

THE CENTER FOR DIGITAL EDUCATION'S

# converge

Q2 2016

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## Inside:

Can analytics  
get an A grade?

The yellow  
school bus  
goes wireless.

How good is  
virtual reality?

Richard Culatta's

Rhode Island's  
chief innovation  
officer wants to  
bring new ideas  
to education.

# CRUSADE

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AJ REYNOLDS

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**Two years ago, Baltimore County Schools** made a commitment to personalize learning. In doing so, the nation's 25th-largest school system created an initiative called STAT (Students and Teachers Accessing Tomorrow), which included moving to a digital curriculum and putting devices in the hands of more than 111,000 students. Superintendent Dr. Dallas Dance developed a plan with his staff and other stakeholders, and they are executing it with precision. Today, results from an independent study conducted by Johns Hopkins University indicate classrooms involved in the initiative are becoming more learner-centered to personalize the overall educational experience.

Baltimore is one of several districts nationwide taking on the digital learning challenge. In fact, 90 percent of the K-12 districts surveyed by the Center for Digital Education (a division of e.Republic, which publishes *Converge*) are either planning or moving to personalized learning. Higher education is also taking on personalized learning to include granting credit for prior learning or work experience, or creating customized pathways for graduates based on defined competencies and meaningful outcomes. This is great news for families and communities because personalized learning is more tailored to individual student needs, interests and outcomes.

The road to personalization isn't easy, but educators can find a partner to share the journey and who can sometimes act as a guide. Omaha Public Schools have partnered with Common Sense Education (formerly Common Sense Media), which supports funding for professional development and design curriculum around digital literacy. The online New Charter University is partnering with Santa Rosa Junior College in California to offer online and blended courses so that Santa Rosa students may complete the last two years of their bachelor's program online.

Personalized learning is about transformation, which the dictionary defines as changing in form, appearance or character. When we claim a transformation in education we need to be sure it truly is a transformation and not just a transition. Transition may mean the teaching practices look the same but new tools are replacing old tools. Transformation indicates the teaching and learning practices are no longer what they used to be but have transformed into something more engaging and enlightening for students.

In an age of personalized banking, health care and shopping, we're ready to have education institutions committed to personalized learning. The common thread throughout these experiences is the role of technology. This issue of *Converge* highlights some of the technologies that are making education both personal and transformational, from analytics and Wi-Fi to open education resources and virtual reality. And our cover story on Richard Culatta profiles one man's efforts to generate transformational change in Rhode Island.

Digital education, like personalized learning, takes time to implement, but as the articles in this issue demonstrate, the benefits to our students will be transformational.

*Dr. Kecia Ray*

**Dr. Kecia Ray**

*Executive Director, Center for Digital Education*

CENTER FOR  
**DIGITAL**  
EDUCATION

The Center for Digital Education is a national research and advisory institute specializing in K-12 and higher education technology trends, policy and funding. CDE advises the industry, conducts relevant research, issues white papers, and produces premier annual surveys and awards programs. CDE also hosts events for the education community. CDE's media platform includes the Center for Digital Education Special Reports, an online resource site, email newsletters and custom publications.  
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Analytics  
can drive  
better  
outcomes  
in education,  
but the  
process  
isn't easy.

By Adam Stone

# Predicting Scholastic **SUCCESS**



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**Administrators in the Spokane Public Schools in Washington** used to pore over spreadsheets and PDFs to see which students might be at academic risk. By the time they had interpreted the information, it was often too late to act. Now they are using sophisticated analytic techniques to gauge student performance in real time, and district leaders say it is making a world of difference.

“You can’t have a process that takes two or three weeks to give you a report. If you are going to intervene early, you have to know right now,” said Chief Academic Officer Steven Gering.

Spokane is on the cutting edge of a trend that uses analytics as a means to improve the quality of K-12 and higher education. Proponents say these techniques can help to shape course content, improve student outcomes and even boost enrollment in the competitive higher education landscape. At the same time, however, a number of hurdles must be overcome in order to reap the full benefits of analytics.

**M**any academic institutions are struggling to put their data to work. According to KPMG’s recent Higher Education Industry Outlook Survey, 39 percent of the respondents said adopting new analytical techniques is a top data challenge, and just 29 percent report using data to inform strategic decisions. Still, 36 percent say that while they have good data, they lack the resources to conduct analyses.

At the same time, schools are under increasing pressure to put data to work, according to Gartner Research Director Glenda Morgan. In K-12 education, public funding has become increasingly contingent upon the ability to demonstrate outcomes. In higher education, schools are pushed by competitive pressures to show graduation rates and academic success in order to recruit and retain students.

Arguably, solid analytics could help schools to achieve these ends. The corporate world thinks so: Gartner predicts that the use of analytics as a way to drive decision-making will be the top CIO priority through 2017.

How will that play out in education? It all begins with the data. Right now access to relevant data is a mixed bag in education. In some cases data can be culled from universal sources, especially through standardized testing, where results are likely to be automatically aggregated for easy comparison across local, state and even national benchmarks.

Some schools can also do this with internal data relatively easily. As a nonprofit online school, Western Governors University can cull data on enrollment, attendance, grades and even which questions an individual student got right or wrong on a test. “We have mapped all our assessment

items to individual learning outcomes, so we have a really good understanding of what areas students are doing well in and what areas they need to improve,” said Jason Levin, the university’s vice president of institutional research.

Sometimes data is harder to come by. K-12 teachers, for instance, may have to enter scores, attendance and other markers manually on a spreadsheet. In KPMG’s survey, higher education leaders said they struggle with data residing in multiple locations (60 percent), as well as with the quality of data available (40 percent).

Once data is acquired, by whatever means, it enters an analytics process typically comprising three key elements: a data warehouse, a processing tool and a visual presentation component. It’s in that middle phase — the software component — that the number-crunching takes place, and this can take numerous forms. For example, software may assign a risk profile when students are not on track; it may cross-reference performance among many students to see where a teacher can improve; or it may use outcomes to determine where course content can be improved.

Analytics also can align attendance with geography: Maybe kids are late because there’s no public transportation available. Or a district might look at demographic factors. Are kids from single-parent households having a harder time? While the price tag of such analytic tools can vary widely, costs typically include new



Chief Academic Officer **Steven Gering:** “Analytics means more than just understanding the data. This is about looking at grades daily.”

CONTINUED ON PAGE 8



## Spokane Analyzes for Attendance and Performance

**With 30,000 K-12 students,** the Spokane Public Schools are an early entrant into the analytics arena, with a Web-based effort to compile, correlate, interrogate and disseminate a range of student data.

“In the old way of doing things, data was dead. Somebody downtown would suck out the information, put it into Excel spreadsheets and make a PowerPoint, or make charts and tables and graphs, and then send it out to schools,” said Chief Academic Officer Steven Gering. Analytics means more than just understanding the data. “This is about looking at grades daily.”

The data dive goes beyond just grades. Running business intelligence tools from Tableau Software on a virtualized server, the school district brings together grades, attendance, behavior and test scores, weighted to paint a picture that identifies at-risk students. In three years, graduation among at-risk students rose nearly 8 percent, from 76.6 to 84.5 percent.

Assessment goes both ways. In addition to looking at student performance metrics, administrators also collect student feedback on teacher performance, school safety and other factors that might be addressed at the school or district level. Course content and other variables can be adjusted accordingly.

The school used a Microsoft SQL Server database to construct a data warehouse that pulls this information from a range of sources, including a student management system that tracks attendance, discipline, test scores and other metrics. The Tableau software presents the information in a dashboard, as well as in a variety of reports.

That visual access has been a major driver of success thus far. “We are able to connect data we have never been able to connect before,” said Gering. “Principals can see all their data side by side, in a single view, all on one screen, where before I used to get a binder from the district, a report here, a spreadsheet in the mail, and we expected principals to somehow do something with all of this.”

The path has not been without its bumps, and Gering’s team has learned some important lessons about the nature of metrics.

“We can get a number that looks wrong and we can say, ‘Fix this.’ Then we get unintended consequences,” he said. “It is easy for a principal to fix a graduation rate. You just pass all your kids.”

