculty periodically worked with the preservice teachers and led seminars.

When Simmons introduced fusion, Mr. Matuch jumped at the chance to work with IMSA again.

"We don't do a lot of experiments here unfortunately," he said. However, with IMSA fusion, he added in an email, "there are many topics, such as cryptography, that I get to teach that I otherwise would not, and it's fun to teach these large units on important, interesting topics."

Fusion students take two field trips to IMSA each year, during which they learn from students at the academy and participate in an experiment—most recently a squid dissection.

The high school students who teach during the fusion field trip are part of another outreach program, known as Allies. Through that peer-teaching program, IMSA students learn how to deliver hands-on stem lessons to children in the younger grades, and hone their leadership and presentation skills. In addition to leading incoming field trips, the Allies act as guest teachers at public schools and teacher professional-development sessions.

Claus von Zastrow, the research director at Change the Equation, said programs like fusion and Allies that promote hands-on learning are of keen interest to the business community. "That's what business leaders want and need—people who are prepared to address real-world challenges," he said.

Mr. von Zastrow also noted that an independent review of the fusion program conducted by WestEd (and paid for by Change the Equation) found that "IMSA fusion students generally took much more advanced, rigorous courses in high school after going through [the program], and were more successful in them," including students from typically disadvantaged backgrounds.

The sheer number of outreach initiatives led by IMSA is striking. Aside from fusion and Allies, there are summer camps, pre-admission programs, science nights, preview days for parents and potential students, individual online mentoring, and workshops for outside students and teachers. Some programs come with a fee, though students can often receive need-based scholarships to attend.

The three IMSA field offices now help the academy administer and provide support for these programs across more Illinois territory.

North Carolina Outreach

The Illinois Math and Science Academy is just one of nearly 100 selective, stem-focused schools around the country that belong to the National Consortium for Specialized Secondary Schools of Mathematics, Science, and Technology. The North Carolina School of Science and Mathematics in Durham is another such residential school that's similar in size and philosophy to IMSA. But the Durham school's outreach efforts look somewhat different.

Melissa Thibault, a vice chancellor at the school, said one of the main ways it reaches students beyond its campus is through video-conferencing classes. Students who live in remote areas without access to certain advanced stem courses can take video classes for free that are taught by the staff at the North Carolina school.

About 550 students take classes this way, and another 200 students who were accepted to the school but are unable live on campus take a full courseload online, she said.

The school works directly with about 1,500 students across the state each year, said Ms. Thibault. The school also provides its integrated stem lessons for free on the state education department's website—a form of outreach not done at IMSA.

"What we do belongs to the state," Ms. Thibault said. "As much as we can make it available, it's our desire to disseminate it as broadly as possible."

Students at all of these specialized schools tend to test well—many take the sat for entry—and nearly all go to college. They receive national awards, win competitions, and publish research in academic journals. But one of the most common ways for the schools to tout their worth is by pointing to accomplished alumni.

At IMSA, educators and students consistently remind visitors that Sam Yagan—the creator of the free dating website OKCupid and now the chief executive officer at Match.com—went to the academy. So did Rob and Mike McCool, who helped start the Internet browser Netscape, and Russel Simmons, who co-founded both PayPal and Yelp.

This pattern of producing alumni who've been successful in digital innovation has not gone unnoticed. Now, school leaders at IMSA are working to capitalize—and improve—on efforts to prepare young entrepreneurs.

Innovation Hub

With the recent $1 million gift from Mr. Chen of YouTube, a 6,400-square-foot "innovation hub" will be built at IMSA. The goal is for entrepreneurs, students within and outside IMSA, faculty members, and the business community to work together on projects, said Ms. Veal, the academy's president. The hub will be modeled after Chicago's 1871, an incubator for digital startups where IMSA students already work.

Ms. Veal views the innovation hub as both a new form of community outreach and a way to take self-directed learning to a new level.

"We're thinking about what the next leap is, and it's the digital learner," she said. "Schools are not structured for that kind of kid."

Mr. Dosch, the science teacher at IMSA, agreed that the hub could be a force for change, but suggested it will require more than just a new space to motivate entrepreneurialism. Students often "have an idea but they tend to not understand what it takes to reach that goal," he said. "They don't know how to get to the end. That's what our job can be here."

