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Why this STEM course has four teachers 44

# eSCHOOL NEWS

Technology News & Innovation in K-12 Education

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## Involve students in your PD

If you're not including students, you're missing a key opportunity

By Alan November

Whenever I'm invited to a school or district to talk with teachers about using technology, I'll ask the principal or superintendent if I can meet with a group of students to prepare first. Often, my request is met with a puzzled reply: "You realize that we want you to come talk to our *teachers*, right? Why do you want to talk to the kids?" My experience is that involving students in both staff development planning and during workshops can lead to a much more successful implementation.



In some schools, third-graders teach PD workshops.

Showing teachers how to use the technology itself—what buttons to push, what features to PD, page 34

## How iOS 9.3 will impact schools

By Bridget McCrea

In March, Apple upgraded the iPad and iPhone operating system to iOS 9.3 (quickly followed by iOS 9.3.1, which tweaked a few bugs). The lead up to the release caught the eye of the K-12 community, which had been waiting for a few tweaks of their own that would help it



iOS, page 16

## What makes a good data dashboard?

Educators share delights and frustrations

By Dennis Pierce

When Amber Teamann was a teacher in Garland, Texas, seven years ago, her use of data to help guide her instruction was fairly limited.

"Based on the programs I was using, I could evaluate how to differentiate instruction for my students," she said. But tracking how well her students were meeting specific grade-level standards at any moment during the year wasn't an option for her at that time, nor was looking at larger trends until after the school year had ended.

Data "was something you would use as an autopsy when everything was over," she said.

A lot has changed since then. Now, as the

Dashboard, page 40

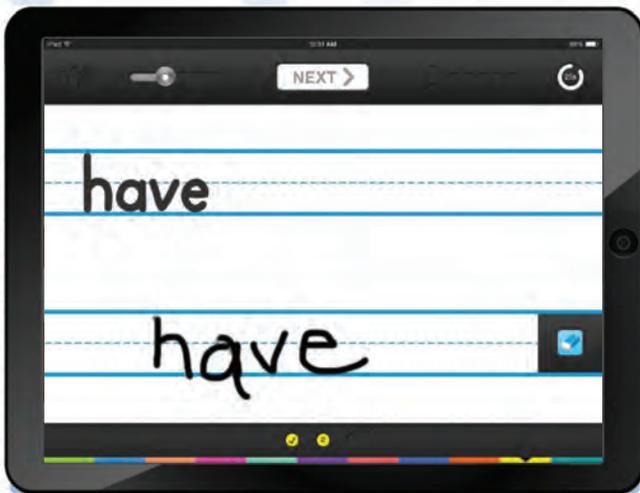
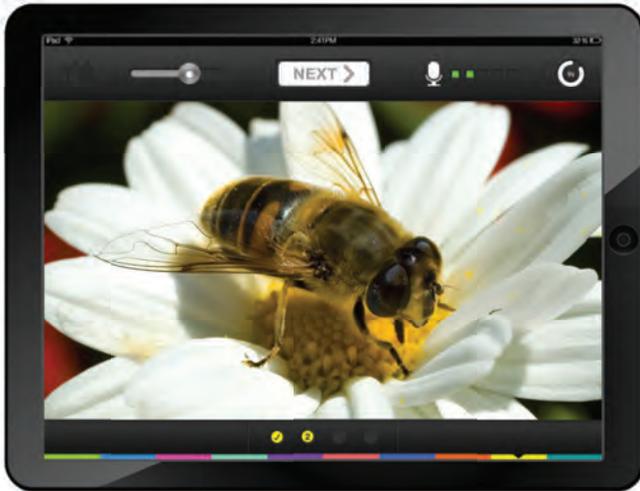


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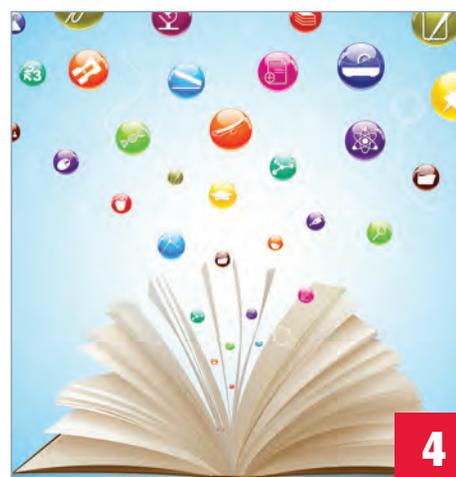
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# Reading Rainbow is closing the reading gap

Public-private partnerships are expanding Reading Rainbow's impact for a new generation

By LeVar Burton

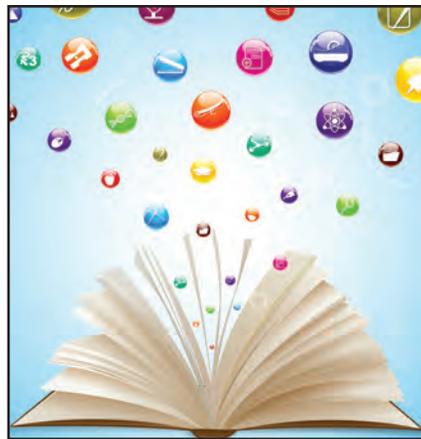
No doubt the definition of literacy is evolving in the 21st century. Not only do we want our children to be fluent readers, but we also need them to be able to think critically about the information they receive and communicate their thoughts, ideas, and opinions in an effective form. This is no easy task, considering the reading gap continues to widen between lower and higher income students and the majority of our children do not read past a fourth-grade reading level.

There are many innovative reading programs being implemented across this country. Interestingly, a number of these programs are being developed not by traditional educational publishers, but rather by ed-tech startups and/or new partnerships between public and private institutions.

I learned early on in my career that the power of public private partnerships can be incredible when used for social good. I believe we can narrow the reading gap by extending literacy programs outside the four walls of the classroom and moving away from standard teaching tools. It was one of the main reasons that I joined Reading Rainbow as the host and producer more than 30 years ago.

I often describe how in its day the idea of using television to get children reading was considered "crazy" and experts questioned how this would encourage kids to read books. Initially the show was launched as an experiment, a summer pilot, to address the "summer slide" in which student's lose important reading skills when they are not in school. Yet Reading Rainbow quickly proved to be more than a summer program and instantly captured young audiences' attention and motivated children to read. Its impact has been long and far-reaching. Every day we receive heartfelt stories from those who grew up watching the series describing how the show had a long-lasting positive impact on their lives in one way or another.

Reading Rainbow influenced these viewers not only to read but to explore various career paths and creative endeavors. This is such a great example of the impact corporate sponsors, public organizations, and educational institutions can make when they work together to provide engaging resources to children of all economic backgrounds. Now, decades later, my Reading Rainbow team and I are still working



New partnerships are going digital.

hard to innovate and inspire a new generation of children to read.

In fact, earlier this year, we embarked on a pilot program with the University of Southern California (USC) and their JEP House, which stands for the Joint Education Project. JEP is one of the oldest and largest service-learning programs in the country, offering college students at USC the unique opportunity to work with faculty, neighborhood schools, and elementary school students to provide academic support. One of JEP's programs is known as USC ReadersPlus, which mobilizes work-study students to provide one-on-one reading and math instruction to K-6 students in nearby Title 1 schools. It has been incredibly successful over the years and warmly embraced by educators and students in their community.

Through a new partnership, we are excited to support USC mentors by giv-

ing them access to Reading Rainbow Skybrary School, our new digital library specifically designed for K-3 educators and their students. This powerful multimedia resource provides hundreds of books, video field trips, and educator-created lesson plans on demand. Armed with laptops and the Skybrary School reading service, USC mentors meet multiple times a week to read one-on-one with their young students. Not only are mentors and students reading and discussing books from the digital library, but they are also absorbing other media resources and completing offline activities for deeper learning on topics.

Teaching someone to read can be intimidating for untrained college students. However, with easy-to-use technology-based resources like Skybrary School, mentors can quickly and easily engage students in reading, and effectively build a range of literacy and learning skills. Tutors then focus on what they do best, forming a trusted relationship with their young students and personalizing the experience to address the child's specific learning needs.

Although our project with USC is still in its early phases, we are beginning to observe how these "at-risk" students, who had limited access to quality children's literature, are discovering books that interest them. Our belief is that together, with the university and the participating elementary schools, we will be able to increase students' reading time and support the topics they are learning in the classroom.

Narrowing the reading gap will most certainly require a commitment from public and private organizations to collaborate in new ways. We are excited to continue to experiment, observe, and most important, partner with other organizations with similar missions. 

*LeVar Burton is an actor, producer of Reading Rainbow, and an education advocate.*



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# Two apps, endless possibilities

AppSmash these apps and create books that come to life

*AppSmashing*—the process of combining multiple apps to create new multimedia content—encourages more creative use of mobile devices and allows teachers to gain insights into student thinking and understanding. When students make their thinking visible through multimedia creation, they practice critical thinking and communication skills and demonstrate understanding of curriculum content.

Evergreen Apps are non-subject specific apps that can be used in a wide range of classrooms across varied grade levels and disciplines. An Evergreen App enables communication and expression in multiple ways, such as through handwriting, typing, audio, video, and animation. An effective Evergreen App is not only flexible, it's also intuitive. It's the type of app that students can use quickly and easily.

This series of articles will provide opportunities to AppSmash with different media, such as audio, video, and images, as well as multimedia presentations, green-screen technology, stop-action animation, and more. The articles will focus on the ability of students to create multimedia content that showcases their learning through a performance or demonstration of understanding.

## Two apps, many possibilities

Powerful Evergreen Apps strike a great balance between flexibility and ease of use, and **Book Creator** is deservedly recognized as one of the most versatile Evergreen Apps.

For use with an iPad as well as Android, and Windows devices, Book Creator facilitates the creation of multimedia books, reports, stories, and many other variations of written, visual, and audio communication. With Book Creator, students and teachers can easily



Tom Daccord

incorporate handwriting, typing, shapes, voice, music, interactive images, and video. For instance, with Book Creator, students can record their voice directly into a page and, for instance, comment on the images, shapes, audio, or video on that particular page. Students can also

insert video directly into a page and turn text and images into hyperlinks to Web content. The finished project can be exported and shared and students could combine their books.

But while Book Creator has a wonderful array of built-in tools, it cannot facilitate all creative multimedia possibilities by itself. Yet, one can easily smash content from other apps into a Book Creator project. One of the more popular apps to smash with Book Creator is Tellagami.

Compatible with iPhone, iPad, and iPod Touch, Tellagami enables students to create speaking avatars. In Tellagami, you begin by selecting a male or female character and move through a range of customization options, changing his or her clothing, facial expression, size, skin tone, and more. A student can then add her a voice to the character—for up to 30 seconds in the free version. Students can create any number of “Gamis”—those short audio-visual messages—and each Gami can be saved on the iPad and later uploaded into another app or otherwise exported.

Importantly, a student can add almost any background image for the speaking avatar. Tellagami provides free background images, but any image that resides on the iPad in use can be pulled into Tellagami. (Students and teachers can save images directly from the web onto their iPad.) So, for instance, a student could create a Gami with a background picture of a historic site and talk about that site.

In another example, a student might incorporate an image from a market scene and describe what is sold at a market using varied descriptive adjectives. The student might incorporate an image from a park or office and describe the surroundings.

A Tellagami speaking avatar can be moved and resized by simply pinching the avatar or moving your finger around the screen. In one clever use of Tellagami and Book Creator, students worked in pairs to develop a book where an avatar on one page was facing in the opposite direction—as if they were speaking to someone on the opposite page. Both avatars had the same background image, so it appeared as if they were in the exact same place and engaging in a conversation. As one flips the pages of the book, the avatars are positioned in different background images and the result is an extended story about their interactions.

Multiple students might also each create a Gami of a different historic site and then all Gamis could be smashed into a single Book Creator project for a class presentation on, say, the ancient world. (Though workflow scenarios differ, students and teachers might use a web-storage platform like Google Drive or Dropbox to share content, or use AirDrop on an iPad.) In science class, students might use Tellagami and Book Creator to create a presentation on animals or flora and fauna. Students in math class might use Tellagami and Book Creator to create a presentation on geometric shapes found in architecture.

In all, appsmashing Tellagami and Book Creator is a strategy to enhance the creative possibilities of a single Evergreen App and simultaneously enable students to express what they know in different ways. 

*Tom Daccord is director of EdTechTeacher, a professional learning organization.*



 Carrie Schiel, M.S., CCC-SLP  
Speech-Language Pathologist, Schools

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# Why Google Vault is an essential tool

Google Vault can help GAFE districts search and retain important data



Vault can assist with data recovery.

## By John Sowash

Ever get nostalgic for the simpler days, where the most subversive ways students could communicate was via bathroom graffiti and passing notes in class? These days, those almost quaint forms of communication have given way to dozens of forms of electronic message passing that can be used for good—and bad.

The real question is whether your district has a good grasp on the communications flowing through your network. As schools have migrated their systems and services to the web, maintaining good oversight and archiving control over district communication has become more challenging and much more important.

Does your district have a plan in place for dealing with a worst-case scenario, such as a lawsuit or questions from police or the media? How do you investigate issues of cyber bullying, sexting, staff impropriety, and fulfill freedom of information (FOIA) requests? While no one wants to think about these things, not having a plan can be costly.

More than 50 million teachers and students are using Google Apps for Education (GAFE) across the globe. As GAFE has gained in popularity, Google has sought to enhance its platform with additional tools and services outside of web-based wonders such as Gmail, Drive, and Google Calendar. One of the

most undervalued tools in this arsenal is Google Vault.