Sometimes the problem lies in a faulty curriculum or some other factor that goes deeper than a quick fix. Gering tries to present the data in a way that will make that deeper need apparent.

“We want to help them get at the real solution, to get past whatever might be inhibiting them from moving forward,” he said.

## Stemming Enrollment Decline at the University of North Carolina

While charged with fulfilling a range of educational priorities, administrators at the University of North Carolina (UNC) System have paid special attention lately to the state's looming teacher shortage. Specifically, they have been looking to analytics to help close the gap in teacher training.

The system operates 15 teacher-training colleges statewide, and while the schools have trained more than 20,000 newly licensed teachers over the past five years, enrollment has dropped by about 30 percent since 2010. "We have some information about why these enrollments have declined, we have theories and assumptions, but we are still painting the whole picture and the analytics are helping to do that," said Alisa Chapman, vice president for academic and university programs at UNC.

To sort it out, planners weigh a range of factors: Do students come from North Carolina or other states? What do their evaluations look like? How long do they stay in the job? What is their instructional practice? By cross-checking all of these, they can pinpoint which teacher trainees are likely to complete the coursework and succeed in the classroom.

"That allows us to refine and make programmatic adjustments where they are needed most, as opposed to making broad sweeping changes that might be changing something we are already doing really well," Chapman said.

An advisory committee drawn from among state educational leaders helped draft the initial criteria, and a newly formed committee of national experts plans to meet quarterly to oversee the ongoing research. The results of this work appear on an online database and an educator dashboard. Both use data visualization and analytics from software firm SAS; both ensure broad public access to the university's research and trend data.

This transparency is a critical piece of an analytics program in a public institution, said Chapman. Tight budgets and, as educational institutions gather more data about students, privacy concerns are increasing pressure on school leaders to make information visible so that everyone can see what is being collected and how it's being used, a trend that puts new expectations on any emerging analytics program.

"People can be dismissive of a printed report, but with a publicly visible dashboard they are asking very detailed questions and we have to be responsive to what those outcomes mean. It has really changed the conversation," Chapman said. This puts new pressure on administrators to get it right the first time, but it also creates the opportunity for more effective policymaking. "It allows us to skip over to a higher level of conversation."

CONTINUED FROM PAGE 6

software, added storage capacity, and training for personnel who will enter data or access information.

Ultimately, the outcomes of these investments should be concrete, including enhanced student performance, better retention rates in higher education and improved graduation rates at all levels.

"We don't say that technology is the only answer, but when we do look at technology, we want to find tools that can enhance student learning and student success," said Bill Moses, managing director of education programs at the Michigan-based Kresge Foundation, a \$3.6 billion organization that supports education and diverse social needs.

"Right now we see analytics as addressing the fundamental processes of delivering education," he said, noting that today's data tools are a significant leap forward from yesterday's spreadsheet-driven world. "In the past, decisions would be based either on very old information or else on gut instinct. Having real-time information means you know where students are currently, and it also means you have the potential to act on that in real time."

Moses' criteria for a sound analytics investment present a meaningful rundown of what the best of these solutions can offer. He is looking for:

- **Rapid turnaround:** The ability to analyze data and get it into teachers' hands quickly.

- **Holistic view:** A data approach that looks beyond grades and attendance to consider wider social issues, administrative bureaucracy and other factors outside the classroom.
- **Legibility:** Solutions that present key findings and action suggestions in readily digestible formats.
- **Scalability:** Analytics must be reproducible outside a single class in order to use the investment campuswide.

**E**ducators and tech experts point to a number of potential hurdles in implementing any analytics solution. One needs reliable data, as



FILICAR/DEEP ROOT

## Early Warning Analytics at Western Governors University

**In four years, the nonprofit online** Western Governors University has grown from 32,000 to 70,000 students. Despite the challenges that may come with rapid growth, success metrics have risen steadily in that time. The school claims a 37 percent graduation rate among undergraduate students 25 and older, 10 percent higher than the national average. WGU projects graduate rates will rise to 45 to 50 percent among students admitted in recent years.

“Certainly there are other factors involved, but we know that analytics has been a big part of that whole picture,” said Jason Levin, vice president of institutional research. The crux of the school’s analytic effort is the ability to give teachers early warning when a student may be in trouble academically. To get there, Levin’s team has implemented Talend, a software tool to perform extract, transform and load functions, feeding data into a central repository and formatting it for analysis by IBM Cognos, which sits on top of an Oracle data warehouse.

The system drills down into specific test scores, measuring academic performance as the key indicator of an at-risk situation. “The best measures are measures of actual learning, and that’s what this is,” Levin said.

Based on statistical analysis, the system will broadcast a green, yellow or red alert to teachers, flagging potential problems. By correlating course assessments and other factors over time, the system also can draw attention to possible changes needed in the curriculum.

It takes a lot of hands-on effort to make the system work, including three engineers and three analysts who respond to daily requests for new dashboards and data tracking. “There is an endless queue of stuff that can be done,” Levin said.

Having multiple eyes on the system helps to ensure success, since metrics are as much about the process as about the product. “These dashboards and reports have to be meaningful and useful, and you have to be sure of the validity of these things, so there has to be some governance,” said Levin. “Someone always needs to be asking, ‘What are the important processes here? Who is going to be responsible for that?’ So we have built a lot of internal audits into the system.”

well as thoughtful policies for its use. Educators must be trained to interpret the findings, and public concerns about the privacy of data must be addressed. In some cases, the technology investment may simply be out of reach, especially for smaller school districts. There’s no silver bullet, except to say that each of these issues must be addressed in any analytics program.

In the end, the outcome of all this work may come at the district level, with the formulation of policies that respond specifically to verifiable information. For many, though, analytics will play out locally as a means to drive early intervention. When the numbers can highlight a negative trend and

send up a red flag alerting a teacher to potential trouble, that’s when analytics really prove their worth.

This means putting findings to use at the ground level. In Prince George’s County Public Schools in Maryland, for instance, measures and indicators are fed to the district, but findings ultimately get passed back to individual schools to determine interventions. Principals and teachers may call for parent-teacher meetings, along with student meetings. They also may use the data to improve communications among teachers or to drive classroom support efforts for at-risk kids.

Janeal Maxfield likewise looks to keep the analytic outcomes close to home. As elementary instructional

specialist for the North Thurston Public Schools in Washington state, she has driven implementation of an online math curriculum from ORIGO, a system whose assessments are used to generate a fuller picture of students’ learning status. That information in turn goes right to those on the front line via reports at the school, teacher and class levels.