Coverage of informal and school-based science education, human-capital management, and multiple-pathways-linked learning is supported by a grant from the Noyce Foundation, at www.noycefdn.org. Education Week retains sole editorial control over the content of this coverage.

Published June 18, 2014, in Education Week Teacher

Award-Winning Educator Taps Technology to Layer Instruction

By Ellen Wexler

One sentence appears on the screen of the video lesson, and then we hear English teacher Diana Neebe read it aloud: "She wasn't petal-open anymore with him."

Neebe, who is narrating the video, tells her students to go ahead and find the passage in their copies of Zora Neale Hurston's Their Eyes Were Watching God. Chapter six, pages 71-72. An audio recording of the passage by actress Ruby Dee begins to play, and the text appears on the screen one sentence at a time. Neebe launches into what she calls a "model think-aloud," highlighting sentences to show her students "what an experienced reader might pick up on in the passage."

"So in this scene we know that Janie is 24 years old and has been married for seven years," Neebe begins when the audio recording of the passage is completed. "And it seems like something happens here that triggers a shift in her, that she's no longer happy…"

Neebe is an English teacher and instructional-technology peer coach at Sacred Heart Preparatory School in Atherton, Calif. In late June, she will receive the Outstanding Young Educator Award at one of the largest ed tech events in the world. Each year the International Society for Technology in Education presents the award to a leader in digital education under 35. Neebe will travel to Atlanta to attend the conference, where she will also give a presentation on professional-development workshops for 1-to-1 learning.

It will be Neebe's 11th conference presentation. Over the last six years, Neebe has spoken about teaching and digital education in Las Vegas, Chicago, Orlando, Fla., San Antonio, Ojai, Calif., Los Angeles, San Diego, and Atherton, Calif. Now, as a result of conversations she had at some of those conferences, she is co-writing a book on teaching in a 1-to-1 classroom.

Real-Time, Nonlinear Instruction

Neebe started teaching at Sacred Heart in 2011—the same year that the school implemented a 1-to-1 iPad program. Teachers began using tools like educational apps, online discussion forums, and wikis. Neebe helped develop the English department's iPad curriculum—which led her to reconceptualize her own instruction.

All of Neebe's students have iPads, which means Neebe has free reign to use digital tools in as many of her lessons and assignments as she chooses. When she teaches writing, she delivers every lecture via video tutorial. Students listen to the lectures at home, at their own pace. If they miss anything, they can pause or rewind the videos.

"In the 'analog' model, students would come to class, I'd lecture about how to write an introduction, or a thesis, or a body paragraph, then students would go home to write, inevitably hitting some writer's block or realizing some underlying confusion," Neebe writes on her website. "Too bad I wasn't there to help!"

Under Neebe's model, students write their essays during class on a shared Google Document, and she can immediately help students who are confused, stalled, or have questions. She can also explore ideas with them.

"My instruction is dynamic and real-time, not linear and prescribed," Neebe writes. "We have had conversations about everything from skills development to race, gender, being the outcast, and how that relates to social power and discrimination … conversations I didn't get to have with students while they were writing at home."

> "There's nothing traditional about how we're doing school these days—and honestly, I wouldn't have it any other way."
>
> **DIANA NEEBE** English teacher and Instructional-technology peer coach, Sacred Heart Preparatory School

Teacher-Cloning

Neebe's students still read at home, but they're not always assigned particular books. Sometimes, they read books they've picked out themselves—and then they update their progress on Goodreads, a social-networking website oriented around books and reading. When Neebe assigns the classics, students typically read the first half of each novel during class time, and the second half at home. "If it's challenging enough to warrant class instruction," she writes, "it's probably challenging enough to read in class."

The most challenging book she assigns is The Scarlet Letter, and last year, Neebe created an interactive iBook to help students struggling with the text. The iBook contains what Neebe calls "video footnotes," which are meant to give context to parts of the novel that are particularly hard to understand. In one of these, for instance, Neebe gives a three-minute overview of American Romanticism. In another, a former art museum guide gives a four-minute overview of light and color patterns in the text.