Google Vault (formerly Postini) is an archiving and e-discovery system that integrates with Gmail, Hangouts, and Google Drive, allowing a district to retain, archive, search, and export critical data. Such capabilities are essential if districts are to be in compliance with the Freedom of Information Act. Google Apps for Education districts receive access to Google Vault for free.

Google Vault can be quickly configured by a Google domain admin (there's a configuration guide online). The most challenging aspect of the configuration is verifying your district's data retention policy. This policy varies by state, ranging from a set period of time (typically three-to-five years) or policy delegation to the local board. For help in determining your state's policy, refer to the National Freedom of Information Coalition.

Google Apps Vault is integrated with Email (Gmail), Hangouts, and Google Drive.

	Retain	Hold	Search & export
Email	Yes	Yes	Yes
Hangouts & Google Talk	Yes	Yes	Yes
Google Drive	No	No	Yes

A complete explanation of supported features is available on the Apps Vault support page. Once configured, Google Vault can serve a variety of purposes:

## Freedom of Information Requests

Google Vault can be used to fulfill FOIA requests, allowing the searching of archived data for the entire district or individual user(s). Data is securely stored and cannot be removed by a user. Discovery is completed through the use of a simple search interface, similar to a Google search, making it possible to search for information based on user,

keyword, or date. Information can be saved for internal review or exported to be handed over to an external party.

## Internal investigation

Google Vault provides transparent access into the account of any user within the Google Apps organization. In the event that a user attempts to destroy incriminating evidence prior to the start of an investigation, Google Vault will still retain copies of all emails and chat conversations even if they have been purged from the user account. Additionally, Google Drive data can be searched and reviewed. One caveat: Drive data is not archived and only files remaining in the user's account will be available for review.

## Data recovery

Google Vault can also be used to recover lost email data. In the event that a user experiences a complete loss of email, content can be exported and re-populated into the user's email account.

Google Vault makes monitoring dis-

trict communication much easier than figuring out who wrote on the bathroom walls. Whether Vault is your primary or secondary backup solution, it is an essential tool for helping district administrators keep staff and students safe and secure and to ensure compliance with state and federal regulations. 

*John Sowash is a Google Certified Trainer and administrator who helps schools use technology in meaningful ways. You can connect with John via his blog ([www.electriceducator.com](http://www.electriceducator.com)) or Twitter @jrsowash.*

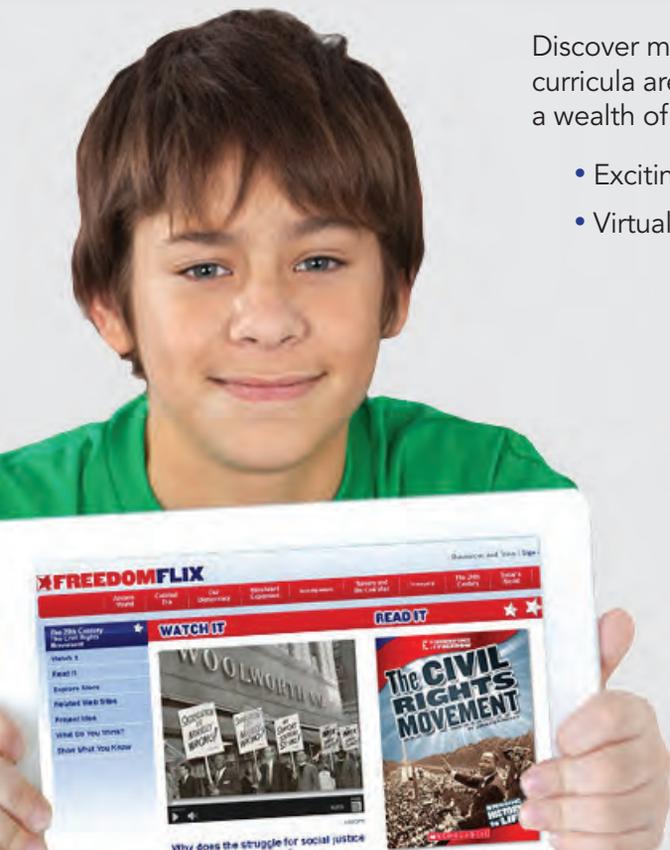
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# How to turn your classroom into a hotbed of creativity and innovation

By Mark Gura

Establishing a classroom that guides and supports students in developing their abilities to innovate and create is not often covered in teacher education or in-service professional development.

Nor does learning about creativity or the skills that are drawn on in the creative act figure strongly in commonly implemented curricula or standards.

On the other hand, our society looks to innovation and creativity as essential avenues that will contribute to its future prosperity and well being. Our policymakers, including those who shape school and education, allude to them often, and the public agrees strongly.

True, vestiges of arts education remain in some schools. But while the arts are closely associated with the notion of student creativity, they cover many other things and hardly fill this gap. Further, it's essential that student creativity and innovation be integrated across the curriculum. We need creative and innovative souls in the STEM, communications, and business areas, as well as in the arts.

Clearly there's a crucial disconnect. But there's good news. Being creative and innovative is a natural part of being human. And while schools commonly ignore it in favor of developing other aspects of thinking and learning, avoiding the looming creativity crisis is eminently do-able. Importantly, our society's shift toward a technology-dominant workplace and intellectual environment also offers answers to satisfying this unmet need.

## Fostering creativity and innovation

Moving into a style of teaching that fosters creativity and innovation need not seem like an overwhelmingly out of reach destination for teachers who haven't begun that journey. It can and should integrate nicely with the rest of what's taught and learned in school. After all, the figures we want to hold up to our students as examples and models

of creative thinking and behavior are participants in the world, not outsiders.

## Next page: The basics of shifting classroom culture

What needs to be established is a shift in classroom culture, in attitudes and understandings, in habits of mind and work. Teachers can begin by establishing classroom values and rituals that support this variety of thinking and learning—by adopting and intelligently using some appropriate, supportive resources—and by engaging students in some simple activities that align well with the rest of what they do.

## Creative classroom basics

Some understandings and easy actions for transforming classrooms into creativity and innovation hot houses include:

- Our schools train students to see the goal of intellectual focus as arriving at a single, correct answer. And yes, in our daily lives that can be what's called for. It is the promotion of this orientation, though, as the exclusive variety of desired solution that is the cause of serious learning imbalance.
- In planning educational activities, the inclusion of student responses that are open-ended, that result in the production of multiple possible responses that differ among students reflecting their imagination, taste, and fancy, is crucial. Digital resources, such as word processing, that facilitate saving numerous versions and that allow for their creators to quickly plug them in as solutions in a variety of contexts, greatly enable this.
- Similarly, an attitude of acceptance of a variety of responses, one's own and those of peers, should be inculcated. Digital content, including student work, allows for this as it is easily captured, combined, and shared in forms dictated by teaching and learning.
- Public sharing of work is important. But with a difference from the tradi-



Feedback can enhance creativity.

tional use of classroom bulletin boards. Rather than exclusively reflecting teacher's decision about what's best and why, in the creative classroom, all students present their work to the community through a digital platform. This could be a classroom drive or blog or a virtual space that allows for public display, peer comments, and multiple drafts as students absorb feedback and revise their work in a continuum of versions—a hallmark of creative process. The social character of group work resources (wikis, blogs, Edmodo, Google docs) supports the establishment of community, an essential element of initiating young people into the collaborative nature. It mirrors the ways they'll likely be creative during the course of their professional lives.

- Creativity in our current world involves not only that mysterious conjuring up of something (significant) from nothing, but involves the responsible, selective curation and re-combination of bits and pieces of the work of those who've gone before. In that respect, resources like Google Image Search, Screen Capture, and the types of "Digital Canvas" represented by PIXIE, Buncee, and even Microsoft Word (if used insightfully as a platform for combining a variety of elements creatively) help re-establish the

**Creativity, page 43**

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## How to create true flexible learning spaces

By Peter West  
and Jamie Dorrington

Teachers who are moving to a blended learning paradigm soon realize that their traditional physical classrooms need modification. In most cases, traditional furniture in a traditional room with a whiteboard at the front doesn't support any of the blended learning models.

This can produce a loss of momentum and enthusiasm as the teacher struggles to find a solution. Teachers who are implementing blended learning have to mark time, get frustrated, or attempt to get by with what is available while flexible learning spaces are designed and built.

### 1. Understanding that blended learning requires modified physical spaces

- a. There are a number of blended learning models. A traditional classroom layout, with the teacher at the front of the room and student desks arranged in rows, doesn't really support these.
- b. While student desks can be rearranged in a traditional classroom, more flexibility and space is often needed.
- c. Even when student desks can be rearranged, traditional desks may not be the best option. Providing alternatives may be necessary.
- d. The new spaces can be created by:
  1. Reshaping and refurnishing (this is the least costly option but don't underestimate the cost of suitable furniture.)
  2. Renovating (heed the warning from people who have renovated their homes—you never know what you will find.)
  3. Building new spaces (the ideal solution despite the disruption and cost).

### 2. Understanding that flexible learning spaces (FLS) need to be built before blended learning is implemented.

- a. Leadership needs to recognize that flexible learning spaces need to be



Blended learning requires more flexible school furniture and floorplans.

- created while developing other components of blended learning.
- b. Ideally, the spaces should be built ready for use once the move to blended learning has started.
- c. Waiting until staff begin implementing blended learning before changing existing physical spaces or creating new flexible learning spaces can create problems. It can create frustration for staff who have put significant time and effort into creating resources to support blended learning, and who have invested time into professional development.
- d. Just because you create the spaces does not mean they will be used effectively for blended learning. However, if you don't build them, you are giving staff an excuse for not making progress. The spaces are just one part of the move to blended learning. Extensive support and professional development are also required.

### 3. Financial commitment

- a. Creating flexible learning spaces to support blended learning costs money. The amount of money varies as noted above, but it must be sufficient to confirm to staff that the leadership is really committed to change.
- b. In other words, is the organization prepared to put their money where its mouth is?

### 4. Design support

- a. Developing these types of spaces should not be ad hoc.
- b. There is research available in this area. It should be used.
  1. ArchitectureAU showcases innovative designs: [www.architectureau.com](http://www.architectureau.com).
- c. There are organizations that specialize in designing these spaces. Finding the right architects and specialist suppliers enhances the probability of success. Visits to schools or universities that have started down this path are useful.

### 5. Professional development

- a. Staff should be supported in the transition to using these types of spaces.
- b. Having professional development on the effective implementation of blended learning using flexible learning spaces is vital.
- c. Find specialists who can model the use of these spaces. (There are some useful courses online that highlight schools and individuals who are successful in this area.) 

*Peter West is director of eLearning at Saint Stephen's College in Australia. Jamie Dorrington is headmaster of Saint Stephen's College.*

# When will assessments test deeper learning?

Technology lets assessments focus on more than just multiple-choice

**By Stuart Kahl**

When we imagine the future of assessment, it's easy to envision all sorts of impressive ways to help gauge what students know and what they can do. Gaming and simulations, especially, create all kinds of possibilities.

But the major focus of assessment technology in recent years, of course, has been on efficiency of test delivery and administration—with little true innovation making it to students' test booklets or computer screens.

Eighteen years ago, Black and Wiliam of King's College, London, told the world of the remarkable academic gains that can be accomplished by the effective use of the multi-step instructional process called "formative assessment." Unfortunately, the term came to mean "frequent testing" to many. Because timing of the evidence-gathering step (during instruction) and immediacy of feedback are important to the process, online delivery of multiple-choice tests is what many chose to do in the name of "formative assessment."

Research indicating that rich, descriptive feedback (not number of correct multiple-choice responses) is the most effective for formative purposes was largely ignored, as were other steps in the larger process. Fortunately, professional development specialists who understand the value of the full process are providing training and tools for true formative assessment.

## The call for performance assessments

The No Child Left Behind Act (NCLB) required high-stakes testing at many grades and quick turnaround of results to accommodate parental choice decisions. To meet those requirements, and to save money, many states reduced or discontinued their use of non-multiple-choice formats, such as constructed-response questions and more extended performance tasks, which are expensive

and take time to score. Efficiencies of time and cost ruled the day.

The result is that, for many students and teachers, their only experience with assessment has been during the NCLB era. And with increasingly higher stakes associated with state test results, it isn't surprising that teachers use tests that



Tech-enhanced items hold promise.

emulate the state tests in their classrooms. Is it any wonder there are concerns about students' lack of higher-order thinking skills and the ability to apply foundational knowledge and skills to more complex real-world problems?

Today's business leaders and policy makers frequently call for deeper learning and college and career readiness in students, and the Common Core State Standards do the same. The federally-funded Partnership for Assessment of Readiness for College and Careers (PARCC) and Smarter Balanced consortia are assessing student achievement relative to those higher standards.

The Smarter Balanced and PARCC assessment consortia are both beginning to use test questions known as technology-enhanced items (TEIs). These are questions that use student-computer interactions such as drag-and-drop, hot spots, and matching for responses that can be scored by computer and can address standards of greater complexity and depth of knowledge than traditional item types. TEIs hold a lot of promise.

Yet writing them is not easy. Some so-called TEIs fail to measure anything more than can already be measured by existing multiple-choice items. For example, asking a student to drag a car image to a location on a hill where it has the greatest potential energy measures nothing more than an item asking students to pick the one graphic out of four that shows the correct spot on a hill where a car has the greatest potential energy. However, many of the consortia's TEIs avoid this pitfall. They're creative and effective and do indeed advance the field of testing.