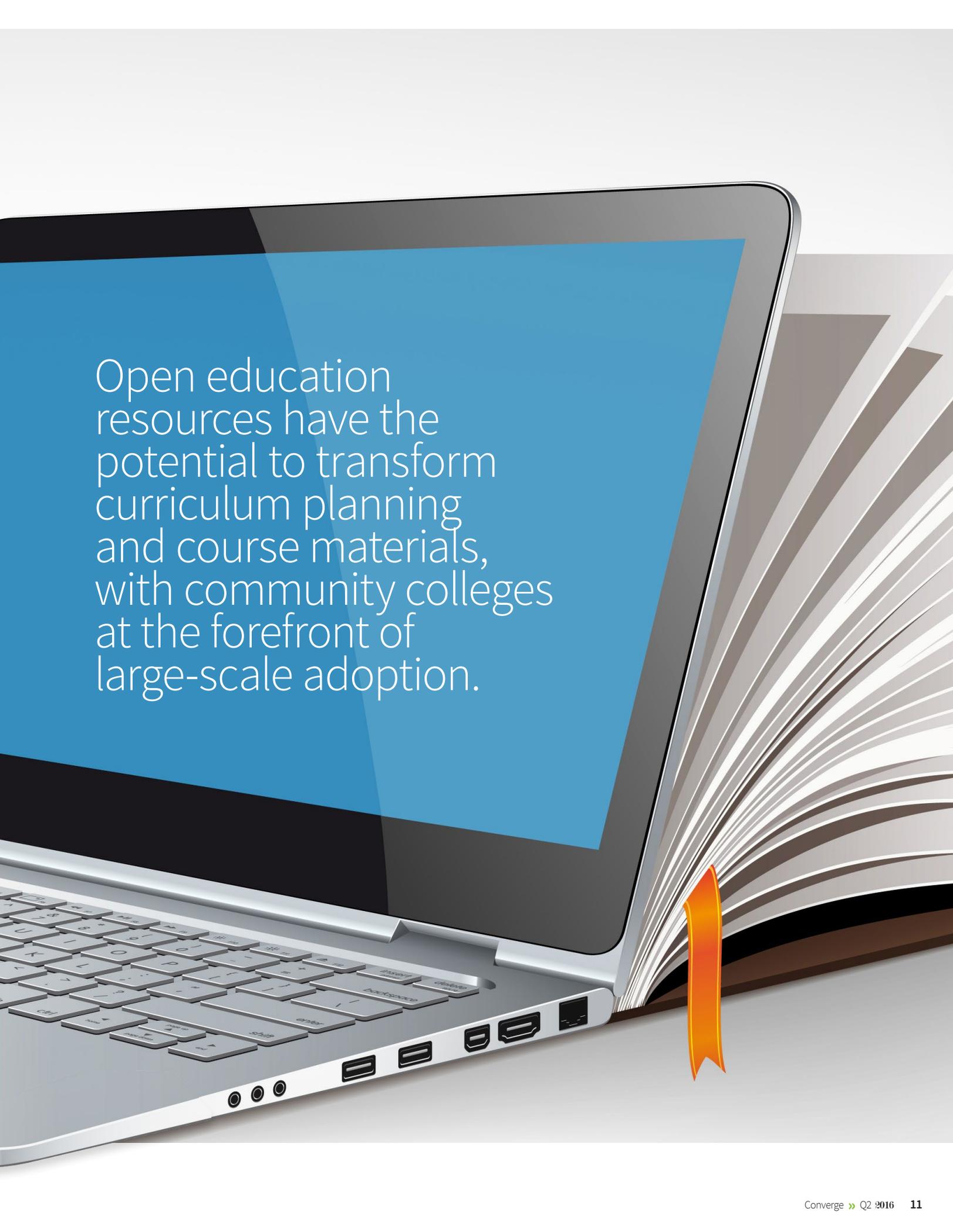
“If we were to keep the data at the district level, it would get stale to the point where there is nothing the teachers can really do about it,” Maxfield said. “So we put it in the hands of the principal and the teachers, since they are the ones taking action — they are the ones who take that data and put it to use in the classroom.”

Leading the

WAY

By Lisa Kopochinski





Open education resources have the potential to transform curriculum planning and course materials, with community colleges at the forefront of large-scale adoption.

**I**n an effort to lower education costs and create an environment where faculty can have greater freedom in their teaching methods and content, community colleges are utilizing open education resources (OER) and transforming the way they operate.

While four-year colleges are often more decentralized — with each professor determining which textbooks are required and creating a syllabus — community colleges are driving OER forward because their curriculums and syllabi tend to be set systemwide.

“Community colleges are at the forefront of OER adoption on a large scale,” said Barbara Illowsky, dean of basic skills and open educational resources for the California Community Colleges Online Education Initiative. “Community faculty spend their time teaching and improving their teaching [methods], instead of having a research requirement.” A mathematics and statistics professor at De Anza College in Cupertino, Calif., since 1989, Illowsky was the first project director of the Community College Consortium for Open Educational Resources (CCCOER).

students and were using primarily public-domain and free (but not openly licensed) materials in their classrooms.

Today there are grant programs such as the Trade Adjustment Assistance Community College and Career Training and many privately funded and state efforts that have helped to grow awareness and also development of OER.

“CCCOER joined the Open Education Consortium a few years ago,” said Illowsky. “We now have over 250 community college members throughout the U.S. and Canada.”

With member colleges in 20 states and provinces — including system memberships in California, Florida, Maryland, Michigan, Oregon, Virginia and Washington — CCCOER is committed to providing support, training and resources for college faculty and administrators who are enhancing teaching and improving student success through OER adoption.

“Some states such as California have passed legislation [SB 1052, SB 1053, AB 798] supporting OER adoption,” Illowsky said. “And Achieving the Dream is providing \$100,000 grants to colleges for developing zero-textbook-cost degrees at community colleges.”

converting whole degree pathways so that students can complete a whole degree pathway having never purchased a traditionally published textbook. My experience with CCCOER is that colleges enter into open education projects in a variety of ways and for a variety of reasons.”

For the most part, West said, colleges want to address three main issues by implementing OER:

**1** **Increasing access** by cutting textbook costs, which is the most obvious and easily understood reason to start open education projects.

**2** **Using OER as a way to energize** new pedagogies. Open resources can inspire institutions to evaluate learning outcomes and curricula that have been previously defined by textbooks. A college can evaluate what it is teaching, why it is being taught and strive to create classes that will better serve students.

**3** **Using OER to inspire faculty.** With more freedom in adapting and adopting open materials, many colleges have found greater collaboration among faculty of different disciplines or even collaboration outside of the institution.

“On a more concrete level, colleges are doing a lot of things to support open education,” explained West. “Some colleges set goals of dollar savings for students. For example, the Maricopa Millions project from the Maricopa Community College District in Arizona is working to save students \$5 million in five years. While other colleges, like my own, are building open education resource degree pathways. The Pierce Open Pathway is a university transfer degree where students never pay for textbooks. There are many colleges nationwide that are currently focusing on OER degree pathways.”

Charles Key is executive director of COT Education in Cupertino, Calif., an independent 501(c)(3) organization with a mission to create and support programs that increase access to affordable lifelong learning.

“By eliminating textbook costs, a student may be able to reduce the cost of his or her degree by as much as 25 percent.”

CCCOER was founded in 2007 by Martha Kanter at the Foothill-De Anza Community College District to provide a voice for community colleges in the open education community. Nine years ago very little OER existed that was appropriate for two-year college curriculum. Faculty were concerned about the costs of textbooks for their

Quill West, open education project manager at Pierce College District in Tacoma, Wash., said community colleges have varied approaches to implementing OER initiatives. “Some colleges are supporting pockets of innovation where small groups of faculty work to adopt open materials, while others are investing heavily in



**Quill West,**

Open education project manager for the Pierce College District in Tacoma, Wash., said community colleges have varied approaches to implementing OER initiatives.



Key said at many colleges across the country the adoption of OER is still happening from the bottom up, driven by individual instructors.

“At others, whole academic departments come together to adopt OER across all of their courses,” he said. “For instance, the Scottsdale Community College math department in Arizona has had remarkable success with this approach. I expect that there are some colleges where adoption is being driven top-down, with the administration mandating or encouraging adoption campuswide.”

Key said OER provides enormous cost-effectiveness at the community college level, largely because the same teaching resources are being used as those for lower division courses at four-year colleges. “And because tuition is generally much lower at two-year colleges, teaching materials account for a much greater chunk of the total cost of attending,” he added.

Linda Williams, a professor of business management and administration at Tidewater Community College (TCC) in Chesapeake, Va., said removing textbook costs as a barrier to student access and success is probably the single largest driver of OER adoption at community colleges. “By eliminating textbook costs, a student may be able to reduce the cost of his or her degree by as much as 25 percent.”

Other benefits of OER include students having access to all course content on the first day of class.

At TCC, OER is used in a systematic way to replace publisher content in entire degree programs. It is this approach that has resulted in the nation’s first Z-Degree (zero-textbook-cost) with TCC’s associate of science in business administration program.

“Other colleges have focused on disciplines and have adopted OER to replace publisher content in all English or math courses,” Williams said. “At a large number of colleges, the OER movement is confined to pockets of ‘early adopter’ faculty who have engaged with the open education

community. Among these faculty, we see a spectrum of adoption as well with some faculty converting their course to all OER and others using OER as a supplement to traditional content. Even if a college is not actively pursuing OER in their courses, OER is helping to start conversations with publishers and bookstores about low-cost alternatives for course textbooks and materials.”

**W**hile it’s easy to see the benefits that OER offers, it has its drawbacks. For instance, Williams said when TCC faculty have been surveyed, the same set of “barriers to adoption” continue to be identified.