By prerecording her lecture material, she can teach multiple lessons at once. In a video she made on Sacred Heart's 1-to-1 program, Neebe shows two of her students sitting at desks in her classroom. One of them is speaking to Neebe, while the other sits in the background with headphones on. He is on his iPad, rewatching one of Neebe's lessons.

"I've cloned myself," Neebe says. "It's like every teacher's dream."

As part of her nomination package for the ISTE award, Neebe created another video showing how she uses technology in her lessons. Learning is personal, she says, and teaching in a 1-to-1 environment helps her provide instruction and feedback based on students' individual needs.

"I'm astonished at the change that's possible when powerful tools set us free to create, innovate, and educate," she says. "There's nothing traditional about how we're doing school these days—and honestly, I wouldn't have it any other way."

Windows 8
Customer Solution Case Study

School District Launches 1:1 Tablet Initiative to Enable Skills for a Global Economy

Customer: Chester County School District
Website: www.chester.k12.sc.us
Customer Size: 688 employees and 5,500 students
Country or Region: United States
Industry: Education

Customer Profile
In South Carolina, Chester County School District includes the attendance areas of Chester, Lewisville, and Great Falls and governs 10 elementary schools, nine middle schools, and nine high schools.

Hardware
HP ElitePad 900 Windows-based tablets

Software and Services
- Windows 8
- Microsoft Office 365

For more information about other Microsoft customer successes, please visit: www.microsoft.com/casestudies

"Our Microsoft-based solution supports multi-media and multi-tasking capabilities.... so we can encourage and support different learning styles to keep our students engaged."

Dr. Agnes Slayman, Superintendent, Chester County School District

Chester County School District needed an educational technology platform that fosters 21st century workplace skills. It launched a 1:1 technology program called hiTEC and decided to standardize on the Windows platform. By September 2014, all teachers and high school students will have tablets running Windows 8 and will use Microsoft Office 365 to expand the classroom with anytime, anywhere, collaborative learning experiences.

Chester County School District is a rural area that's home to more than 5,500 students from kindergarten to grade 12. All students and their families benefit from the school district's mission, "A great place to grow, committed to excellence for all students." Expanding on this mission, the district is introducing an exciting new program that will prepare students for the new world of work within the global community.

Called hiTEC (helping integrate Technology, Education and Careers), this 1:1 technology program will deliver a Windows-based tablet into the hands of all high school students by September 2014. By integrating technology into the classroom, the district will equip students with 21st century skills that prepare them for college and career-readiness. "Our goal is to broaden our students' educational experiences and ensure that our graduates are ready to compete in a global economy," says Dr. Agnes Slayman, Superintendent at Chester County School District.

To put hiTEC into action, the district needed an educational technology platform to support engaging, collaborative learning experiences and to

introduce students to the latest business productivity software. Teachers had to be able to use the tools to create dynamic, interactive, globally relevant instruction.

1:1 Computing

Chester County School District decided to go with a Microsoft solution, and in early 2013 began working with Microsoft to launch hiTEC. "Our Microsoft partnership facilitates learning environments where students are empowered to work collaboratively, think critically, problem solve and effectively utilize technologies—critical components of an effective workforce," says Dr. Slayman.

By January 2014, all teachers and many high school students had received an HP ElitePad 900 tablet running the Windows 8 operating system for use at school and at home. By September 2014, all high school students will have their own tablet and 8th grade middle school students will have access to Windows-based tablets at school.

The district also subscribed to Microsoft Office 365 cloud-based business productivity tools. Now students and teachers can use Microsoft OneDrive to store and share files online and Office OneNote to organize their work.

Enabling 21st Century Learning

As teachers integrate technology into their classrooms, their role evolves. "In a 21st century classroom, the teacher is not the only access point to information," says Dr. Slayman. "Within our program, hiTEC, the teacher is empowered to become a facilitator whose lesson plans direct students down individual learning paths."

The district is taking advantage of Microsoft programs to provide professional development for its teachers. The training will boost instructor confidence in using the latest technology to convey content, reinforce new skills and engage students in 21st century learning. "Microsoft Innovative Educator (MIE) trainers were used to enhance the understanding, use and integration of Windows 8 and Office 365 into our classrooms," says Dr. Slayman.