Initially, the next generation assessments of both PARCC and Smarter Balanced had planned to make extensive use of extended performance assessments—which require students to perform some sort of task. However, both consortia have scaled back their plans because of concerns about feasibility, security, efficiency, and psychometric quality. PARCC chose not to count through-course performance assessments administered at different points during the school year. Early on, the Smarter Balanced working group on performance assessment envisioned multi-day, project-like activities, some of which could involve group work. But Smarter Balanced reduced the scope of its performance component to more traditional on-demand tasks that can be administered in back-to-back periods.

Thus, the primary focus of NCLB-era testing—both high-stakes accountability testing and school/classroom-based testing—has been on foundational knowledge and skills. Most testing has not effectively engaged students in the kinds of activities that would tap deeper learning and support the broader goals of education.

## What schools can start doing

Fortunately, performance assessment, neglected for some time, is on the

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# 13 apps that promote higher-order thinking

These mobile apps go way beyond games

By Lisa Rodriguez

Mobile devices are becoming increasingly common in schools because they cost so much less than computers—and because so many students are willing to bring their own devices to school.

While mobile devices, tablets in particular, have been commonly used to reinforce math and reading skills through the use of games, they can also be used to promote the development of higher-level skills and knowledge included in the National Educational Technology Standards for Students (NETS\*S): creativity and innovation; communication and collaboration; research and information fluency; and critical thinking and problem solving. Here are a handful of high-quality apps that reinforce these skills and promote others.

## Writing skills

Students who resist typical writing instruction with pencil and paper may blossom as authors when given the opportunity to compose electronically on computers and tablets. Some that struggle with the fine motor skills necessary for producing legible print are liberated by the ability to type. Although pressing letters on a flat screen without being able to feel them may be awkward for an adult accustomed to typing on a keyboard, students that learn to type on these devices when they're young are likely to be as skilled on them as they are on a traditional keyboard.

Another advantage of having students compose their written work on mobile devices is the ability to save and organize work. The **Noteshelf** app allows users to type on the virtual keyboard or write with a stylus in a wide variety of colors, and includes the ability to highlight in several colors. PDFs can be imported or new documents can be created from scratch.

**Collins Big Cat Books** apps appear to be simple read-aloud picture books

with beautiful animated pictures and sound effects. However, each one has a Read by Myself' option enabling the reader to read aloud and record their voice. Reading buddy activities could involve older students recording themselves so their younger partners can listen to them reading the book at any time. They have a 'Story Creator' feature that has several backgrounds similar to the original story, objects, characters, and speech bubbles that enable students to create their own picture book. This feature makes the C. Collins Big Cat Books apps appropriate for a wide range of grade levels.

## Presentations

The most well-known presentation program is *Powerpoint*, but free apps exist that are easy to use on mobile devices. One of these apps is **Haiku Deck**, which can also be accessed on computers. Students can create attractive slideshows for research reports, persuasive speeches, poetry, or other written work and present them to the class with their own narration.

## Research

Mobile devices make it possible for students to have an almost infinite number of research sources available right at their desks. Safe search engines designed for K-12 students are available such as **Kidtopia**, which has content area buttons to help focus research. Many other safe search engines and research websites can be accessed at [symbaloo.com/mix/searchjr](http://symbaloo.com/mix/searchjr). Notability allows students to make notations and highlight PDF files, while **EasyBib** helps students cite their research sources correctly.

## Art, music, & photography

Art, music, and photo apps provide opportunities for students to use mobile devices in constructivist, student-



Devices can reinforce math and reading skills.

tered ways, allowing them to create original products. A camera capable of taking photos and recording video comes standard with most mobile devices. This feature could be utilized in science units in which students take photos of science experiments, plants, insects, or other objects in nature. The recording feature can be used by students to record dramatic skits, musical presentations, interviews, and other creative projects.

The **Autorap** app turns students' voices into raps with melodies of popular rap songs. Students can retell stories, recite poems, or create their own songs without having to sing. They simply read and record into a smartphone or tablet, and even the most hesitant reader's voice is instantly turned into a catchy tune. A link is created to students' creations that can be shared with friends or family members. Other musical apps enable students to create their own tunes with drumbeats, sound effects, digital guitars, and pianos.

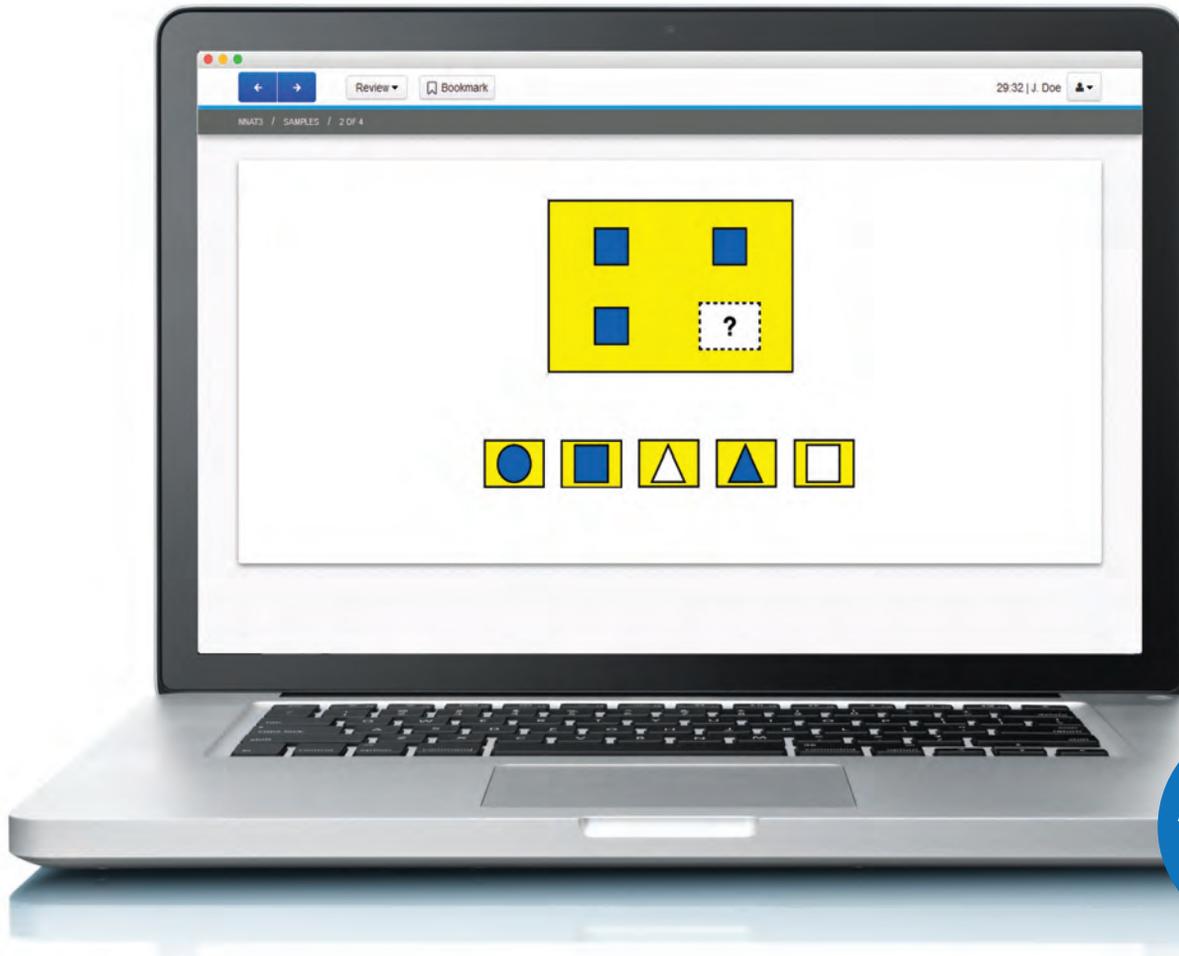
Drawing and painting apps allow students to create artwork or illustrations to accompany their writing. **Drawing Desk** and **Doodle Buddy** have drawing and painting tools, colors, textures, and stamps that are easy for even young students to use.

A search of any famous artist's or musician's name in the app store or at [www.applicious.com](http://www.applicious.com) will result in many apps to enhance a lesson or unit. For example, a search for 'Van Gogh' results in animated storybooks about Van

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## iOS

continued from page 1

better manage both shared and one-to-one iPad implementations. It's only been a couple of weeks since the new operating system hit prime time, but the feedback is already coming in—and it's largely positive.

New features in iOS 9.3, for example, make it easier for IT to set up and manage devices via a new managed home screen layout. This feature allows administrators to deploy iPads configured for students and to select which applications will appear on their device home screens. It might be most useful in shared environments, where more than one student is using a device—but where not all of the apps are relevant for all of those users. Schools can also locate and recover stolen or lost devices via ongoing location tracking that doesn't compromise student privacy.

### Expanded capabilities

Carl Hooker, director of innovation and digital learning at Eanes Independent School District in Austin, Texas, says his 8,000-student district kicked off its one-to-one mobile device implementation in 2012. Devices at Eanes have been upgraded to iOS 9.3, and he's already seeing positive impacts. The new Classroom app (the "teacher's assistant"), for example, lets instructors quickly see what students are working on at any given moment. "We were able to do this before with our mobile device management platform," said Hooker, "but it was never built into the iOS."

With the new operating system, teachers can also use AirPlay to share a specific student's work on a big screen using a projector and Apple TV. "We used to have to ask students to bring their iPads up to the front of the class to plug them in to be able to do this," says Hooker. On the backend, he says administrators like how the device enrollment profile (DEP) allows districts to purchase devices and then "sync" the device serial numbers with Apple. "This capability has been around for about a

year and a half," says Hooker, "and it's great because if someone steals the device, it will ask for school credentials when the [thief] tries to wipe the device clean and reboot it."

What's different now is that the DEP function is folded into the operating system's volume purchase pricing (VPT) program on iOS 9.3. Through the program, schools save about 50 percent off mobile apps by purchasing them in bulk. "Apple turned it into a one-stop-shop that makes deployment faster," said Hooker, "and also helps us save money." The feature is particularly useful for schools with one-to-one programs that include students who are under 13 years of age. "It can take months to track down all of the parent approvals and get every single student's ID set up," says Hooker. "During that time—which could extend into October during the typical school year—pupils weren't getting apps. I feel like that's really going to be streamlined now."

iOS 9.3 will also help schools using shared or hybrid one-to-one implementations better manage their devices and how they're used. "The biggest problem it solves is the ability to share iPads, which were originally designed as personal devices that stored all the user's personal preferences and data directly on the device itself," said Sam Glikzman, the author of "iPad in Education for Dummies." "That made it difficult to use a different device. The new update stores files and data in the cloud and users can access that information for any device. This allows schools to now share devices between students and classes."

A classroom using iPads that are stored on a cart, for example, can assign a specific device to each student (e.g., Johnny always gets iPad No. 5). As students pick up their devices and log in, they'll only see those apps that are available to them. And while all apps remain on the devices, a "show/hide" feature shields some of them from certain users. "If a third-grader logs in," said Hooker, "he or she will only see third-grade apps."

The new iOS release also addresses student privacy issues, according to

Dean Hager, the CEO of JAMF Software, which makes MDM software for iPads. Hager said traditional methods of locating lost or stolen devices have created issues for the educational sector. For starters, students could easily turn off their device's location services, thus disabling the tracking capabilities. With location services on, however, the school could find itself violating a student's privacy (via 24/7 tracking during non-school hours).

"iOS 9.3 now does it right with 'lost mode,'" Hager said. "If a student does lose a device, he or she can tell the IT department which, in turn, can instantly lock the device and put it in low-power mode." And here's the kicker: If location services is turned off, this move on the IT department's part turns it back on and allows it to track the device without violating any privacy rules. "I personally think this is a very important feature for education."

### Wish list for the next release

Asked about his wish list for future iOS releases, Hooker said he's like to see the company offer even more device management tools and capabilities for K-12 teachers. "Apple has taken the steps to give teachers oversight over what their students are doing, but it could be doing more," he said. For example, iTunes U's usefulness for the deployment of documents, and to a degree, workflow, could be enhanced and combined with Classrooms.

"All of a sudden you'd have a cool, slick way to do wireless workflow," said Hooker, "with the teacher being able to say, 'All right class, here's the next assignment. I'm going to push it out to you.' Then she can just hit a button and have the assignment sent out to all of the devices." Once completed, the assignments could be submitted wirelessly using AirDrop. "I know all the parts and components are there, but [Apple] needs AirDrop, iTunes U, and Classrooms to sync together and form this really modern way of turning in work." 

*Bridget McCrea is a contributing writer for eSchool News.*

# TED-ED clubs create tomorrow's TED Talks

The clubs are giving students new opportunities for sharing their stories

**By Stephen Noonoo**  
Editor, @stephenoonoo

One of Mitzi Stover's biggest challenges as a teacher is convincing her students they have a voice. Stover teaches speech and English at North Torrance High School in a working-class area of Los Angeles where kids seldom travel or even leave the neighborhood.

"Their world is very small geographically," Stover said during a presentation at the CUE 2016 conference in Palm Springs. "And teenagers are already so dismissed most of the time."

From her years of teaching, Stover knew that having students delve into their interests and personal experiences was one of the best ways to develop their passions—and in turn their public speaking. But presenting to the same classmates they saw every day was decidedly low-stakes and hardly helped her convince students they had a voice, let alone a global reach.

That's when she turned to TED, best known for a series of conferences centered around big ideas and engaging 15-minute presentations called TED Talks. Recently, TED has started an outreach of sorts to help mold the next generation of confident speakers, primarily through its education-focused arm—TED-ED—that features a lesson designer, original animated shorts inspired by teachers, and public speaking clubs.