These include the amount of time required to locate, vet and adopt content to replace traditional textbooks; the lack of large banks from which to create assessments; the lack of knowledge about licensing and what is and is not OER; and difficulty locating discipline and course-specific OER content that’s aligned to outcomes.

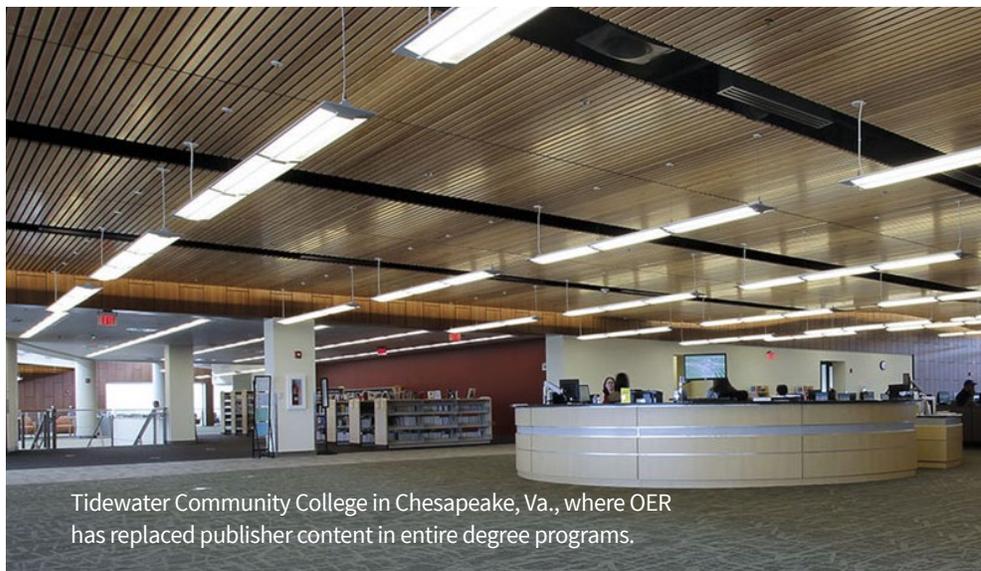
Key said one of the historic weaknesses of OER has been the relative lack of ancillaries (study guides, quizzes, etc.) that accompany the textbook. “OER adopters have

traditionally had to provide their own ancillaries, while the major publishers can provide turnkey solutions that include everything from lesson plans to tests to sophisticated tracking of student activities,” he said. “This lack of support can make use of OER particularly challenging for community college instructors, who typically carry a very high teaching load.”

The other problem is that OER remains difficult to find. Traditionally most OER have been produced by individuals who then store their works on private websites or other distributed platforms.

“Although there are some listing services such as [collegeopentextbooks.org](http://collegeopentextbooks.org), there is no global authoritative directory of OER,” said Key. “The advent of curated repositories — sponsored by either an institution, system or a government entity — has made it easier to locate high-quality OER, but there are still many worthwhile products available that remain difficult to locate. Community colleges can be particularly affected since they may have fewer resources available to search for OER.”

Mark Jenkins, director of e-learning and open education for the Washington State Board for Community and Technical Colleges, said their research has shown that one of the barriers



Tidewater Community College in Chesapeake, Va., where OER has replaced publisher content in entire degree programs.

to OER adoption was a lack of fit between institutional policies around intellectual property and the ways that OER allows faculty to work.

“That’s not an OER problem,” he clarified. “That’s a problem anytime you introduce a new innovation or strategy into complicated organizations. Our response is to support OER implementation by creating language around ownership that meets institutional and faculty needs — little things like that are important for ‘norming’ OER in colleges.”

Another challenge is that OER can be time-consuming to curate and adapt, and that the techniques for being effective can be rather specific, Jenkins said. “That’s something that can be addressed through providing easy access to professional development opportunities and support services. We provide opportunities to learn and have no shortage of willing and enthusiastic participants.”

It’s clear that when looking at both sides of the OER equation, the pros definitely outweigh the cons.

Una Daly, director of curriculum design and college outreach for the Open Education Consortium in the San Francisco area, said that in addition to significant savings to students over the past five years, their research has shown that learning outcomes for students (e.g., exams and class grades) have stayed the same or shown a slight improvement with use of OER.

“Retention and persistence data for students taking classes where OER is used appear to be improved, but more research in this area is needed to understand the drivers,” she said.

From a faculty perspective, the choice to move to OER is generally voluntary, and thus their motivation is strong.

“Many faculty select OER because they don’t want to teach to a textbook, but want to customize the learning experience for their students, which OER supports,” said Daly. “Switching to open content for a course involves work for faculty and other instructional

staff and colleges who recognize that the value of this work will support it through release time or stipends. Faculty who use OER report that one of the benefits is more collaboration with other colleagues and staying more current in their discipline.”

**A**s for what is next, there has been some discussion that OER could make it so that 80 percent of curriculum is free, allowing students and school systems to invest their money into resources besides textbooks. But is this figure too enthusiastic?

“As far as the 80 percent number as a specific idea, I have no idea about that,” said Jenkins. “In the short term it seems too optimistic in our system, but I’ve been amazed by the rate of change in the OER community. New business models, easier adoption, better products and services are emerging all the time, and if you combine those usability factors with the incredible growth in policy support at the global, federal and state levels, it’s not unreasonable to say that OER is making serious inroads and that the rate of change is accelerating.”

Williams, meanwhile, believes the 80 percent figure for a free curriculum is an easy target to achieve and may already be an accurate estimate. However, she wonders whether the better question to ask is whether 80 percent of the curriculum will be “open.”

“To reach this target, content will need to be released for public access with intellectual property rights that specifically endow the user with the rights to revise, remix, redistribute and retain the content. If we ask if 80 percent of curriculum can be ‘openly licensed’ in the not-too-distant future, then the answer is that it is possible, but it will not happen quickly.” 🟢



## ADVANCING OPEN ED

State leaders across the country are sending the message that they will support schools that adopt openly licensed educational resources.

The U.S. Department of Education announced 13 state commitments to advance OER at a #GoOpen Exchange event on Feb. 26. With OER, educators pull learning materials from a variety of sources at no cost and can mash them up in their classrooms to help students learn.

“When we started, there was no guidance, no support for doing this,” said Joseph South, director of the U.S. Department of Education’s Office of Educational Technology. “#GoOpen states make open education resources the center of their state’s strategy.”

### The 13 #GoOpen states are:

- Arizona
- Georgia
- Indiana
- Maryland
- Michigan
- North Carolina
- Oklahoma
- Oregon
- Rhode Island
- Utah
- Vermont
- Virginia
- Wisconsin

Along with these states, 31 school districts pledged to replace at least one textbook with OER material in the next year. Nine other ambassador districts that already have taken steps toward implementing OER will mentor them through the transition.