Improving Student Engagement

Within the hiTEC program, students are using technology to take control over their learning and become more engaged in the process. This new educational philosophy is centered on "lifelong learning," where students focus on critical thinking, communication, collaboration, and creativity, and career and technology skills in addition to core subjects.

"We envision our 1:1 computer program as a new approach to teaching that embraces technology-rich lessons that lead students to critical thinking and mastery of content," says Dr. Slayman. "Our Microsoft-based solution supports multi-media and multi-tasking capabilities—touch, keyboard, mouse, digital ink, and voice—so we can encourage and support different learning styles to keep our students engaged."

Anytime, Anywhere Learning

Thanks to hiTEC, students are experiencing firsthand the potential of anytime, anywhere access to information and they are becoming more attuned to learning outside the classroom. "Teachers can create web pages with educational resources for students to access outside of school and collaborate online with their classmates to finish work on their own time," says John Stiver, Director of hiTEC Chester County School District. "This capability reinforces the idea that learning doesn't only happen in school."

And with hiTEC, Chester County School District is eradicating the "digital divide" in the county. To ensure that all students can access the Internet outside of school, the district partnered with TruVista Communications and Comporium to place Wi-Fi hotspots around the county. Students use these hotspots to connect to the Internet through the district's network and work on their assignments.

Better Prepared Graduates

Students at Chester County School District are learning the skills that today's employers demand because they are gaining experience with enterprise-level technologies: tablets running Windows 8 and touch-enabled software, and email and online collaborative services from Office 365. "Our goal is that when students graduate they'll know how to collaborate virtually, access and analyze digital information, and think creatively to solve problems," says Stiver.

Fostering Global Awareness

The hiTEC program also fosters global awareness. Thanks to the support of the Envision South Carolina project and a local industry, Springs Creative, this fall students in Chester County will meet virtually with classes in foreign countries, expanding their cultural horizons without leaving the classroom.

"We want our young people to have a global perspective, but exposure to world history and culture is dependent on the use of technology," says Dr. Slayman. "This is an exciting way to prepare them for future workspaces without walls."

Document published June 2014

Microsoft

Published April 4, 2014, in Education Week Finding Common Ground Blog

COMMENTARY

Fighting Teacher Isolation With Technology

By Jennie Magiera

Our students' everyday lives include plenty of opportunities to learn from peers. Group projects, seating arrangements, and class discussions push our students to interact and learn from those around them—like it or not.

But what about teachers? It's easy for us to become isolated in our classrooms. Many of us engage in professional learning communities to learn from colleagues and push ourselves to improve. But crowded schedules can make it difficult to schedule face-to-face meetings—and sometimes, it's difficult to find a PLC to meet our goals and current needs.

So what else can a busy teacher do? Build your own professional learning network and/or use virtual tools to facilitate your PLC's work, of course! This may seem like a daunting task, but fear not. Instead, check out these four free platforms and tools that can help you jumpstart your own professional learning.

Twitter

Twitter is a great solution for the on-the-go educator who needs updates in bite-sized servings. Twitter allows for info-sharing and collaboration in 140 characters or less. It can seem overwhelming at first...how can you streamline information, clearly delineate your PLCs and PLNs, and organize colleagues you follow? Hashtags and lists to the rescue!

A hashtag is a pound sign (#) in front of a word or phrase (no spaces!) that signifies a topic. You can make up your own—but you may want to start by exploring and using hashtags that are more established. For example, if I want to find tweets related to 4th grade education, I can plug #4thChat into my search box. For tweets about iPads, I check out #iPadEd. I can contribute new items to these topics by using hashtags in my own tweets.

Hashtags not only help Twitter users label their tweets with a topic, but they are also used to facilitate live conversations at certain times. For example, every Monday night at 8:00 p.m. ET, #KinderChat has a discussion. At that time, kindergarten educators around the world hop online to talk about teaching, tagging their tweets with #KinderChat. When I search for the #KinderChat hashtag at that time, I can follow (and take part in) the conversation. (Want to learn more? Take a deeper look at hashtags or check out a schedule of regular Twitter chats for educators.)

A list on Twitter is a curated group of users that you follow. You can group people based on your relation to them (family/friends/coworkers) or the topics they regularly tweet about (math/science/educational technology). By using a third-party Twitter program such as TweetDeck or HootSuite, you can view Twitter using multiple columns showing Twitter feeds from each list. For example, you could have a column that includes only tweets by science teachers you follow. This can make it easier to absorb and respond to information, issues, and questions.