While teachers have been cribbing the TED format for years, letting students deliver fast-paced talks on big ideas, Stover took it a step further, applying to start an official TED-ED club, a process that involved an application and a live video interview. Stover has taught speaking for years, but even she came to dread the interview part with open-ended questions she couldn't anticipate. "I try to push my students to take risks and get out there, but we teachers also have those moments of being intimidated," she said.



Clubs feature a dedicated curriculum.

The interview went fine and Stover now runs TED-ED clubs in her two speech classes and an out-of-school club, where students meet during lunch or after school. The clubs give teachers like Stover access to a wealth of curricular materials, including 13 suggested lessons that cover everything from how to structure a talk to picking a good topic (although she can't share lessons with colleagues unless they, too, complete the application process).

The real perks to Stover are in the global community of educators it lets approved teachers—called facilitators—tap into. Since TED-ED clubs began in 2014, around 2,200 clubs have sprung up in more than 115 countries. About 500 of them are currently active, some with students as young as 8, although most are at the middle and high school levels.

Facilitators can connect via private Facebook groups and arrange for their students to practice speaking together or just get to know one another. Already, her students have chatted about the weather with peers in New York and waxed ecstatic on the virtues of Taco Bell with a class in Canada.

At the end of every year or club rotation, facilitators are encouraged to record their students giving TED talks of their own and submit it to TED directly via unlisted YouTube videos.

TED also wants teachers to share student progress in regular updates, complete with photos and video. Some students were game, but others were wary of the exposure. To ease their anxiety, Stover struck a deal. Every student would have to present, but "I told them I won't upload their video if they don't want me to," she said. "They can see it at the last minute and decide they don't like and that's OK."

The first year she tried it, Stover reported mixed results, especially when it came to the final talks. "Some were good, some were terrible, some were rambling," she said. "I didn't have visuals or a microphone." Last year she worked with students on activities to sharpen their presentation skills, had them prepare slides, and bought a wireless microphone. Already she's seen the improvement—and so has TED.

When facilitators submit talks to YouTube, a TED staffer watches every one looking for standout speakers. One girl in Stover's class, who spoke about how young people can combat climate change, was flown to New York to speak at the TEDYouth conference. Three others had their talks featured on an official TED YouTube channel.

Such successes are rare, Stover admits, but they go a long way toward convincing students that someone is listening to them. Now, even within the walls of their classroom, students are starting to feel that way. One boy, who struggled in school and hadn't completed any of the writing assignments or pre-talk activities, wasn't even expected to give a talk at all, but ended up bringing the room to tears with his heartfelt plea for why boys should show more emotion. Another startled his classmates by eloquently recounting his hidden experiences in overcoming depression.

"I tell the students, 'I just care that you have a message,'" Stover said. "It's not about the grade, I just want you to give a great talk." 

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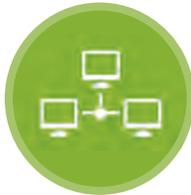
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# When student hackers attack

Denial of service attacks can shut down internet access and leave IT teams powerless

By **Bridget McCrea**

When Jeff McCune noticed that his district's 500 Mbps internet connection was full, he knew something was amiss. When he investigated further and saw that the Internet protocol (IP) addresses were coming in from China, Australia, and the Netherlands, McCune realized that the problem was more than just a random overload or ISP outage.

"I was seeing 550 Mbps of traffic coming from a single link and that pushed our usage up over the 10 percent cushion" allowed by its main service provider, said McCune, a network analyst with St. Charles Community Unit School District



DDoS attacks can cripple districts.

(CUSD) 303 in St. Charles, Ill. "There was no way anyone from China would surf the website of a school district in Midwestern America that hard."

To McCune, it appeared the CUSD was being hit by a full-blown Distributed Denial of Service (DDoS) attack. The hackers cut off the entire district's internet access for four hours at a time and then repeated the process 10 more times over the following six weeks during the fall of 2014.

McCune hit dead ends when trying to get internet providers to address the problem for his district. Using a combination of one major carrier plus a smaller, local provider, he was able to manually transfer traffic and usage between the two providers in order to cut off part of the attack and eventually restore service—at least until the next attack.

"It was pretty frustrating because we couldn't get anyone to help us," recalled McCune. "Even the major carrier didn't have anything in place at that time to deal effectively with DDoS attacks."

## Service, denied

As CUSD and other K-12 districts have learned firsthand over the last few years, DDoS attacks can quickly bring down what has become an educational mainstay for students, teachers, and administrators alike: access to the internet. Defined as an attack in which multiple compromised systems hit a single target, thereby creating a "denial of service" for anyone who is trying to use the targeted system, DDoS prevents legitimate users from accessing information, services, and anything else that's driven or supported by the internet.

In the CUSD's case, the entire district was without internet. "If you could get a web page to open, you were lucky," McCune said. That created problems in the classroom, where teachers relied on cloud-based tools.

McCune said the district's IT team jumped on the problem immediately, but notes that it took time for it to come up with a workable solution. Initially, it took a one-off approach by simply blocking the IP addresses that were causing the disruption. When the hackers figured out that strategy, they started using IP addresses that appeared to be coming in from Microsoft or Google. "We couldn't use the same strategy and block our access to those sites," said McCune, "so we gave up on that."

Working with the smaller ISP, the district was able to cut off the impacted access upstream in its network until the DDoS attacks stopped—at which point access was then restored. "At the time, the services available to help address this type of issue cost upwards of \$100,000 a year, which was way more than were paying for internet access."

## Help wanted

While looking for solutions to the recurring DDoS attack problem, McCune learned about the built-in intrusion detection and prevention firewall that the district had, but wasn't using, from a company called Juniper Networks. McCune got someone from the company on the phone and was walked through the process of installing and configuring it. "At that point, we could see in detail what was happening and we were able to deal with it in a smarter way," he said.

So while the DDoS attacks continued, they didn't necessarily bring the district's internet access to its knees—nor did they overwhelm its firewall. And while the hackers continued to maximize CUSD's 500 Mbps connection, McCune was able to partition the network in a way that would quickly show whether the culprit was an internal or an external IP address. "I narrowed it down to a group of buildings, and the I chopped it up even more and figured out it was coming from one of our high schools," said McCune. (Two students were later expelled and charged with the attack.)

Today, CUSD is using a solution called Border Gateway Protocol (BGP) that allows the district to handle its web traffic and automatically "flip over" to another connection when one has been compromised.

"It does that without any manual intervention on my part," said McCune. In the event of an attack, the network will "black hole" the IP address in question and stop passing traffic to that address. The new setup has already been tested: In January 2015, middle school students launched their own DDoS attack. This time, McCune was alerted immediately. "I was able to take care of the problem within 20 minutes." 

*Bridget McCrea is a contributing writer for eSchool News.*

Switch colors



just like that.



# 4 essential data use priorities for policymakers

New report outlines how careful data use and policies can support elevated teaching

**By Laura Devaney**  
News Director, @eSN\_Laura

Four data policy priorities can help state policymakers take advantage of data provisions in the Every Student Succeeds Act (ESSA) in order to move from data compliance to leveraging data to improve student learning, according to a new report from the Data Quality Campaign (DQC).

The report, *Time to Act: Making Data Work for Students*, says policymakers at every level should follow the four data policy prescriptions in order: measuring what matters, making data use possible, being transparent and earning trust, and guaranteeing access and protecting privacy.

Specifically, the report provides recommendations to help policymakers transform data from a tool for compliance to one that supports continuous improvement and achieves results, including state and district-based examples of how leaders have effectively used education data.

The recommendations outlined in the report leverage the longitudinal data systems that exist in every state and how the effective use of such data can allow for every student in the country to be provided a personalized learning experience that best fits his or her needs.

“When those closest to students have the right data, at the right time, in the right format, with the training and tools to use it well, students thrive,” said Aimee Rogstad Guidera, president and CEO of DQC. “Now that we have the information to support every student in the nation, we must act to ensure no student falls off the path to success.”

The report also highlights the importance of ensuring teachers and policymakers know how to use and understand data so they are able to make informed policy decisions on key education topics, such as early childhood education access, teacher quality, or col-



Some states focus on data security.

lege and career readiness.

Because every state now has a robust longitudinal data system—an “incredible feat,” Guidera said—“it’s now possible for every student to benefit from personalized learning.”

The brief provides four recommendations, along with state examples corresponding to each recommendation, for policymakers:

**Measure What Matters:** Be clear about what students must achieve and have the data to ensure all students are on track to succeed, including by connecting data from early childhood through K–12 to postsecondary and the workforce.

Washington state has been successful in this policy area by having its Education Research and Data Center (ERDC) collaborate with parents, researchers, policymakers, and other stakeholders to identify and prioritize research and policy questions. The ERDC uses a variety of indicators based on state longitudinal data to answer these questions through published studies and reports. Developing measures of success based on multiple factors, in addition to statewide assessments, is also critical to demonstrating progress toward stated goals.

**Make Data Use Possible:** Provide teachers and leaders the flexibility, training, and support they need to effectively and quickly use data to support student outcomes. State leaders should push for policies that support districts

and schools to prioritize data use.

Delaware has done this by investing in resources that give the state the capacity to analyze data about education outcomes, which then informs policy decisions. For example, the state’s research on teacher quality led to the proposition of Senate Bill 51, which required teacher preparation programs to raise admission standards and emphasized high-quality student teaching experiences.

**Be Transparent and Earn Trust:** Ensure every community understands how its schools and students are doing and how data is valuable, protected and used.

In Ohio, this is done using an online school report card platform that allows the public to access timely, high-quality, and relevant information on districts and schools that is easy to navigate and provides clear ratings around issues including student performance, enrollment and graduation rates, and education funding.

**Guarantee Access and Protect Privacy:** Provide teachers and parents timely information on their students and make sure it’s kept safe.

For example, Indiana provides teachers, parents and students secure access to student data using Learning Connection, a platform that allows for teacher collaboration and helps teachers personalize learning to meet unique student needs. Meanwhile, Idaho has made protecting student data a top priority by passing the Student Data Accessibility, Transparency and Accountability Act in 2014.

The report also offers conceptual changes that are important for the conversation around data use to continue, Guidera said, including putting students at the center of the conversation and ensuring data use supports student learning, as well as shifting the focus from building data systems to empowering the people behind the data.

eSN



# Making Their Mark

In Trevor Shaw's physical computing class at the Dwight-Englewood School in New Jersey, a group of eighth-graders recently created their own Star Wars-inspired laser turrets using a 3D printer. The students used a servomotor to control the turrets electronically and an LED light on the end of the guns to simulate a laser firing.

"The kids were designing these themselves. They were measuring, designing in CAD, and creating prototypes through trial and error to get them right," said Shaw, who is also the school's director of technology. "They were outputting their design on the 3D printer, realizing it didn't quite work right, redoing it, and then coming up with a program that would make the turret turn or make the LED do a rapid fire."

Along the way, students were learning not just science, technology, engineering, and math (STEM) skills, but also creativity, problem solving, and a host of other "soft" skills that today's employers covet. Perhaps best of all, their learn-

How the maker movement is inspiring a new generation of problem solvers and innovators

ing "was being driven by their curiosity and their passion," Shaw said.

It's benefits like these that are fueling the rise of the "maker movement" in K-12 schools. Aiming to inspire a new generation of problem solvers and innovators, a growing number of schools at all levels are creating maker spaces equipped with everything from construction paper and

glue guns to electronics kits, 3D printers, and laser cutters.

In Shaw's class, students design and build their own inventions in a classroom that's set up like a maker space.

"In my experience, the best learning happens when the content is a means to an end, and not the end in itself," he said. "What I mean by that is, let's start with something the students find interesting. A maker space gives them the opportunity to begin with something they want to build."

Shaw gives his students a broad challenge, such as: Make the coolest thing you can imagine that moves. "I'll give them

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## Mark

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some direction and then get out of their way, so they can explore,” he said. “Then, when they dive in and start making what they want to make, they’re going to run into problems, and they’re going to realize, ‘I need to learn how to control an LED or how to write a program.’ And then the learning happens organically as they go through those projects.”

The maker movement isn’t really anything new. “Montessori said that when you work with your head, your heart, and your hands, it all works together,” said Sylvia Martinez, who co-authored the book *Invent to Learn: Making, Tinkering and Engineering in the Classroom* with Gary Stager. “This is good pedagogy. Piaget said knowledge is a consequence of experience.”

But one of the things that’s different today is the sophistication of the technology tools available to students.

“You can now take really complicated, sophisticated things and make them accessible to the novice,” Shaw said. “Say you want to design a part for a robot and then fabricate that part, and do it five or six times until you get it right. Twenty years ago, you would have needed engineering skills to actually design it. You would have needed software that would have cost tens of thousands of dollars. You would have had to send your prototype out to be fabricated, and you would have waited weeks and weeks to get it back.”

Today, with the help of widely accessible design programs and 3D printers, “any sixth-grader can do that in a single class period,” he said. “And any teacher can incorporate that into her class. It’s such an empowering experience.”

### Having students own their learning

Empowerment is a word that Ryan Erickson also uses when he talks about the impact his own school’s maker space is having on students.



“At its core, the maker movement is about empowering students to create their learning, and then they *own* that learning.”

Erickson is the maker space coordinator for Cedar Park STEM Elementary School, a K-5 school in Apple Valley, Minn. Cedar Park created a maker space within a section of its library. The space is part of the school’s rotation of specials, so all students have an opportunity to experience it.

“At its core, the maker movement is about empowering students to create their learning, and then they *own* that learning,” Erickson said. When students are using the maker space, he added, “We’ve seen their engagement go through the roof.”