JESSICA MULHOLLAND AND TANYA ROSCORLA

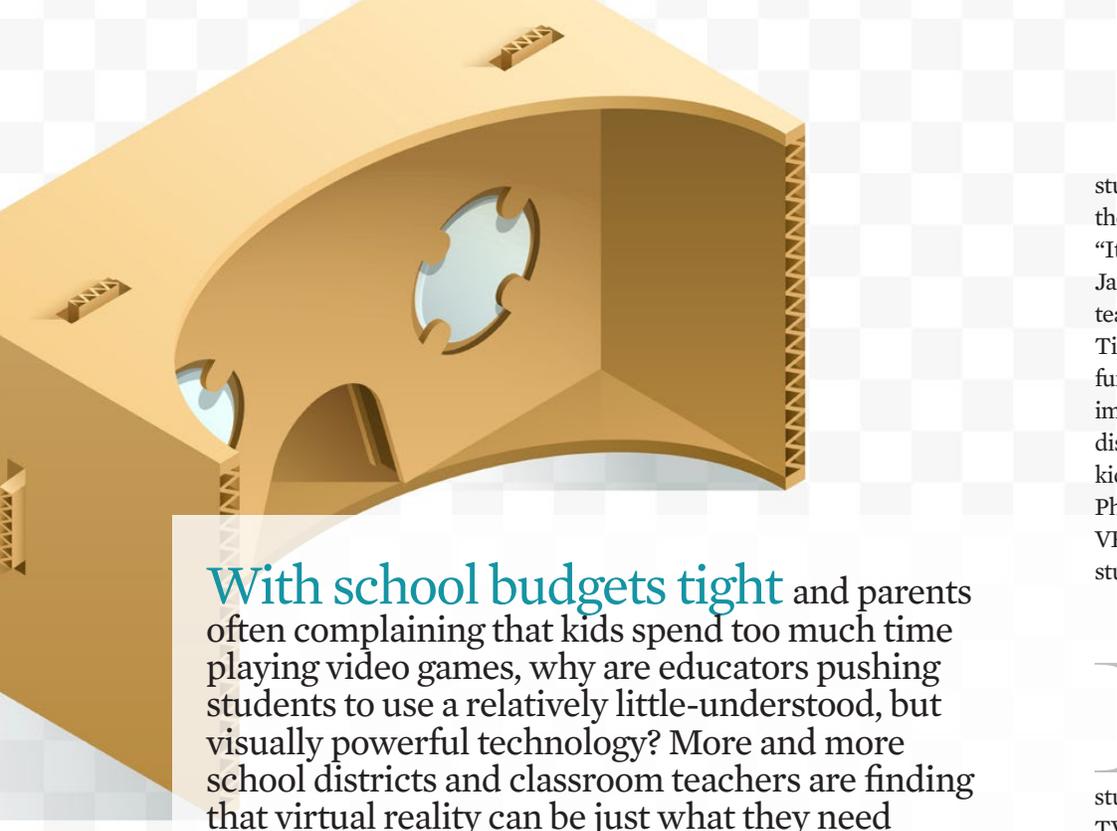


A student in a dark blue polo shirt is wearing a VR headset, holding the cardboard front piece up to their eyes. They are smiling and looking towards the camera. The background is a blurred classroom with bulletin boards and a red fire extinguisher. A large, semi-transparent 'V' is overlaid on the image.

*Virtual reality has  
made inroads with  
K-12 education, but  
is it really helpful?*

*By Jennifer Snelling*

# VIRTUAL FUTURE



**With school budgets tight** and parents often complaining that kids spend too much time playing video games, why are educators pushing students to use a relatively little-understood, but visually powerful technology? More and more school districts and classroom teachers are finding that virtual reality can be just what they need when classes can't afford to take a field trip across town, much less to another state or overseas. And that's just the beginning of the possibilities that VR offers. With affordable devices such as Google Cardboard, a growing number of virtual experiences are suddenly available to students everywhere.

While data on just how widely virtual reality is used in schools is hard to come by, anecdotal evidence and the rate at which VR apps and devices for educational purposes are popping up suggest that educational VR is here to stay.

Long considered a novelty for gamers, VR is making the transition to the classroom for two key reasons: affordability and available content, according to Maureen Brown Yoder, professor of education technology at Lesley University. Inexpensive equipment, offered most notably by Google Cardboard, is helping VR with the affordability issue, while an increasing number of apps aimed at education are helping make content accessible. "VR has been around for many years, but I don't think it was very widely used at all in education," said Yoder. "But the real difference is that now there's better content."

Right now, anyone with a smartphone and a cardboard headset

can experience free VR programs produced with 360-degree cameras. More sophisticated headsets are readily available from Oculus Rift, HTC Vive, Open Source VR and Samsung, but cost from \$300 to \$1,000 each, making them cost-prohibitive for most school districts, unless they're donated.

In May, Facebook announced that its company, Oculus VR, the Menlo Park, Calif.-based startup behind the VR headset known as the Oculus Rift, is piloting programs with an educational component. Dubbed VR for Good, the program will donate gear to San Francisco schools and connect students with professional filmmakers to produce three- to five-minute, 360-degree videos about their community.

Google Cardboard, however, is the real game changer for VR in schools. The cardboard and Velcro headsets open up the world of virtual reality for as little as \$7 per device.

In its simplest form, VR allows teachers to show, rather than tell, their

students about places or times that they wouldn't be able to visit otherwise. "It provides equity in access," said Janice Mak, an instructional coach and teacher from Phoenix. "I've taught in Title I [a federal program to provide funding to local school districts to improve the academic achievement of disadvantaged students] places where kids have never traveled outside of Phoenix, even to the Grand Canyon. VR is about bringing the experience to students everywhere at very little cost."

**D**oes the technology's growing availability translate to value in the classroom? Imagine a student sitting at a desk, looking at a TV set or a computer monitor. Her eyes may appear to be focused on that screen, but she may also be looking out the window to the playground. If she's looking through a VR viewer, all distractions are blocked out. "When adults first look through viewers, they just look through the viewer, straight ahead," Yoder said. "But give one to kids, and they're looking around, looking backward. The view is 360 degrees." And that includes only intended content.

Cutting out distractions is just the beginning. In using a format that children are familiar with through games, teachers can present content more effectively. A study published in *Nature Biotechnology* found a "76 percent increase in learning outcomes when student[s] used a gamified lab simulation ... and a 101 percent increase when they used it in combination with traditional teaching methods." Those are some rather promising numbers.

VR has the power to excite kids in a way that textbooks and worksheets don't. Barbara Mikolajczak, marketing and community relations manager at the Immersive Education Initiative, runs VR camps and classes for students in the Boston area. Her pupils have worked with other students from Australia in Minecraft, a virtual game where

users can create their own world or experiences, to build a virtual version of the Old North Church in Boston.

“The students were so excited about converting meters to feet,” Mikolajczak said. “They realized that the doors wouldn’t be in the center, so that evolved into a lively discussion about what’s more important: the pure numbers or the symmetry of design. You wouldn’t have seen that in a normal lesson about the Old North Church.”

Jaime Donally, instructional technology coordinator at the Gladewater Independent School District in Texas, said virtual reality can also help kids be open to experiences that may scare them. “Students who may be afraid to go underwater or can’t swim can go to the Great Barrier Reef. It gives them that experience, a toe dipped into the water, to see what it’s about,” Donally said. “It may inspire them to be explorers and take risks in the class.”

The opportunities don’t end with VR. There’s also augmented reality (AR). Whereas VR replaces the real

world with a simulated one, AR uses elements in the real world that are supplemented by virtual ones. AR builds upon the physical world by displaying information overlays and digital content tied to physical objects and locations. Microsoft HoloLens and Eon Reality devices are examples of this technology, although AR apps also will work with a phone or tablet.

With an AR app, you can point your phone at a picture in the book and it comes alive so that the dinosaur in the picture growls or, in the case of the Anatomy 4D app, it lets you study a picture of a heart while it’s pumping.

As Yoder suggested, content is key. Last October, *The New York Times* sent Google Cardboard viewers to 1.3 million people and released a film, *The Displaced*, about children caught up in the global refugee crisis. The newspaper is now producing regular VR content through a new division, NYT VR. Other news organizations have

followed suit, such as ABC News VR, where a correspondent leads tours of places in the news.