Google Hangouts

Many of us use Google for searching, emailing, scheduling, and mapping. But you may not have tried one of Google's most powerful platforms for professional learning: Google Hangouts. At first, Hangouts seem very similar to Skype and FaceTime. All are video-conferencing platforms.... But Google Hangouts offers a myriad of added tools and tricks.

Do you have an educational Google account (an email address issued to you by your educational institution that operates in a Google environment)? If so, up to 15 individuals can join you in the same Hangout. (Even with a personal gmail.com email address, you can invite up to 10 participants.) This makes Hangouts a great venue for virtual meetings.

Additionally, Google Hangouts offers screensharing and productivity tools to leverage during your meetings. Screensharing—the ability to show your computer's screen to other Hangout participants—is especially helpful when supporting a colleague to use a new website or computer program, or when troubleshooting an issue. Productivity tools, such as embedded Google Documents, presentations, or YouTube videos, allow you to drive an entire meeting from your couch—with participants joining in from the neighboring seat cushion or a different continent.

Pinterest

In the past, when a teacher had a great idea, others might only find out about it by visiting his or her classroom, or hearing about it in the teachers' lounge. For example, I remember going to a vertical grade-level meeting in a colleague's classroom and jotting down ideas on the back of my students' homework. Now Pinterest makes it easier than ever to "visit" other teachers' classrooms.

Organized like a set of bulletin boards, Pinterest allows users to "pin" great photos and ideas they find anywhere on the Web. Teachers are taking this site by storm, pinning novel ideas for anchor charts, classroom library set-ups, and even lesson plans. One of the reasons this site becomes so addictive is that it's a visual way to organize information. Pinterest also encourages users to follow one another (much like on Twitter) to see each other's pins and learn from others' discoveries.

CTQ Collaboratory

All of these tools and sites can help to facilitate collaboration amongst a PLC or PLN, but none are overtly designed for teachers to connect with and learn from one another. The Center for Teaching Quality's Collaboratory, on the other hand, was built from the ground up as a virtual community for educators. This platform unites teachers from around the globe to discuss, learn about, and collaborate on a wide range of issues in education. Topics include everything from tips for changing grade levels to big-picture questions like whether traditional grading patterns are harmful to students.

(*Editors' Note: Education Week Teacher* partners with the Center for Teaching Quality to publish a regular column by teachers

who are part of the CTQ Collaboratory, formerly the Teacher Leaders Network.)

The site offers a searchable member directory, member profiles, and a "suggested connections" feature to help you find others, as well as tools for communication and collaboration (including group chat, wikis, and more).

Moreover, you can join "Content Labs" (smaller communities) for mentorship and support in key areas. Many teachers hunger for support and struggle to find it in our own buildings—it can be easy to feel lost or alone. These labs can expand your network of professional mentors, supporters, and cheerleaders. (Some people use online dating sites to meet others beyond their immediate circles. Similarly, teachers can leverage online networking sites like the CTQ Collaboratory to meet like-minded colleagues to push their practice.)

So How Do I Get Started?

Now that your school year is winding down, or your summer is gearing up, this is the perfect time to recharge your batteries and learn new skills. So while sitting on the beach, hop on Twitter and connect with some new colleagues. After an afternoon barbecue, invite your grade-level partners to a Google Hangout to plan for the fall—and share a Pinterest board with them to collect your ideas and inspiration.

Jennie Magiera is the Digital Learning Coordinator for the Academy for Urban School Leadership, a network of 25 Chicago Public Schools. As a member of the CTQ Collaboratory, Apple Distinguished Educator, Google Certified Teacher and CPS' 2012 Tech Innovator of the Year. Jennie works to redefine education through digital learning. She explores how to leverage 1:1 devices such as Chromebooks and iPads to increase student metacognition, collaboration and creativity. You can follow Jennie on Twitter at @MsMagiera.