Erickson leads projects that support the school’s STEM curriculum. For example, in fifth grade, students learn about how different land forms are made. “One group researched meanders—how rivers move back and forth,” he said. “They found that a meander is formed by erosion. We had them use a free web-based sculpting tool, called SculptGL, to erode a cube away to form a meander.”

The students were performing the same function the river does over time, he said, adding: “They were able to print out that meander and hold it in their hands, interact with it, and present the concept with the model they had created. All the while, they were learning not only about meanders but also making skills, presenting skills, and CAD ability.”

Cedar Park’s maker space includes a 3D printer from Stratasys, a local Minnesota company, and Erickson is excited about the technology’s ability to connect the physical and the digital worlds.

“You can create something in the digital world and then hold it in the physical world,” he said. “That’s really powerful.” What’s more, students can share their digital file with the world, and humanity as a whole can benefit from their solution to a problem.

“One aspect of 3D printing is that it allows students to kinesthetically work

with content, so they can understand abstract concepts better,” Erickson said. “But the greatest impact I’ve seen from 3D printing is that, when I can get my students to make something, they own that learning now. At the top of Bloom’s taxonomy is to create. This is making it its core. And all the while, we’re teaching 21st-century skills.”

Cedar Park’s maker space includes not only a 3D printer, but also a laser cutter, a vinyl cutter, and low-tech manipulatives such as Legos and K’NEX. “While those building blocks have their place, a lot of kids have those at home,” Erickson said. “It’s another level of engagement altogether when students are working with the technology.”

In Shaw’s classroom at the Dwight-Englewood School, he has electronics kits such as littleBits, MaKey MaKey, and Arduinos for building circuits and other electrical components. He also has a 3D printer and tools such as pliers, soldering irons, and glue guns.

The goal of his class is to “teach kids how to learn,” he said. He has come up

with a list of “habits of mind” that all good problem solvers should possess (see sidebar page 28), and he uses a structured design process to help students develop those skills.

“If students can’t remember the difference between a resistor and a capacitor six months after leaving my class, who cares?” he said. “But they better be really good at problem solving and designing things, and figuring out how to learn what they need to learn. That’s really the goal—and I’m hoping it will be a transformative experience for them.”

### A different approach to instruction

With support from a \$3 million Investing in Innovation (i3) grant from the U.S. Department of Education, two public schools in Chicago have created maker spaces (called “digital ateliers”) that are used to provide both formal and informal learning opportunities for students—and the addition of these spaces has made a big impact on student achievement.

The project, called Convergence Academies, is expanding traditional ideas about education while giving urban students a greater sense of purpose. The Center for Community Arts Partnerships at Columbia College Chicago joined with the Chicago Public Schools on the program, which is making learning more active and engaging by integrating digital media into both the culture and curriculum of Morrill Math and Science School, a K-8 elementary school, and Tilden Career Community Academy, a high school serving grades 9-12.

During the school day, teachers take their students into the digital atelier to complete hands-on projects using technologies such as graphic design software, video editing tools, electronics kits, and 3D printers. During lunch and after school, the ateliers provide a safe and comfortable place for students to gather and explore 21st-century skills under the guidance of artists and other professionals, called “digital media mentors.”

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A river’s meander printed in 3D



“Our goal is to help teachers make the connection between play, tinkering, and discovery and how these lead to deeper learning experiences for students.”

## Mark

continued from page 25

This blending of formal and informal learning is one of many aspects that make the program unique.

“Students learn in multiple ways,” said Mindy Faber, co-director of the Convergence Academies project. Besides learning in the classroom, “they learn through their peer culture, and their interests motivate their learning,” she explained. But schools traditionally have not been very good at cultivating the learning that happens when the school day ends, Faber said—and the Convergence Academies model could be one way to change that.

There is evidence to suggest the program is having a big impact on student success. Morrill has moved from a Level 3 to a Level 1 school and off the district’s probation list since the program began in 2013. At Tilden, the average attendance rate has increased from 74 percent to 82 percent, and the graduation rate has improved from 37 percent to 54 percent.

More importantly, students are being exposed to possibilities they never would have known about before—and they’re learning important technology skills that can put them on a successful career path.

“In a maker space, everyone belongs and everyone’s interests count,” Faber said. “When you come into a maker

space, the process begins with inquiry—what problem do I want to solve? What is a problem in my community that we can help design a solution for? The process is creative and iterative. It is a safe space for experimentation and discovery, not a high-stakes, right-or-wrong type of environment. Hierarchies are flattened out, and everyone has something to contribute.”

When students make, design, and invent, “They are developing multiple literacies,” she said, “but they are not learning STEM knowledge for its own sake—but because they must apply that knowledge in order to solve the problem that is driving them.”

This is a fundamentally different



“We know that creativity diminishes as kids go through school. So, why not empower kids when they’re most creative, and give them these tools and coach them in the skills and the habits of mind that are going to sustain them for the rest of their careers and their lives?”

way of approaching learning for schools and teachers, Faber said. Many teachers “do not know how to teach this way,” she added. “It is not part of their pre-service education.”

Teachers need to shift their roles away from content providers to “designers of learning experiences,” Faber said. “Learning how to set up structures, design environments, use space effectively, and curate technologies and resources strategically—that is the future role of the teacher.”

To support teachers in making this shift, the Convergence Academies program hosts training sessions in which teachers learn to design and evaluate digital media projects, while giving students the space to create and explore. During these workshops, teachers assume the role of learners as they complete challenges using tools such as robotics, photo and video editing software, and graphic design software.

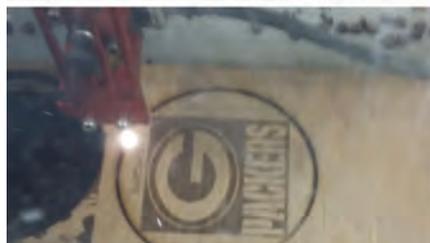
“Our goal is to help teachers make the connection between play, tinkering, and discovery and how these lead to deeper learning experiences for students,” Faber said. Participants are given sample activities and rubrics they can apply with their own students. In addition, the project is building a suite of online modules for teacher development, called the Connected Classroom Design Studio, that any school system will be able to use.

## Some keys to success

This kind of training is critical if maker spaces are truly going to transform learning, Martinez said.

“There’s always a tendency to focus on the stuff, because it’s cool,” she said. “Things like 3D printing—what could be cooler than making something out of nothing? But there has to be a serious conversation about the learning that will happen there. You can’t just build a maker space and expect that learning to happen.”

K-12 leaders must give their teachers time to collaborate and redesign successful projects to take advantage of



“One of the aspects of the maker movement that we’ve tried to embody is that it’s about sharing knowledge and ideas. Let others’ successes and failures help you.”

these new tools, she said. They also should encourage connections between various academic subjects.

Another common barrier is cost. But K-12 leaders shouldn’t let this keep them from moving forward, Erickson said.

“Looking at how much some of this equipment costs can be a stopping point for some people,” he said. “But you can create a maker space without implementing these more expensive pieces of equipment at first, and then build out the space from there. Don’t let your financial situation stop you from letting your students experience making and creating.”

To get started, Erickson recommended touring other schools that have created maker spaces. “Look at other models that have been successful elsewhere,” he said. “Tour the schools, ask questions, partner with them. One of the aspects of the maker movement that

we’ve tried to embody is that it’s about sharing knowledge and ideas. Let others’ successes and failures help you.”

In explaining the value of maker spaces for schools, Shaw noted that young students are at their creative peak. “We know that creativity diminishes as kids go through school,” he said. “So, why not empower kids when they’re most creative, and give them these tools and coach them in the skills and the habits of mind that are going to sustain them for the rest of their careers and their lives?”

When Martinez was researching her book, she heard from K-12 leaders who were concerned about how maker spaces and learning through exploration fit in with the high-stakes accountability movement. Her response was that the two are not mutually exclusive.

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“When Gary and I wrote the book, we were really talking about a progressive tradition of education that has largely disappeared from our schools,” she said. “The teaching profession is bleeding people who remember what it was like to have centers in a classroom

and do hands-on projects. If this happened on our watch, we can undo it. We can make classrooms places of joy and excitement. Part of effective leadership is questioning: Is what we’re doing right for kids? If not, what are we going to do about it? It’s complicated, but I think we can do it.”

Research suggests that when students make things themselves, they

value their learning more.

“Kids believe they can change the world,” Martinez concluded. “I think it’s up to schools to give them real tools and change that belief from being just wishful thinking to reality, where every child knows he can change the world, because he’s had experiences of making things that work and has had agency over his own learning.”

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## Ten habits of mind for effective problem solvers

Trevor Shaw teaches a physical computing class to eighth-graders at the Dwight-Englewood School in New Jersey, but what he really teaches his students is how to learn and solve problems. He does that by challenging his students to make things in a maker space environment.

Shaw has come up with 10 “habits of mind” that he tries to instill in his students. These are the characteristics that define effective problem solvers, he says.

**They take time to carefully define a problem.** Students sometimes go off track because they make assumptions about what a problem requires. An effective problem solver will take the time to ensure he understands the problem and what it’s asking.

**They know what they know.** Good problem solvers review what they already know and incorporate that knowledge into their understanding of the problem and their solution design.

**They can figure out what they don’t know.** They can identify gaps in their understanding and articulate those as questions. They’re constantly asking themselves, “What don’t I understand about this system—and what do I need to learn?”

**They can find the information they need effectively.** They’re expert researchers, skilled in using all kinds of information resources, including classmates. They can distinguish between reliable and unreliable sources and can identify high-quality sources that match their reading level.

**They collaborate.** They view classmate as sources of information and talent. They help teammates divide tasks equitably and according to each another’s strengths.

**They are undaunted by complexity.** They aren’t overwhelmed by large, complex systems. Instead, they’re able to break a problem down into smaller components that can be understood and attacked separately.



**They model solutions and test them.** They can visualize a solution in their mind. They build digital simulations and physical models. They use these models to test their solutions following a methodical process.

**They produce multiple, divergent, and creative designs.** They can think creatively and imagine many possible solutions to a problem.

**They persist through ambiguity, challenges, and setbacks.** They stay with problems for a long time. Challenges and setbacks are met with a positive attitude and as an opportunity to explore new paths.

**They evaluate the quality of their solutions with brutal honesty and make revisions.** They have an idea of what the solution to a problem should look like. Throughout the process, they measure the quality of their work against that mental model—and they’re not afraid to make adjustments as needed.

eSN

# The 4 essential elements of any successful one-to-one program

By **Alexandra Ito**

As more and more schools and districts set goals to provide one-to-one access to technology to students to meet teaching and learning goals, district and school leaders are faced with the task of planning and implementing technology resources at levels that they might not have experienced in the past. My district, Santa Ana Unified (SAUSD), is increasing access for students through a program called “Access for All,” a well-received iPad and Chromebook initiative. Through this experience, we have developed a model for planning and implementation.

## Establish your vision

It is important that any plan to increase levels of access to technology for students does not move forward as a “technology for technology’s sake” effort, but that is integrated as part of the district or school vision for teaching and learning. At SAUSD, the goal of expanding access to technology for students is aligned to the district Framework for Teaching and Learning and has been established as an essential part of the district vision. This vision is centered on establishing a growth model with expanding choice options for students, enhancing personalized learning pathways, and providing a wide variety of blended learning opportunities to support increased student engagement and improved student learning outcomes.

## Engage stakeholders

One of the first considerations when planning a one-to-one initiative is establishing support and funding. The Local Control Accountability Plan (LCAP) is a critical part of California’s Local Control Funding Formula. As part of establishing the LCAP plan, school districts must engage parents, educators, staff, and the community.

At SAUSD, the decision to expand access for students emerged through the district’s collaborative discussions with its community groups as part of its LCAP planning. Through the feedback provided by parents, students and teachers at over 100 facilitated discussions, increased access to technology to students was identified as an important district goal to support student success, and was established as part of the district’s funding plan.

When deciding which mobile device model to select for purchase for schools, we held a “technology roadshow” to give students an opportunity to voice their opinions on their preferences for specific models of mobile devices. This roadshow was held at representative elementary, intermediate, and high schools in the district, and students “road tested” a variety of mobile devices and gave feedback about selection. As a result, two mobile devices (iPads and Chromebooks) emerged as choices for school selection.

## Plan for network readiness

Network readiness is an essential component of any one-to-one plan. All district-level E-rate and all additional wireless upgrade plans were aligned to support the implementation of our “Access for All” initiative. During our first year, the district’s intermediate schools were identified as the first schools to implement one-to-one mobile devices with their students. This decision was based on earlier experiences in expanding technology-rich learning environments at the intermediate school level. Due to these earlier efforts, the infrastructure at some of these schools had already been updated and served as a model for expansion to other schools.



Let students try devices before purchasing them.

## Build site-based support and leadership capacity

After district planning had determined the grade level focus for implementation and hardware and infrastructure plan, the implementation focus shifted to building and supporting site-based planning capacity. One of the key elements for supporting school planning was established by putting in place bi-weekly “Tech planning Tuesday” meetings.

The school’s communication efforts focused on providing information on the “Access for All” initiative and to provide a roadmap of the school’s implementation plan. At school meetings held for parents, this information also included a review of the district’s mobile device use policy, and parents were given the opportunity to choose whether their child would bring the mobile device home to extend learning. The mobile device implementation planning focused on how the school would check out the mobile devices to their students, and how their support staff would manage and facilitate repairs. As part of our professional development planning, the district created required courses for teachers, which schools scheduled to be held at their school sites. The district also provided an online digital citizenship class for students, which they completed as part of their process for receiving the mobile device.