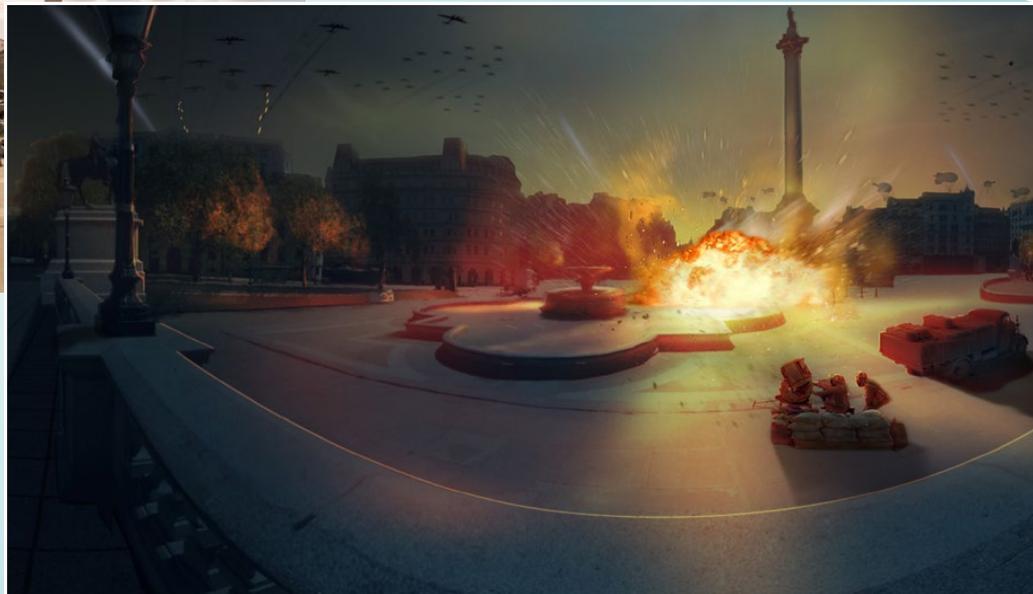
Journalists aren’t the only ones using VR to take people places. Respected organizations like NASA and National Geographic are producing VR content that’s useful in the classroom, and much of it is free. NASA videos allow students to take field trips to Mars; the Guggenheim Museum VR lets students replicate a walkthrough of the famous New York art museum’s galleries. YouTube 360 provides content made by people all over the world, including a tour of the Large Hadron Collider (the world’s largest particle collider located near Geneva, Switzerland), along with an explanation provided by the BBC News.

Timelooper, a virtual time travel app, takes students to a geographic location linked to a historic event, such as the Great Fire of London 350 years ago. WildEyes films 360-degree views of natural habitats, producing interactive earth science, biology and physics lessons.

Not surprisingly, Google has become a leader in producing educational content. Google Street View allows people to make 360-degree videos of their own locations and post them online. Google Earth lets people see places that are closed to



Virtual reality tools like Timelooper allow students to go back in time to historic events like London’s Trafalgar Square during World War II.



Immersive learning combines virtual reality with student interactions. For example, zSpace has a platform for STEM education in which students can build a virtual robot.



the public, such as the San Jacinto nature preserve in California.

Nearpod, another tool that many teachers value, recently launched what many consider to be the first virtual-reality-based curriculum. Nearpod partnered with 360Cities to use its library of panoramic images of the Egyptian pyramids, Easter Island, the Great Barrier Reef and more. Prices for schools and districts start at \$1,000, but select schools will receive the content for free. Similarly, ThingLink has launched a content app, VR Lessons, designed for elementary school students. Students visit different kinds of ecosystems from the French Alps to a jungle in the archipelago of northern Australia.

The Immersive Education Initiative and National Park Service paired up with high school and

college students to create a 3-D version of Bent's Old Fort along the Santa Fe Trail in Colorado using Minecraft. Google Expeditions is a program developed specifically for classrooms, although it's currently available to a few pilot schools.

Many educators, including Yoder, say VR has the potential to open up the world of education once students are creating their own virtual worlds. The process of researching and

collaborating makes VR creation ideal for enhancing education.

Finally, there is zSpace for STEM and medical education and Anatomy 4D, a good example of augmented reality. LectureVR allows students to be in a room with Einstein as he discusses the Theory of Relativity. AltspaceVR provides a social virtual reality experience that could allow students from across the world to collaborate as if they're in the same room.

Platforms that film 360-degree videos, like WildEyes, create interactive lessons for students.



zSPACE

WILDEVES

There are many potential benefits to incorporating VR in the classroom and, yes, it's fun for students. But there are potential negative impacts. While many of the apps are free for educators, and Google Cardboard, in particular, is inexpensive, virtual reality technology overall isn't cheap. Also, while Google Cardboard is inexpensive, it is also fairly breakable and it's hard to sanitize cardboard as it passes from face to face.

Schools must provide Wi-Fi access and, while many education institutions have iPads, teachers will need smartphones to work with the headsets. Even though many kids have

“We always emphasize creating with technology rather than just consuming it.”

phones or parents have old phones they could donate, not all districts let students bring smartphones to school.

Besides the costs, there are some physical challenges to using VR in the classroom. Sometimes students can experience motion sickness or bump into objects as they wander around the room. Plus, it can get noisy because the kids are excited. That's not necessarily a bad thing, according to Mikolajczak. “Teachers have to learn to embrace the high fives,” she said. “You don't see kids getting this excited to learn in a normal classroom.”

Many teachers don't know where to start. “They need training and tools,” said Donally. “A few teachers will try something different, but if you want your district to buy into it, it has to be laid out so they can customize it. When I train teachers, I give them lesson plan ideas for incorporating VR and connecting it to content. Otherwise, they

would think it's cool, but it never shows up in their classroom.”

In addition, there's always the risk of using technology for technology's sake and not tying it to a curriculum need. While using time with virtual reality as a reward might be fun, it's not reaching the potential the tech has to amplify learning. The most important factor, said Yoder, is that the VR experience is tied to the content. For instance, in a French class, students may go to Paris virtually, then write a story about it.

“The teachers who use this thoughtfully and effectively will figure out how to enhance what they're already doing,” Yoder said. “Virtual reality needs to be embedded in a meaningful way if it's going to work.”

Mak suggests looking at the International Society for Technology in Education Standards for guidelines for implementing technology in the classroom. “We always emphasize creating with technology rather than just consuming it,” said Mak. “It's always about pedagogy first and technology next. We must emphasize creative thinking, writing, logical thinking. It's not just a new toy. It can be powerful if leveraged in the right way. The more ways to integrate into the curriculum, the more students can get from the experience.”

While there's no substitute for touring a world-famous museum or the Egyptian pyramids, letting students walk through a simulated version of these places has many potential benefits. Chief among them, VR has the power to democratize education for children.

“We must recognize that our kids have to have these types of experiences to become who they need to be in the future. VR can help kids become more well rounded and be ready to make it in their future,” said Donally. “It's not just a fun thing to have, it's necessary. Educators aren't looking at it that way yet, but they will.”

## IMPACTS BEYOND K-12

Colleges and universities are also getting in on the VR action. It starts with helping students decide what school to attend. Before deciding to fly across the country to visit every potential college, students can walk through a school's virtual campus with YouVisit, including tours of Harvard and Dartmouth.

Medical schools are one of the main places VR is showing up, for obvious reasons. According to a survey by the American Association of Anatomists, about two-thirds of first-year gross anatomy is spent with cadaver dissection. Western University of Health Sciences in Pomona, Calif., has opened a first-of-its-kind center that allows students to learn through VR. The Virtual Reality Learning Center houses four different VR technologies: two zSpace displays, the Anatomage Virtual Dissection Table, the Oculus Rift and Stanford anatomical models on iPads.

Architecture is another area where VR shows clear potential. The University of Minnesota College of Design uses a motion-capture system to offer students a way to evaluate decisions, construction details and other factors before a design is realized.

Stanford, Dartmouth and Purdue are among the schools using VR to help athletes train while reducing the impact of contact sports. Football teams may only be allowed to have four sessions with live tackling and blocking, but with VR, a player can step on the virtual field and count those hours as traditional film study. Basketball and hockey are next, said Next Galaxy, maker of the programs.





Rhode Island's  
Out-of-the-Box  
Innovator

Richard Culatta has a passion for seeing good ideas take root in education.

*By Eyragon Eidam*





**RICHARD  
CULATTA**

Rhode Island's chief  
innovation officer

# If you ask Richard Culatta about his standing as Rhode Island's chief innovation officer, he'd likely joke that he is a man with a certain reputation — and depending on who you ask, it's not always a good one.



What Culatta does that tends to irk people satisfied with the way things are is cultivate new working relationships, the kind not typically found in traditional government institutions. And this means putting people in unfamiliar situations that for some are, well, just plain scary.

But for every naysayer who thinks things are good enough as is, there are also those who have witnessed the positive effects of cross-silo cooperation and embraced the Culatta way of doing things.

When he was first appointed in January 2016 by Gov. Gina Raimondo to head up the state's innovative efforts, he was looking for ways to take the ideas he had seen percolating at the federal level and actually implement them in an environment where they could thrive.

In his former role as director of the Office of Educational Technology with the U.S. Department of Education, Culatta said coming up with new ideas was not an issue, it's just that implementation was not the federal government's strong suit.