Published on June 13, 2014, in Education Week's Finding Common Ground Blog

COMMENTARY

Project-Based Learning: Connecting With Your Community

By Mike Arsenault

It's the time of year when students around the country are taking high stakes tests. More times than not, those tests are tied to a percentage of teacher and administrator evaluation. That percentage varies by state and can range anywhere from 20 percent to 50 percent. Unfortunately, in our test-based accountability system, teachers and students have very little knowledge of what will appear on the tests, and often receive no effective feedback on where the students did well, and where they need to improve.

Engaging tools surround us, and have the potential to change how we interact with one another, but more importantly, the community at large. Classrooms and learning opportunities within those classrooms are becoming more and more collaborative. Student collaboration typically happens student-to-student, student to teacher, and student to community.

We can't forget the community. The community connections can be local people or anyone in the world with tools like Skype, Google+ Hangouts, email, phone calls and more. The community offers us support, but also can provide students with important insight into what is needed as they enter the workforce. The relationships created between students and the community may even inspire community members to learn from students and become more innovative.

In the last few months I have been fortunate to see some great student presentations of exemplary projects. Frank Harrison Middle School (Yarmouth, ME) was a national finalist in this year's Samsung Solve for Tomorrow contest. As part of this contest we presented our work alongside the other 14 finalists at the SXSWedu conference. As I watched the presentations I noticed that each one included collaboration with outside experts in their community.

A few months later our students were invited to present at the 2014 Maine STEM Ecology Summit. Once again...as I watched other schools present their work I noticed that these projects included partnerships, typically with local universities and colleges.

This year we have placed an emphasis on creating opportunities for our students to work with people outside of the school. This started in December as we took part in the Hour of Code activities. The Hour of Code initiative was started by Code.org and backed by many companies and celebrities. Its focus is to demystify computer science and to create an opportunity for students to gain exposure to writing computer code using online tutorials during Computer Science Education Week. We contacted local companies to request that they share their coders to work with our students as they completed the tutorials. To build excitement for the project several of these professionals visited our Math classrooms the week before Hour of Code and spoke with our students about their jobs and what they did on a day-to-day basis.

The project we completed for the Samsung Solve for Tomorrow contest exploring the effects of an invasive species, the European Green Crab, is having on the Maine coastline was also a great example of students working with outside experts. As we started the project a European Green Crab Summit was scheduled in Maine. Our students went through the list of presenters to learn about their research. We contacted each of the presenters and requested that they meet with our students to help them with their work. As our group worked on the project they were connected with: three university professors doing cutting edge research, our town manager and the president of the Maine Clammers Association.

After seeing the great presentations at the 2014 Maine STEM Ecology Summit I tweeted how impressed I was with them. I

received a reply asking: "Rural schools have a difficult time doing this and being a part of programs...advice?"

My advice to teachers looking to add external partnerships within their schools is simple... ask for help.

Most people in industry and higher education are excited about what they do and enjoy sharing their expertise with K-12 students. When you ask have a good idea of what you want from your partners. People are much more willing to help you if they have a clear idea of your expectations.

Teachers must also be willing to meet with these individuals at a place where they are comfortable. In our experience with the European Green Crab project our students met with some of our external partners face to face. Other partners due to distances away from our school were not willing to travel to work with our students. We used tools like Skype, Google+ Hangouts and simple audio only phone calls depending on the tech savviness of each partner. These people are helping you so you must be accommodating to their needs.

Connecting students with outside experts can create a much more powerful and real learning experience for your students. Experts in the field bring their experiences to our students in ways most classroom teachers cannot. That connection to a unit of study will increase student engagement and make the learning much more long lasting. It takes time to cultivate these connections but the time is well worth it.

Mike Arsenault is the Instructional Technology Integrator at Frank H. Harrison Middle School in Yarmouth, Maine.

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1:X Initiative
http://www.lisd.net/apps/pages/index.jsp?uREC_ID=225712&type=d
Lewisville Independent School District'

21st Century Libraries Initiative
http://www.21stcenturylibraries.org/

Center for Teaching Quality
http://teachingquality.org/collaboratory

Code.org
http://code.org/

STEMworks
http://changetheequation.org/stemworks

YOUmedia
http://youmediachicago.org/

Younger Americans and Public Libraries
http://www.pewinternet.org/2014/09/10/younger-americans-and-public-libraries/
Kathryn Zickuhr, Lee Rainie
Pew Research Internet Project, September 2014

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