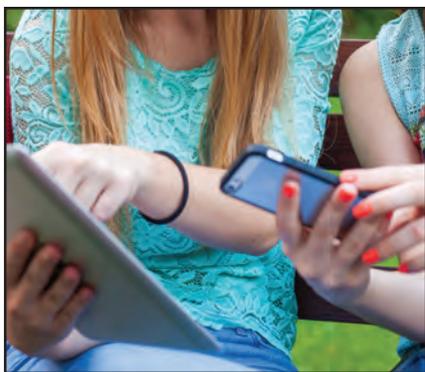
*Alexandra Ito is the director of learning innovation with technology at Santa Anna Unified School District in California.*

# Shocking data reveals Millennials lack skills

International data sets show U.S. Millennials hit global bottoms for skills

**By Meris Stansbury**  
Managing Editor, eCampus News,  
@eSN\_Meris

It's a conversation a decade ago that was so widely circulated and discussed that even dedicated education stakeholders grew weary of it: U.S. students are performing below average in math and reading compared to their international peers—what do we do? Ten years



Skill gaps in literacy and math persist.

of jumbled reform initiatives and touting Millennials as the most educated demographic in recent history later, national and international research groups say nothing has changed; and, in fact, the problem may be getting worse.

In 2013, the Program for the International Assessment of Adult Competencies (PIAAC) released the first-ever global data on how the U.S. population aged 16 to 65 compared to other countries in terms of skills in literacy and reading, numeracy, and problem-solving in technology-rich environments (PS-TRE). The PIAAC then broke down the data by specific age group, including Millennials, or those born after 1980 that were between the ages of 16 and 34 at the time of the assessment (2012).

Overall, revealed the data, despite having the highest levels of educational attainment of any previous American generation, Millennials, on average, demonstrate relatively weak skills in all skill sets researched compared to their international peers.

Also, the data revealed that while it is true, on average, that the more years of education one completes the more skills one acquires, far too many are graduating high school and completing postsecondary education without receiving the right skills needed to enter a competitive, global workforce that is becoming more and more technology-based.

“These findings hold true when looking at millennials overall, our best performing and most educated, those who are native born, and those from the highest socioeconomic background,” writes Irwin Kirsch, director of the Center for Global Assessments at Educational Testing Service (ETS). “Equally troubling is that these findings represent a decrease in literacy and numeracy skills for U.S. adults when compared with results from previous adult surveys.”

Kirsch also cited several studies from organizations that support the PIAAC's findings, including the National Assessment of Educational Progress (NAEP), ACT, and the College Board.

But what are the hard numbers to support these claims; and is it just a matter of more education?

According to the PIAAC's 2013 report, which included 5,000 people in each country surveyed and was designed as a household study of nationally representative samples of adults ages 16-65, data on U.S. Millennials reveals:

- In literacy, U.S. Millennials scored lower than 15 of the 22 participating countries. Only Millennials in Spain and Italy had lower scores.
- In numeracy, U.S. Millennials ranked last alongside Italy and Spain.
- The youngest segment of the U.S. Millennial cohort (16- to 24-year-olds), who could be in the labor force for the next 50 years, ranked last in numeracy, along with Italy, and among the bottom countries in tech-driven problem solving. In literacy,

they scored higher than their peers in Italy and Spain.

- Our best-educated Millennials—those with a master's or research degree—only scored higher than their peers in Ireland, Poland, and Spain.

The PIAAC notes that after studying the data collected from all countries, simply providing more education may not hold the answer to skilling-up today's students.

“If we expect to have a better educated population and a more competitive workforce, policy makers and other stakeholders will need to shift the conversation from one of educational attainment to one that acknowledges the growing importance of skills and examines these more critically,” writes Kirsch.

In the ETS Center for Research on Human Capital and Education's brief, the aim of this data and call to action is not to “bemoan the nation's declining status,” but instead suggest essential ways in which skills interact with broader social and economic forces.

“A nation with some of the most prestigious institutions of higher learning in the world houses a college-educated population that scores among the lowest of the participating OECD nations,” emphasizes the ETS brief. “Millennials who will form the backbone of this nation's future are not poised to lift us out of this predicament; in fact, the lack of adequate skills in this population has become a challenge for us to confront.”

The brief concludes by explaining that the demand for more skilled workers may translate to a demand for workers with “very high levels of education” and perhaps very particular kinds of education and technical expertise. “Even those with some post-secondary education, or even many with a four-year baccalaureate degree, may face two distinct and critical challenges: One is that their skill levels, despite post-secondary education, may be inadequate, particularly in a global labor market.”



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# Study Shows Lasting Gains from At-Home PreK Program

*New research shows Waterford curriculum at the preschool level has positive longitudinal effects for children through fourth grade.*



A recent independent study published by the Utah State Office of Education shows children who used Waterford UPSTART the year before kindergarten saw immediate positive gains and were still outperforming state averages on standardized tests in grades first through fourth across language arts, math, and science.

UPSTART is an at-home kindergarten readiness program that combines Waterford's adaptive, personalized learning software with a high-touch parent engagement program.

Utah's state-funded UPSTART program has prepared more than 18,000 Utah 4-year-olds for kindergarten. Each year, the program is evaluated by the state and each year studies show all children have higher academic gains when using Waterford—including children who are at risk (below 185% poverty), English language learners, and special education.

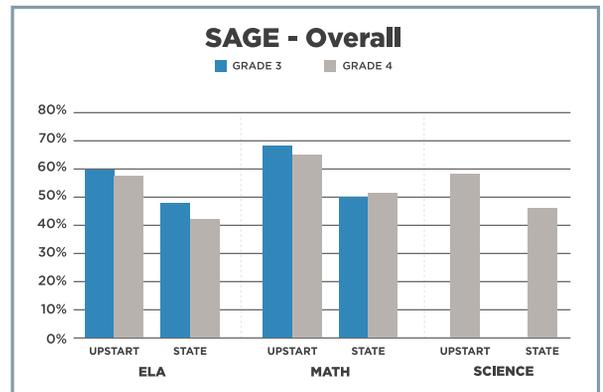
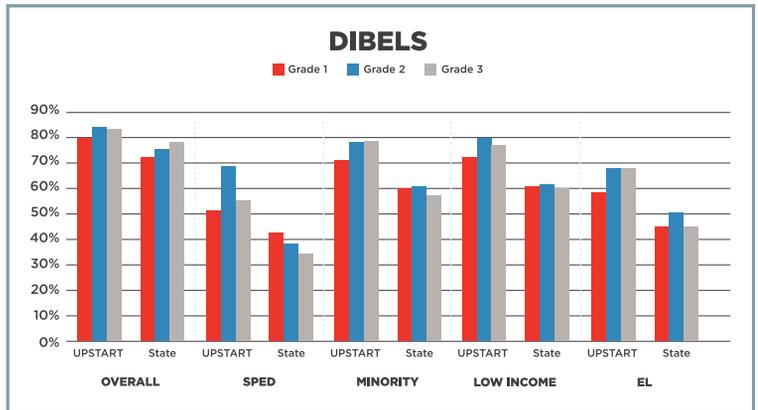
## Does Waterford have a lasting effect?

Yes. The latest state report shows children who used UPSTART before kindergarten continually outperformed state averages in DIBELS and SAGE testing in grades first through fourth.

## What does this mean?

Whether children are using Waterford at school or at home, the curriculum has been proven to have immediate positive effects for students who use it. This study also shows that these gains last, giving Waterford students a foundation of early literacy, math, and science skills that impacts their long-term academic success.

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*Sources: National Institute for Early Education Research and U.S. Department of Education*

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## PD

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use—isn't the real challenge in ed-tech professional development. The real challenge is helping teachers understand their students' expectations and motivation and behavior and lack of knowledge around basic technical skills that are often overestimated. Not including students in at least some parts of the staff development is like teaching surgeons how to operate only on cadavers.

### Have teachers observe others

One of the techniques I like to use is to have teachers watch as I teach a class. Not only can they see how I'm using technology as a tool to support students' learning; they also can observe how I interact with the students and the strategies I use to elicit deeper thinking and give students ownership of the learning process. As the lesson unfolds, teachers can ask questions of me or the students to learn more about why the lesson worked or what I was thinking as I used a particular strategy.

Sometimes, what I *don't* do is just as important as what I do. For instance, instead of answering a student's question, I'll turn the question around and have the student find the answer, then share it with the rest of the class.

The interaction between teachers and students can be very rich, giving observers a better understanding of the issues they're likely to face in their own classrooms. Those are the kinds of lessons that teachers would miss in a traditional staff development session. For example, even though every student has a device, I might group students together in clusters of two or three to engage them to reach consensus around an academic challenge. In this way, the student conversation gives teachers more insights into their thinking.

Watching students learn also removes the possibility of a teacher thinking, "This is too difficult for my kids," or "My students already know this, and I don't need to teach it to them." We often overestimate what students know about

technology, or we underestimate what they are willing to do. Seeing how students respond to instruction that uses technology to elicit deeper thinking can help change that mindset.

### Ask for students' input

As I mentioned, I like to meet with students first before giving a presentation to their teachers. I'll hold an advance Skype session with about 20 students, along with their principal or superintendent and maybe the technology director. I'll tell the students that I'm going to show their teachers how to use technology to make learning more fun and effective, and I need their input.

I'll ask them, "Do you know how to find information with Google?" And all of the kids will say, "Yes." Then I'll give them some challenges, and very few of them are able to complete those challenges. Or, I might say to them, "What do you think about students recording video tutorials to help other kids learn?" Some might say, "That's the job of the teacher, isn't it?" But oth-

*Some principals have never thought to ask students: "What is it you need to help you learn?"*

ers will say, "I think I might like listening to other students explain a concept."

Having this information helps me later, when I work with their teachers. I can tell them, "You know, your students really need you, because they all think they know how to do a Google search—but it turns out there's a lot they don't know about finding information online." Then, I'll show the teachers some search strategies they can share with their students. Or, I can tell them that many students say they'd like to watch videos of their peers explaining concepts, which could cut down on some of the work the teachers do themselves.

If I had made these suggestions without talking to the students in advance, I

wouldn't have as much credibility. But because I heard from the students first, the information I'm sharing is supported by evidence and carries more weight. Gathering insight from students about how they want to learn and what skills they lack, can help shape ed-tech professional development and make it more meaningful for teachers.

### Create student leaders

At one school I recently visited, third-graders were leading workshops for their teachers on topics such as how to use Minecraft, or how to tag web pages using Diigo. I couldn't believe what I was seeing: A third-grader leading a workshop on Diigo? I didn't think a third-grader could do something that sophisticated. But I was wrong.

In this example, the principal made sure all the student-led workshops were recorded to create a staff development library that teachers could access any time if they had a question. That also let parents see what was going on in their child's school—and how their child was contributing to the learning. I thought that was fantastic.

When I've involved students in staff development, I've seen some principals who were stunned by their students' insights. They had never thought to ask their students, "What is it you need to help you learn? What kind of learning environment can we build for you?"

Before a recent workshop, I asked students how they wanted to learn—and what kinds of technologies they use to learn outside school. One middle school student told me he used Wolfram Alpha to answer what he called his "burning questions," such as whether there is water on Saturn. When I worked with teachers later that day, and I introduced Wolfram Alpha (which can seem overwhelming), I shared the story of their own student who uses it all the time to answer his "burning questions." A story like this can make a new tool much more intriguing and accessible—and maybe even necessary. 

*Alan November is senior partner and founder of November Learning.*

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# 4 radical school models upending education

Goal setting and PBL serve as cornerstones for new school models

**By Stephen Noonoo,**  
Editor, @stephenoonoo

These days, there are few who would disagree that education needs to start looking more like the world students will one day work and live in and less like, well, school. What that might look like in the future is anybody's guess, but it may be safe to assume a lot more will be required of students than simple passive learning.

Four school leaders recently spoke about their innovative school models and visions for student success in an increasingly digital world during a panel hosted by Clayton Christensen Institute cofounder Michael Horn at this year's ASU GSV Summit in San Diego. The new models overwhelmingly favor some combination of project-based learning coupled with self-directed goal setting and skill building for students' life after school. Here are the four school models and their approaches to teaching and learning.

## Design Tech High School, San Mateo, Calif.

This new charter will one day serve students in grades 9-12, but for now 280 students are currently enrolled up to 10th grade. The mission: to make the world the better place through teaching students the theory and methodology behind design thinking.

"For us, we believe design thinking is both a mindset and process to help us reach this mission," said Ken Montgomery, the school's founder. Part of the design thinking mindset, he said, contains a "bias toward action," which for students means asking them to be self-directed much of the time.

On a typical day, students receive their daily schedules in the morning. Sometimes there's a note in there—called a referral—prompting them to spend additional time on a subject or with a particular teacher, but otherwise students have a lot of flexibility in



Collaboration and self-directed learning play a big role in these new models.

choosing how they spend their time. They can choose to catch up on coursework, try to get ahead, or work on a curiosity project, which the school is constantly pushing them to undertake.

Those projects give students a chance to put design thinking to the test and develop something they want to create. Here, the school's recent partnership with Oracle, and its employees, can make a big difference (the school is eventually planning a move onto Oracle's campus). One girl, who had a visually impaired grandmother, designed and created a watch that played a unique song when different denominations of paper currency were passed underneath.

"We're really trying to operationalize that self direction," Montgomery said. "The typical day is extreme personalization. It all starts with them learning what they need to do and building their schedule, and us providing the expertise they need to reach their goal."

## The Incubator School, Los Angeles

"Our school is an entrepreneurship themed school," said founder Sujata Bhatt by way of introduction. In that, she means, it mimics a startup incubator, of the Y-Combinator sort, like those that have cropped up in most urban areas over the past few years.