"At the federal level, one of my goals was to really say, 'How can we create a context, an environment to accelerate education through technology?'" he said. "While it's fantastic to see all of the great things that are happening and make great creative contacts, implementation does not happen [at the federal level]; it happens at the state level. I really wanted to have a chance to try to do that."

Now, Culatta will have his chance in the laboratory of state government. Rhode Island mirrors national education averages for student performance levels in science, math, reading and writing, according to the National Center for Education Statistics. The state stands 34th in the nation by the center's count for 2015 — a number Culatta no doubt hopes to boost. At the high school level, the state reports graduation rates at around 83 percent for 2015.

Given his past efforts to bring teaching and learning tools to remote portions of Guatemala with the Rose Education Foundation (a nonprofit that supports educational opportunities for disadvantaged children in the country), it's no surprise that Culatta has a passion for seeing good ideas through. To hear him tell it, bringing Internet connections to Latin American mountain towns in the early 2000s was a feat that opened the door for the area's youth and

opened his eyes to the true potential for technology in education.

"Back then that was a pretty crazy idea. I said, 'Why don't we try to connect these schools to the Internet and bring in some opportunities that way?'" Culatta recalled. "Even just the process of how we did it at that time was pretty remarkable, being able to get Internet up into some of these mountain regions of Guatemala. But, as soon as we did, we actually gave these kids a shot and for once they had a pathway that could lead them to a sustainable life, which they had never had before. No other approach was going to be able to bring that to them."

That seemingly unattainable mission all those years ago is what he credits for his leading-edge approach and steadfast commitment to education technology today.

"I originally got into this space because I had several experiences where it became clear to me that technology, when used appropriately, which is a big caveat ... could be one of the most powerful levers to close equity gaps that we've ever had."

And Rhode Island just may be the perfect place to inject innovative ideas into the mainstream. While it doesn't have the technical reputation of larger, more industry-heavy states, its small size makes it an ideal proving ground for things larger states would be too afraid to attempt.

"Rhode Island, just because of its size, I thought could be such a great lab for innovation in government in general. Education is one [area], but



Gov. Gina Raimondo

DAVID KIDD



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broadly just doing things differently and trying new approaches. That's why I was excited to try this out."

Take the state's computer science initiative, for example. The plan is proof of Culatta's sensible yet out-of-the-box thinking: Give all students, at every one of Rhode Island's some 300 public schools, access to computer science courses by 2017.

"Some of the issues, whether you have two schools or 20,000 schools, are going to be the same and you are just going to have to deal with. For example, one of the challenges is the traditional government process; the traditional process is just slow," he said. "If you are dependent on legislation, even if it's great legislation, even if you get all the support behind it, the fact that you have to go through that is a slow process."

"If it works, we'll be the first state in the country to offer computer science in every school," he said.

Even in the smallest state in the U.S., such a well intentioned plan could be difficult to implement through traditional means. That's why Culatta doesn't focus on only doing things through the normal channels.

In a time where governments everywhere are under the proverbial microscope, the Rhode Island innovator is working around the roadblocks and finding alternate routes to the end goal.

"People either love me or hate me for that, but it is true that I definitely pull people across traditional silos to work together. The advantage of it is that you can

get more done more effectively with better solutions. The challenge, of course, is that sometimes it's a little uncomfortable working across silos."

Rather than wait on legislation that may or may not fall in a project's favor, or battle unions for the ability to launch a promising initiative, the innovation office opts for pooling resources and working with partners that have not customarily been approached for their insights and skill sets.

He points to one of his general rules: Have someone from private industry, the nonprofit sector and government working on each project. "Having those three at the table just leads to better solutions," said Culatta.

While the government may be limited in what it can do quickly, the nonprofit and academic corner of the partnership triangle might not have the same constraints. It becomes more about leveraging available resources than fighting for new ones.

"What we were trying to do, and what our strategy has been, is let's find opportunities to get stuff done through nontraditional approaches that don't require us to tackle some of those time-consuming initiatives," he said.

**A**dditionally, Culatta said the state's willingness to embrace the memorandum of understanding and compelling opportunities for partners has been an effective approach so far.

While some might think that Culatta's ideas sound great on paper, he practices what he preaches. Even his office, located on the campus of Rhode Island College, is a testament to working across the institutional confines of old-style government.

"I believe that the best innovation happens when you have people

that are sort of working across the traditional boundaries," he said. "If I'm running around saying, 'Hey, we should work together across silos.' I felt like one of the best ways to show that was to demonstrate it."

One benefit of his geographic location at the college is the access to faculty and, perhaps more importantly, students with fresh ideas and an unjaded way of seeing the world around them.

When it comes to what the innovative leader is working on next, Culatta said his team is looking at how to drive personalized learning to new levels and the potential to make learning materials open source.

The roughly \$8 billion a year educational publishing industry has put what he sees as unnecessary limitations on educators with international copyright standing between the teachers and their ability to customize materials for their students.

"We've outsourced our intellectual capital, and I believe we need to take that back," Culatta said. ◉

*"I believe that the best innovation happens when you have people that are sort of working across the traditional boundaries."*





# EQUITY & ACCESS

School buses equipped with Wi-Fi are doing more than providing Internet access during long commutes — they are helping to bridge the digital divide. *By Julia McCandless*



## BUS RIDES

are being launched into the 21st century as school districts across the U.S. work to implement Wi-Fi access for students as a way to make travel time more worthwhile.

The Internet is an invaluable tool for work, social interactions and learning. For many students, completing schoolwork and achieving academic success relies heavily on having access to the Internet. Research findings from Speak Up 2015 found that one in five students are unable to do their homework because they don't have Internet access outside of school. As a way of addressing this issue, some school districts are offering Wi-Fi to students during bus rides to and from school.

However, it's not a widespread trend yet. Only 5 percent of school district administrators currently report providing Wi-Fi on buses, but 24 percent say they want to.

Trailblazers that have already adopted on-bus Wi-Fi include Vail School District in Arizona, which began the service in 2009 as a way to engage high school students faced with long travel times. Since the district covers a large, geographically diverse area spread out across 425 square miles, students living in rural communities can spend up to two hours per day riding the school bus.

To connect students on the road, a wireless router is installed on the front of the bus with a USB stick modem. Students access a public network to make things simple and hassle-free for bus drivers.

The school bus Wi-Fi serves as one feature in a larger strategic design by Vail School District to engage student learning in the digital age. The district is "textbook free" and instead provides each high school student with a laptop to access assignments, teacher communication and educational resources. It also serves as a tool for students to connect with one another and the outside world.

While it may sound expensive, Matt Federoff, the district's CIO, said

that after all the costs are factored in, the price comes close to that of providing traditional textbooks. In fact, one way the district funds the Wi-Fi service is through local business advertisements featured on connected buses. “As a public entity, if we provide additional Internet access at a modest cost or no cost with the support of local businesses and provide connectivity to students who might not have it, there really is no reason not to do this,” he said.

That’s especially true in rural, impoverished communities like the Coachella Valley Unified School District in Southern California. Reported as one of the poorest school districts in the nation, up to 40 percent of its students did not have Internet access at home in 2011 — a “red flag problem that needed a solution,” recalled Superintendent Darryl Adams.

The solution? The district implemented Wi-Fi access during school bus rides, but it also takes the initiative a step further by parking approximately eight buses in rural areas at night to serve as Wi-Fi hot spots so students and their families can access the Internet from home. The district has also started using salvaged vehicles as permanent hot spots in trailer parks and remote locations where Internet service would otherwise be unavailable.

The Coachella district currently provides Wi-Fi on 100 of its school buses that transport 20,000 students. And the connectivity is part of a bigger tech initiative: Each student receives an iPad to use from preschool until they graduate high school. Adams said the district used a bond initiative, which taxes community members to provide those high-tech resources to their students, garnering approximately \$42 million over the course of 10 years. “Parents were willing to tax themselves because they know the value of this,” he said. “Our students have access to equity and knowledge. The buses allow them to be online on the way to school, athletic events or field trips.”