The Los Angeles Unified pilot school has a lot of autonomy letting it function much (but not exactly) like a charter might. Most of the 200-odd middle and high school-aged students are there to learn entrepreneurial skills—everything from how to design technology to starting a business, pitching to investors, and diving deep into data and analytics to help run operations.

On any given school day, students start by meeting with advisors to discuss goals and current events, then move on to their student-created clubs doing everything from creating YouTube videos to putting on performing arts productions. Students also have two impact projects to contend with—one concerning humanities, the other STEM—often connecting with what Bhatt calls "lived experiences."

One student, she said, is creating a special back brace that also provides an extra pair of hands, inspired by a parent who works in the construction industry. The impact projects were designed to cross as many disciplines as possible, and students are expected to provide ample documentation to back up their work from persuasive writing, to presentation and pitching.

All that practice isn't just preparing students for some far-off future—some of them are already pitching real CEOs as part of their entrepreneurship teams,

which function like miniature startups. Each team has already received seed funding in anticipation of a full launch by the time those students get to 12th grade.

“We want to prepare students for three different futures,” Bhatt said. “One is college, the traditional four-year college pathway; also startupland, so they can choose to move into that and then come to college when they’re ready to go to college; and then the third choice that we’re preparing students for is a kind of un-college, unbundled experience.”

### Big Picture Learning (BPL)

The students at this network of more than 50 schools in the United States (and 60 outside the country) are 75 percent minority and 75 percent free/reduced lunch eligible; and more than 20 percent of them have learning differences, according to Carlos Moreno, co-executive director of Big Picture Learning, which received much of its funding from the Gates Foundation. “We believe all of our students are brilliant,” Moreno said. “And we need to provide them with an opportunity to be brilliant.”

BPL schools tend to focus on the three R’s, Moreno said: Relationships, relevance, and rigor. “In order to best serve our students we feel that we need to know them really well,” he said. A robust advisory system pairs students with an advisor for up to four hours a day. In advisory, students are focusing on content but also on social and emotional learning and noncognitive development.

Students spend two days a week at internships that suit their interests—the relevance portion—and, on campus, work on deep project-based learning that ties into their internship work. For some students, there’s no expectation to take traditional English or science courses, although they are offered.

Instead, developing numeracy and literacy skills happens in an environment that might not look too different from a jobsite. Students demonstrate the third R, rigor, via the occasional standard assessment but more meaningfully through portfolios and quarterly

presentations, where they’re expected to vigorously defend the work they’ve done in front of their peers.

### Khan Lab School, Mountain View, Calif.

Sal Khan’s very own Silicon Valley tuition-based micro-school currently enrolls 60 students, who range in age from 5 to 13—but don’t call it K-8. “We don’t have grade levels,” explained school director Orly Friedman. “Instead, we’ve decided to group our students by independence level, which means we put them in groups based on how much support they need from a teacher in order to work to the best of their ability.”

Once a week, every student sits down with a teacher to discuss and set goals for themselves in a range of subject and content areas, as well as more fluid self-assessments such as character strengths, cognitive skills, and passion projects (yes, even the 5-year-olds).

The goals ultimately determine how much time students spend on any given subject (Khan Academy materials are naturally used to teach both math and Javascript) plus how much time they need with teachers vs. solo and group work. “For the most part, the morning is more individual self-paced work,” where teachers can also tutor students or pull them out into small groups, Friedman said. “The afternoon is more project-based, collaborative work.”

Additionally, all students move through two blocks of wellness—inner and outer. With so much to do, the school day can run long, often ending at 6 p.m., with Friedman explaining that many students stay the whole time in order to “continue working on goals.”

Since it’s only in its second year, the model may still be something of a work in progress. “Some kids end up wasting a lot of time for the first couple of months,” Friedman said, as they acclimate to setting and achieving their own open-ended goals. “How much time do we allow—where is that balance? I think that will be a question that we’ll ask for a long time.”

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# Arizona's Mesa Public Schools Use Technology Platform to Reliably Track Assets Across 87 Different Institutions

Keeping up with all of the “stuff” that circulates both on and off campus has become increasingly complex for K-12 school districts over the last few years. As the largest public school district in Arizona, Mesa Public Schools (MPS) faces particularly difficult challenges when managing assets across its 87 different institutions.

After using a labor- and time-intensive asset management system for years, the 63,000-student district went in search of a better solution for its 2015-'16 school year. Looking for a system that would manage both student and faculty assets—including the devices that are being issued to secondary school pupils as part of its 1:1 initiative—MPS wanted a solution that was easy to use, mobile, and customizable.

After participating in a live demonstration for local Arizona school districts hosted at the headquarters of Troxell, a national value-added reseller of classroom and presentation technologies, MPS liked what it saw

*“SAM is intuitive for a wide range of users, and training takes less than 10 minutes. Setup, deployment, and continued use are seamless.”*

and signed up to participate in a free system trial. During that trial, school officials put Troxell's School Asset Manager (SAM) through the district's research and evaluation process.

The evaluation team quickly decided that SAM would help them achieve their short-term 1:1 goals, as well as their long-term multi-asset tagging plan. “SAM is intuitive for a wide range of users, and training takes less than 10 minutes,” said Michelle Hamilton, director of purchasing. “Setup, deployment, and continued use are seamless.”

Initially, MPS scanned 2,500 devices for deployment to Skyline High School students, with each device taking less than two minutes to complete. “Superintendents and parents were standing over our shoulders as we checked out devices to students, and it worked like a charm,” Hamilton added. “SAM is on the cutting edge of technology.” Next, MPS utilized SAM when

issuing devices to students in a math program at the elementary school level.

According to Hamilton, the asset-tracking technology combines QR asset tagging (ultra-strong asset tags included), scanning, document and media storage, network management, and help-desk requests. This enables the district and its many schools to manage all of their fixed, mobile, hard, and soft assets.

Today, MPS knows who is responsible for any single device at any given time, when it is assigned to a school/department/program, student, teacher, or repair shop, when it changes hands for any reason, or when a teacher changes schools.

Should a device need repair, the school scans it out to the technician and then scans it back in upon return. And, MPS knows where all devices are both on and off school grounds—like when a student takes the device home—thus creating cost savings for the district as parents are made responsible for devices that are issued to the students.

Because it's customizable, SAM offers powerful online reporting tools that districts can use to create custom reports quickly (i.e., location of all assets purchased with Title 1 funds). When data is recorded, it can be reported on instantly and exported to common formats with one click.

“Tim [Cropper-Williams] of Results Squared Limited was able to customize configurations during deployment in real time for our specific needs in order to make selections easier and far quicker for us,” said Bobette Sylvester-McCarroll, assistant superintendent of business services.

“With our previous asset management system,” Sylvester-McCarroll continued, “the deployment would not have gone this way. We had to go through a multitude of labor-intensive steps throughout the entire process.”





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## Dashboard

continued from page 1

principal of Whitt Elementary School, part of the Wylie Independent School District in Texas, Teamann and her staff are using information that is more timely and that reveals students' performance in relation to specific state standards to help guide their efforts.

"We've come a long way in using timely data to help drive instruction," she noted.

For many teachers, access to timely data that helps tailor instruction in meaningful ways is still a challenge, a Gates Foundation report revealed last year. But in a growing number of school systems, this is improving—and the development of more sophisticated data dashboards that can pull together information from a variety of sources, including both formative and summative assessment data, is helping.

### Measuring multiple factors is key

Teamann and her staff are using a data dashboard called Aware, from Plano, Texas-based Eduphoria, to monitor the growth of their students. With Aware, educators can create and administer their own assessments and import other state and local test results to view students' progress and understand larger trends. Teachers meet weekly in professional learning communities to review the data and plan their instruction accordingly.

Pulling together data from a variety of sources is important, Teamann said. If you don't have access to a wide range of information, she explained, you won't get an accurate picture of a student's strengths or needs.

Steven Anderson, a former teacher and instructional technology director who maintains the website Web20Classroom, said data dashboards can be powerful tools—but only if they are part of a larger decision-making model that takes a more holistic view of students.

"Data dashboards can be very bene-



*"There is effective data and student skills data, and data about how students learn best. If students feel safe and comfortable and connected to a teacher, they will succeed. For students to feel that way, they need to be taught in a way that works for them."*

ficial if we're using them in conjunction with other means of assessment," he said, "such as formative assessment, portfolio assessment, and performance assessment." If not, "then we're making a huge mistake."

Anderson also is wary of dashboards that claim to predict how well a student will do.

"When you start to rely on algorithms that tell you how students are going to achieve, there's an inherent risk in that," he said. "We're only looking at one small piece of information, but there are so many other factors that affect student achievement. We're not taking into account any of the other things that are happening in the classroom, or socioeconomic status, or parent involvement."

Those non-academic factors are critical to School District 73.5 in Skokie, Ill. The district has created what it calls a Student Skills Rubric that measures factors such as how prepared students are for class, whether they are on time, how committed they are to learning, and how well they work with others.

"There is more to students than just academic data," said Lisa Westman, a former teacher who is now an instructional coach helping District 73.5 educators differentiate their instruction. "There is effective data and student skills data, and data about how students learn best. If students feel safe and comfortable and connected to a teacher, they will succeed. For students to feel that way, they need to be taught in a way that works for them."

The district is piloting a data dashboard called the Otus Student Performance Platform, created by two Chicago-area teachers—and the system is flexible enough to incorporate data from the custom-designed Student Skills Rubric, so teachers and administrators can see how students measure according to these factors in addition to more traditional academic ones.

The system "integrates all of our data," Westman said, including formative and summative assessment results, third-party assessment data such as the Northwest Evaluation Association's Measures of Academic Progress or

high-stakes test results, and the students skills and participation data.

Having all of this information available in a single dashboard is extremely helpful for educators, she said, and it leads to richer, more productive conversations among staff.

“It is of utmost importance to look at all of our students as multidimensional individuals,” she said. “I honestly believe there are no students who cannot achieve success; it’s just a matter of looking at the right information and then putting those puzzle pieces together in the right way. A data dashboard helps you to put those puzzle pieces together in a way that makes sense.”

### Other essential characteristics

An effective data dashboard not only should contain information from several different sources and be flexible enough to incorporate both academic and non-academic factors—it also should provide insight into both larger trends and small details, Westman said, such as which discrete skills students need help with.

Above all, it must be easy to use.

“It needs to be teacher-friendly,” Teamann said. “If it requires entering information and then converting it and applying it in a different manner, that’s three steps you don’t need. Teachers aren’t statisticians, and they aren’t

mathematicians. They’re working with kids. I want that to be as easy as possible for them.”

Data dashboards are only as effective as the information they contain, she added, and educators should not over-rely on them.

“Data tells a story, if you have enough data points. But I also never take for granted my teachers’ eyes and opinions,” she concluded. “There may be more to the story than what that child scored on his last two assessments. It’s important for teachers to have input as well.” **eSN**

*The former editor-in-chief of eSchool News, Dennis Pierce is now a freelance writer covering education and technology.*



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# Promoting safety in a digital world

Keeping students safe in the digital era means a proactive IT strategy

## By Harold Reaves

Technology has become a mainstay within the walls of today's schools. One-to-one computing is enhancing and enriching the student experience, transforming the way we teach and the way we learn.

K-12 schools were expected to spend approximately \$4.7 billion on technology this past year, according to marketing firm IDC, with no sign of a plateau. But as technology adoption continues unabated, the safety of the students who are meant to benefit from these advances is frequently overlooked.

## The evolution of learning with computers

When desktop computers first appeared in schools, the curriculum focused on typing, word processing, and basic coding skills. Then search engines arrived, completely revolutionizing the way students accessed and consumed information over the web.

The next leap occurred with a transformational social networking experiment known as Facebook, instantly connecting people around the world and giving new meaning to the term "global village." Today, educational organizations rely on computers and tablets to provide a more flexible approach to classroom learning, forming the dynamics of how educators and students interact.

In the past 25 years, technology has steadily progressed from a productivity tool to a staple of modern communication, interaction, and lifestyle.

The benefits of one-to-one computing programs are well documented and recognized by the communities that sponsor them with public funding.

Digital solutions such as classroom management, collaboration, and online polls allow teachers to be more productive so they spend less time administrating and more time teaching.

Students have access to more resources and information, allowing them

to expand their learning potential beyond their immediate physical environment.

However, along with the benefits of mobile devices come the associated challenges. These challenges range from mismanagement and carelessness to misconduct and theft of school devices—often putting students at risk. Ultimately, you must be able to prove good stewardship for the funding you receive. But most importantly, you must establish safeguards for the students that use these devices.

## Social etiquette

A school computer or tablet provides the student with an access point to a vastly infinite amount of content over the internet, some appropriate and some not. This includes social networking tools that are easily accessible.

Students require guidance and coaching to ensure they exercise this power appropriately, including safe and appropriate conduct on these sites. You should develop simple guidelines to help establish boundaries for topics such as privacy, bullying, language, and what to post.

This type of dialog can go a long way to shaping their understanding of how their digital activities will remain online in perpetuity.

## Protecting students and your investment

Along with student safety, you are also responsible for managing and securing the devices themselves. For many school districts, this means keeping track of hundreds of devices across multiple schools used by thousands of students who are constantly on the move. As a result, a simple inventory or device status report is often resource-intensive and rarely accurate.

Ultimately, when a device is no longer available, whether due to damage, loss, or theft, the learning experience for the student is interrupted.



Remote capabilities can help IT keep track of student devices.

## IT efficiency

The reality is that most school districts are under immense pressure to create efficiencies, establish accountable oversight, and provide a secure learning and teaching environment. In order to achieve this balance, you must implement a combination of technology and best practices.