But Wi-Fi access isn’t just a way to get students online, it’s also created

## TIPS FOR A SUCCESSFUL ROLLOUT

✓ Consider putting solar panels on top of the school bus so there’s plenty of power throughout the night for Wi-Fi users.

✓ Work with private landowners to determine where school buses can be parked at night.

*Source: U.S. Office of Educational Technology*



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a ripple effect of many positive impacts, as measured by district officials. “The No. 1 benefit is there’s no discipline [problem] on the buses now because students are engaged,” said Adams. “Our attendance has gone up; graduation rates have gone up by about 10 points. More students are going to college than before, and parents are happy with the program.”

With such positive results, it’s no wonder that more school districts are considering similar programs. The Miami-Dade County, Fla., Public School District recently rolled out a “Wi-Fi-on-the-Go” pilot this year to test the viability of providing education-based Internet access to bus riders. With 967 bus routes covering 2,431 square miles, the district has one of the most expansive school bus systems in operation. Many of those routes run for 30 minutes or more, meaning students could potentially use that time for studying, reading or completing coursework.

As Assistant Superintendent of School Operations Steffond Cone noted, the 18-bus pilot will test the effects of school bus Wi-Fi access on academic performance. “It helps

to maximize the time on a school bus, and we have students that don’t have Internet access at home,” Cone said. “Therefore, when they’re on the bus, they can utilize that time. We feel that’s very important as students are riding in to school.” The district plans to evaluate data from the pilot this summer to determine next steps and the possibility of expanding the program.

While Wi-Fi-equipped school buses may eventually become the status quo, today they may be most beneficial in technology-driven districts. “It makes sense to implement in a place where you are providing tools to students and providing content in a digital fashion,” said Federoff. “If you’re in a place where the kids have devices and you’re delivering content in a digital format, that’s the place to start.”

For the Coachella Valley Unified School District, it’s also a way to bridge the digital divide and support students in rural areas. “We’re providing a true progressive education system,” Adams said. “Our kids need to have many options. They have to be problem-solvers and entrepreneurs, and they need to have access to knowledge and information and to each other.” ○

# Tech-Supported Dialog

K-12 classrooms need to be hotbeds of social learning.

By Cathleen Norris and Elliot Soloway

**T**he coffee pot in the teachers' lounge. The water cooler in the law office. The playground at an elementary school. The lockers in the hall at a high school. The dinner table in your home. What do these places have in common? Social learning — these are places where individuals learn from and with one another. Indeed, the majority of situations and locations in our lives are places where social learning takes place.

But then why isn't the teacher with 35 students in a classroom on the above list? Because the hallmark of social learning is dialog not monolog. However, in that classroom just described, the dominant pedagogical strategy is still direct instruction — where a teacher in the classroom, a video of a teacher or a computer screen all deliver a monolog to students.

Yet two giant pillars of Western thought, along with parents, agree that social learning is a good pedagogical strategy:

- In Plato's *Meno*, Socrates said that knowledge will not come from teaching but from questioning.
- "Education is a social process. ... Education is not a preparation for life; education is life itself," wrote John Dewey in *Democracy and Education*.

What's exciting is that the infrastructure technologies to support dialog — social learning — in K-12 classrooms are essentially here, driven by these factors:

#### **1-to-1 is the new normal:**

According to a recent study, 50 percent of K-12 classrooms are already 1-to-1, in which schools issue each student a device. At that rate, 100 percent of U.S. K-12 classrooms will be 1-to-1 by 2020.

**Internet-connected:** With changes in E-rate, the availability of low-cost solutions for home Internet and new cloud-based network management technologies, network connectivity may no longer be K-12's Achilles' heel.

**Powered by software:** While liberating in its day, Web 2.0 is a bit tired. Moore's Law plus entrepreneurial zeal are enabling the creation of Web 3.0 technologies that support synchronous communication and collaboration. For example, press the mayday button on an Amazon Fire tablet and a live salesperson appears to work with you, synchronously, to make a purchase. Indeed, free, device-agnostic, collaborative Web 3.0 apps are readily available (e.g., Google's

Apps for Education, Microsoft's Office 365, and our Intergalactic Mobile Learning Center's Collablify Suite of Productivity Tools) to support K-12 students in working together synchronously, co-creating artifacts while talking full-tilt.

While we're in the early days for Web 3.0 technologies, you can take this prediction to the bank: In three to four years all Web pages and mobile/Web apps will be "collabridged," meaning they all will support synchronous communication.

Some educators are taking the opportunity to use Web 3.0 technologies to support social learning. For example, various inquiry-oriented pedagogies (e.g., 5E, project-based learning) employ social learning technologies to support students working together to figure things out, for example, by explaining phenomena and solving problems.

However, some educators are using new technologies to support the old, direct-instruction pedagogy. In "personalized learning," children sit in front of computers, sometimes for more than half of the school day, being fed content supposedly tailored for them by machine-learning algorithms. This is no different from the same old monolog-style of instruction.

Social learning is the education strategy of the playground, of the workplace, of the dinner table, of the learning strategies of Plato, Dewey and, more recently, of serious thinkers such as Lev Vygotsky and Seymour Papert. The time has come to support educators in taking advantage of 1-to-1, Internet-connected, Web 3.0 technologies and make our children's classrooms hotbeds of social learning. 

**Cathleen Norris** is a professor at the University of North Texas College of Information's Department of Learning Technologies. She is a past president of the International Society for Technology in Education and the National Educational Computing Association. **Elliot Soloway** is a professor in the University of Michigan's College of Engineering and, along with Dr. Norris, started the Intergalactic Mobile Learning Center, creating tomorrow's educational software today.

# TECH SAVVY: Community Colleges Make Digital Strides

For the last 11 years, the Center for Digital Education has analyzed how community colleges use technology to improve services while also identifying IT trends and priorities. Here are key findings from the 2016 Digital Community Colleges Survey.

## Top 10 Tech Priorities:

- ✓ Mobility (Devices/App Support); and Website Redesign/Updates (tied)
- ✓ Cybersecurity Tools and Testing
- ✓ Network Infrastructure Modernization (Wired and/or Wireless)
- ✓ Server Consolidation and Virtualization
- ✓ Disaster Recovery/Business Continuity
- ✓ Digital Content and Curriculum
- ✓ Hire and Retain Competent IT Personnel
- ✓ Computer Refresh
- ✓ Server Refresh
- ✓ New/Updated Enterprise System

## Career Momentum

- 93%** provide professional development on how to integrate technology into curriculum and instructional practices
- 59%** offer professional development for teachers on how to use mobile apps for instruction
- 30%** mandate ongoing tech-based instructional training

## Social Strategies

- 46%** have developed and published social media policies — an 18 percent increase in the last four years
- 27%** of the colleges' policies address teacher/student interactions on social media sites
- 11%** have social media archive tools so that exchanges can be captured/recorded — down 9% from last year



FLICKR/TRUCKEE MEADOWS COMMUNITY COLLEGE

## Data Management

**48%** report that server virtualization is complete — a 5% increase over 2015

**36%** report that data center consolidation is complete — a 4% increase over 2015

**78%** use cloud computing services that have resulted in cost savings

**90%** have backup for technology systems and data, and 62% have tested those platforms with successful results

**42%** of colleges are actively considering the potential of the Internet of Things in their strategic planning

**96%** of colleges have an emergency alerting and notification system in place

## Top Digital Community Colleges

### ✓ Large Colleges (10,000+ students):

- 1st** Montgomery County Community College, Pa.
- 2nd** Howard Community College, Md.
- 2nd** J. Sargeant Reynolds Community College, Va.
- 3rd** Bucks County Community College, Pa.
- 3rd** Thomas Nelson Community College, Va.
- 3rd** William Rainey Harper College, Ill.

### ✓ Mid-Sized Colleges (5,000-10,000 students)

- 1st** Hostos Community College, N.Y.
- 2nd** Virginia Western Community College, Va.
- 2nd** Walters State Community College, Tenn.
- 3rd** Delta College, Mich.

### ✓ Small Colleges (up to 5,000 students)

- 1st** Laramie County Community College, Wyo.
- 2nd** Mid-Plains Community College, Neb.
- 3rd** Lake Sumter State College, Fla.
- 3rd** Rappahannock Community College, Va.



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