Since it is unlikely you will receive a substantial increase in funding and IT resources, keeping track of your devices will require remote capabilities that provide you with a reliable two-way connection so you can reach out and secure a device regardless of user or location.

This will allow you to quickly assess the status of a device and installed applications. You will also be able to easily perform compliance reporting for one-to-one and other funded initiatives. Resource-intensive exercises, such as physical inventory cycles, can be replaced with accurate and timely reports, allowing you to divert IT resources to learning initiatives.

Also, with limited budget to replace lost or stolen devices, the ability to recover a device will ensure funding can be used for learning initiatives versus buying replacement devices. But none of these measures will matter if your students and employees are at risk. 

*Harold Reaves is the global manager for Absolute Safe Schools.*

## Apps

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Gogh, interactive art museums displaying his works, and a painting/drawing app called **PlayART** by Tapook that allows students to create their own works of art with paintbrushes and stamps in Van Gogh's style.

### Formative assessment

Audience response systems that enable all students to respond to questions simultaneously allow all students to demonstrate knowledge or express opinions, and allowing teachers to quickly check for understanding. Prior to websites and apps such as **Socrative**, **Kahoot**, and **Quizzizz**, expensive sets of devices known as clickers had to be purchased. Students can now use any mobile device or a computer as a response tool with all the advantages of audience response systems without the cost. Quizzes or sur-

veys can be administered anonymously or with identifying information. Results can be saved and downloaded as spreadsheets for teachers to review, facilitating assessment and grading.

### Using what you have

Teachers without mobile devices in their classrooms can start by connecting their own personal devices to classroom projectors. As devices are purchased and made available in more classrooms, a full class set of devices is not necessary; just a few can greatly increase engagement and enhance instruction and learning in ways that promote critical thinking skills and creativity in ways never before possible. 

*Lisa Rodriguez is a technology and literacy teacher and ed-tech coach in Portland, OR. She has been teaching courses in education as an adjunct professor since 2010, when she received her Ph.D. in educational technology.*

## Creativity

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classroom as a place where imagination comes to life, naturally.

### Creative challenges

Moving our students into the realm of creativity often involves engaging them in challenges that require them to analyze and research issues, collect materials and ideas with which to respond, and then create a solution that communicates their new ideas.

A challenge might stem from a prompt such as "Select an item commonly discarded as garbage (e.g., small plastic beverage bottle) and come up with a new use for it that will benefit people." Students would first research the item, as well as ways people currently recycle it, then present their solution in a poster using graphics, text, and links to web-based media, and share it on the class blog. They might also be responsible for reviewing their classmates' work, choosing at least one to offer feedback for.

Students rely on a variety of search resources and their own sophistication in using them. Thinking tools like graphic organizers and outlining and prioritizing resources help them analyze information. Writing and illustration resources help refine their visions as drafts, trial conceptions, and mock-ups. And communications media lets them share their work with an actual audience, eliciting feedback.

This, by the way, is not just school stuff; it's today's real world of creativity. Understanding and becoming adept in it can and should begin in our classrooms.

Our students are not only naturally creative, they are growing up surrounded by digital resources designed to enhance and channel this aspect of thinking and working. Today's classrooms that reflect this will be the ones that are most effective in developing the creators and innovators of tomorrow. 

*Mark Gura is the author of the forthcoming ISTE book, "Make, Learn, Succeed: Building a Culture of Creativity in Your School" (May 2016).*

## Assessments

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rise. Today's rigorous standards, updated technology, and lessons learned from the NCLB era have given us both the capabilities and the know-how to do it effectively. We have the technology we need right now for very effective performance assessment, both curriculum-embedded and standalone. In conjunction with these assessments, we should look forward to more of the following:

- Students, individually and in groups, engaged in learning and assessment activities that involve digital research, exploration, collaboration, and organization tools
- Students producing scoreable products making use of tools to publish, storyboard, map, and create videos; students using presentation tools and apps for interactive white-boarding, screen-casting, and multimedia presentations
- Students storing their work and submitting it for evaluation via digital portfolio systems
- Teachers and others—anywhere—scoring student work and auditing scores using distributed scoring systems

These applications of technology are not new, but the NCLB era saw far too little use of them. We need to make greater use of the technologies we have now and, at the same time, make sure new tools don't drive us to practices that inhibit deeper learning. Emerging pilot programs in Ohio and New Hampshire are already making good use of technology and performance assessments. As educational reformers call for changes in the ways many teachers and students spend their time, the tools and technology already at our disposal can go a long way in supporting those changes—changes embodied in performance-based instruction and assessment. 

*Stuart Kahl is founding principal of the nonprofit assessment organization Measured Progress. A former elementary and secondary school teacher, Kahl frequently writes about the value of assessment in education.*

# One STEM course, four different teachers

A STEM rotation model engages students in projects with real-world implications

**By Patricia A. Wargo**

What does it mean to truly apply classroom knowledge? Years ago, application meant a comprehensive exam or essay. In today's educational environment, students are encouraged to apply what they've learned, not just on tests, but during multifaceted, multimedia projects that bring relevance to lessons and help students realize how their learning is used every day in the real world.

Walking into one of our four STEM classrooms at Huntingdon Area Middle School, you won't see students working quietly on worksheets. They'll be huddled up in small groups, collaborating, brainstorming, critically thinking about how to solve the world's problems. The expertise of four diverse teachers from different disciplines created a project-based, rotation model that has given middle school students a new realization that skills they learn in a classroom can be found in real-life situations, not just on a test.

In the summer of 2015, the district asked a technology teacher, a library media specialist, a math teacher, and a science teacher to create a STEM course that would be part of the students' daily class schedule. The teachers decided to split their 100 students among the four of them and rotate every three days. Over the course of a nine-week project, students would use knowledge from all four teachers to finish their multifaceted, cross-curricular projects.

## The 'Big Picture'

Undertaking a large project over a long period of time helped students digest content in smaller doses while allowing each teacher's strengths to shine during specialized and focused lessons.

"If I were to keep the same 25 kids for a semester, they'd have a great experience with aspects of science," Samantha DeMatteo, the science

teacher, told me. With the rotation, she added, students "are able to spend a few days focusing on other subjects in reference to the same project. Each day they can build on what they've already learned, which brings them one step closer to their goal: completing the project."

Teachers and students recently completed their second project of the school year, called "Artificial Island Real Estate Agent." Students created a 3D model of their island using scale drawings, rocks, and sand. The project also included research essays on environmental impacts, volume and mass calculations, and a comprehensive marketing plan to attract people to their newly created island. At the end of the project, students created models, brochures, drawings, and videos to guide a group presentation that they delivered to an audience of 100 of their peers.

"Students have to be great researchers to be great problem solvers, but they also have to be articulate communicators," said Sally Steward, the STEM library media specialist. "During the artificial island project, students were asked to create an advertisement and marketing plan to sell the homes on their island. We went in-depth on persuasive writing, copyright laws, plagiarism, and how to analyze media when differentiating credible and non-credible sources." Although Steward doesn't teach one of the traditional STEM subjects, we view research and writing as a major aspect in the big picture focus for our STEM course.

## Helping students and teachers focus

When it comes to content and grading rubrics, the team uses Defined STEM, an online curriculum supplement with hundreds of lessons that put student prompts, videos, and articles at their fingertips. The Huntingdon STEM team chooses four performance tasks to

complete during the school year, and dissects the content to fit each of their strengths.

"I like that I am not pretending to be the expert on certain topics or spending hours outside of class each week teaching myself about environmental impacts and muscular systems to teach my lessons," explained math teacher Ben Young. "We use each other as references and to bounce ideas off of. But even better, the students use us in the same way and can easily see how our disciplines aren't that different after all."

The format forces the teachers and the students to use their time wisely, because they know it's limited. Technology teacher Matt Rakar said that students are rarely bored or distracted because of all of the activity happening in the classrooms. And, Rakar said, hands-on projects that used to "scare" him have now become the most fulfilling part of his work.

To integrate their work with Huntingdon's curriculum, the STEM team works with core teachers to align projects with standards. Math and science teachers have reported increased test scores and engagement in their courses thanks to the hands-on experience from the STEM team.

Dividing long-term projects into attainable tasks helps students grasp concepts at a rate they can keep up with, and challenges them in a variety of subject areas. The multifaceted projects and the rotation model create an environment where students can relate their knowledge and skills to the real world, which makes the STEM course not only educational but fun. 

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*Dr. Patricia Wargo is the director of education at Huntingdon Area School District in Huntingdon, Penn, and oversees the Huntingdon STEM team.*

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Co-Founder Larry Siegelman 1954-2002

# Confessions of a teenage tech addict

As kids get older, cries for strict limits on their screen time tend to taper off. By the time students hit high school, many are accustomed to texting in the hallways or even sneaking a peek at Facebook during dinner. But is the laissez-faire approach to device use actually enabling addictive behavior? Parents think so—and so do many of their kids, according to a recent Common Sense Media poll of 1,200 parents and teens centered around technology use and addiction. Multitasking, toggling between multiple screens or between screens and people, which is common for kids doing homework or socializing, can impair their ability to lay down memories, to learn, and to work effectively, according to the report. Here's a bit of what the teens (and their parents) copped to:



Say they're addicted to their mobile devices

**59%** of parents  
**50%** of teens

Say that their teens spend too much time on their mobile devices



**66%** of parents  
**52%** of teens agreed

Feel the need to immediately respond to texts, social networking messages, and other notifications



**48%** of parents  
**72%** of teens

Check their devices at least hourly



**69%** of parents  
**78%** of teens

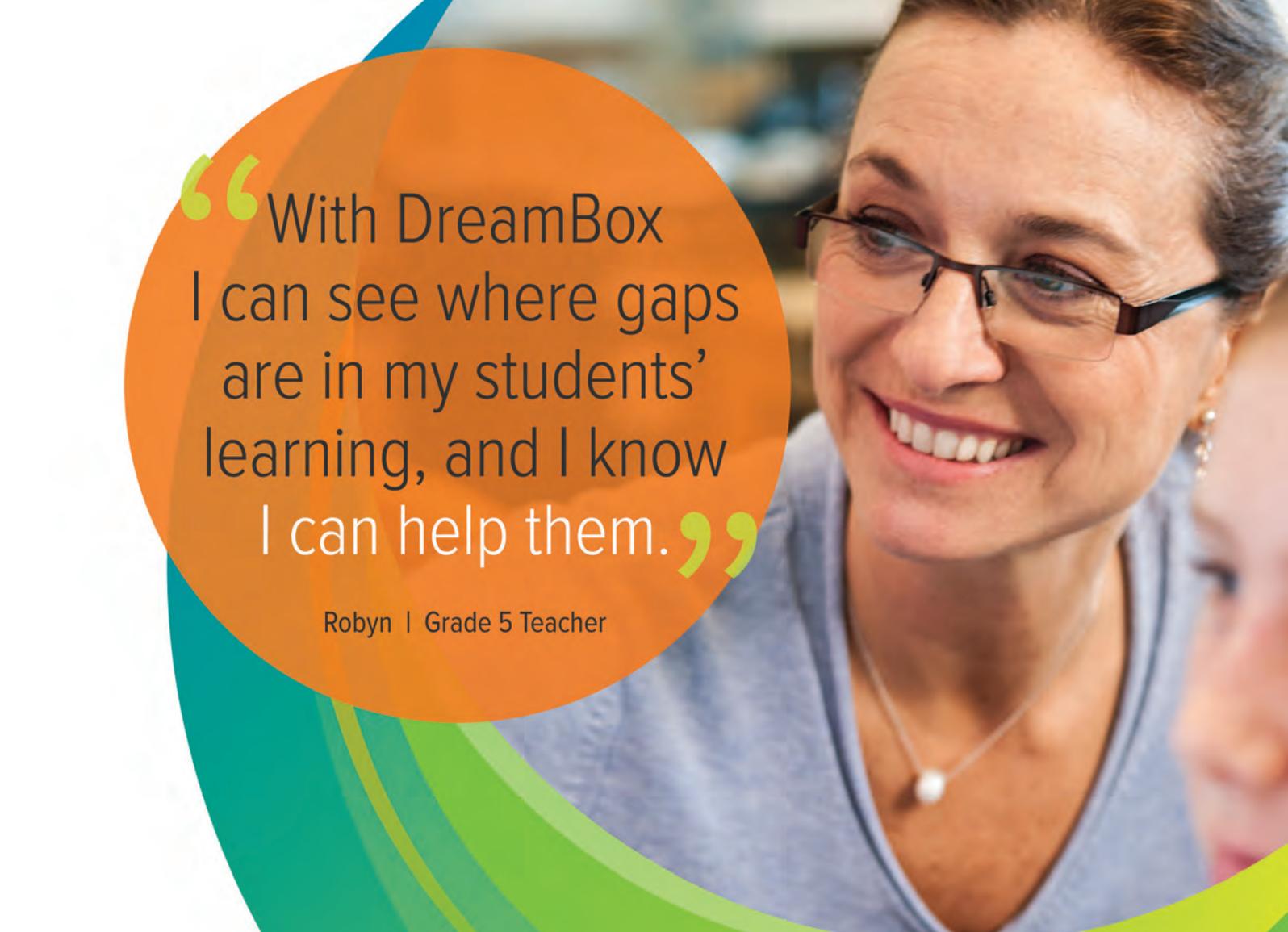
Try to occasionally reduce the amount of time they spend on devices



**50%** of parents  
**33%** of teens



Source: "Technology Addiction: Concern, Controversy, and Finding Balance" by Common Sense Media



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