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The LAST MILE

Broadband becomes a non-negotiable for rural schools

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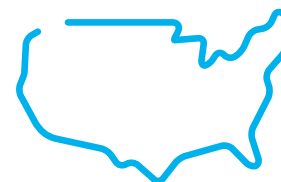
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There may be nothing more fundamental to our nation's future than educational equity. Beyond the obvious issue of fairness, there's a clear societal imperative to ensure that all kids have access to learning and learning resources that position them to be productive and successful members of our communities.

But addressing this issue is difficult and complex in an age where the gap between the rich and poor is widening and political polarization makes it harder to enact policy solutions. That's why we think it's so important to bring you this collection of bright ideas for giving students equal access to effective instruction and vital digital tools they need to reach their full potential.

This issue of *Converge* looks at how innovative leaders, districts and institutions are confronting equity across a range of grade levels and a wide spectrum of topics. For instance, we talked with the executive director of Pre-K 4 SA, a groundbreaking program in San Antonio that provides high-quality early learning to all four-year-old children in the city.

At the other end of the spectrum, we looked at Florida State University's wide-ranging initiative to reimagine the higher education experience. Inspired by nearby Disney World, the university is taking a cloud-based, data-driven, mobile-enabled approach to connecting students with subjects they're passionate about and keeping them on track for graduation.

And, of course, our cover story looks at the crucial challenge of providing broadband internet access to students wherever they are. We took an in-depth look at how state and local leaders are covering the "last mile" — and maybe a few more miles than that — to link rural campuses and classrooms to the web.

Speaking of last miles, we've reached the end of the road for *Converge* magazine. We're extremely proud of the stories we've told here at the intersection of learning and technology. We're also grateful to our community of loyal and engaged readers.

It's time, however, for us to take a new approach to covering important education trends and innovations — one that treats education as an integral part of state and local government instead of a separate silo. Therefore, we're moving our education coverage to *Converge's* sister editorial platforms: *Governing* (governing.com) and *Government Technology* (govtech.com).

Thanks for reading, and we hope you'll join us there!

Alan M. Cox

Alan Cox

Executive Vice President and Publisher
Converge *magazine*
Center for Digital Education

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The U.S. Department of Agriculture recently awarded the Cranberry Isles a $1.3 million grant that, in the words of the town's service provider, will create "the same quality internet as New York City."

By Mark Toner

The LAST MILE

Broadband access remains elusive for many rural schools and campuses, though the challenges — and solutions — may be broader than education.

Maine's Cranberry Isles are well within eyeshot of the millions of tourists who visit Acadia National Park, but they were in danger of losing a vital connection to the mainland.

The equipment powering the islands' internet connection needed to be replaced. Existing service was unreliable and slow, prompting the islands' 120 full-time residents to go to the mainland or huddle near the library for a Wi-Fi connection. Students at the recently reopened school couldn't reliably access Google Docs to do their homework.

As a result, the town's residents voted to borrow a staggering $1.2 million to bring fiber-optic broadband to the islands, reasoning the increase in taxes would be offset by the lower cost of service.

The islands' experience is typical of the challenges rural areas face. Providers often are reluctant to connect or upgrade service across sparsely populated areas with few customers spread out across challenging terrain. Where it's available, broadband is often costly, or too slow and unreliable to meet state and federal standards that open the door for grants. Dedicated funding that ensures schools, libraries and health care providers have reliable internet keeps those institutions from expanding service into the community. As a result, local governments often have to take matters into their own hands, as Cranberry Isles did. Only in this case, the story has a happy ending.

In March, the U.S. Department of Agriculture (USDA) awarded the islands a $1.3 million grant that, in the words of the town's service provider, will create "the same quality internet as New York City," erasing the town's debt and ensuring the project's sustainability. The same month, President Trump signed into law an omnibus funding bill that provides $600 million for USDA to create a new broadband loan and grant pilot program for rural areas that will complement its existing efforts.

In addition to federal funding, a significant number of states have renewed or created new programs to support rural broadband initiatives in recent years. In 2017 alone, bills passed in Montana, Minnesota, Maine, Indiana, West Virginia, Maryland, Kentucky, Tennessee, Alabama, Colorado and New Mexico, while bills were introduced or considered in another 10 states.

"In communities across Tennessee, broadband is an essential service that will increase economic investment and growth to help businesses, families and individuals thrive," Gov. Bill Haslam said of the nearly $10 million in matching grants the state issued in early 2018 as a result of its new legislation.

Even so, the continuing lack of access to broadband, on campus and off, exacerbates equity issues for rural communities. Christopher Mitchell, the director of the Community Broadband Networks Initiative with the nonprofit rural advocacy group Institute for Local Self-Reliance, recalls a recent conversation with students from rural Ohio.

"They have almost no social lives, because any time they're in the range of a decent network — a library or a McDonald's — they

In early January, Tennessee Gov. Bill Haslam announced nearly $10 million in broadband accessibility grants to build new infrastructure in 13 Tennessee counties.

have to get their homework done because they don't have good access at home," he says. "The kids who start with fewer advantages end up having less opportunity, which is the exact opposite of what we want our schools to be doing."

The Challenge

Depending on who you ask and what you consider to be "broadband," as many as 34 million Americans still lack high-speed internet access, including 6.5 million K-12 students. The majority live in rural areas.

Thanks in large part to changes to the federal E-rate program and state matching funds, the number of K-12 schools without a fiber connection to the internet decreased dramatically in recent years — from 9,500 in 2015 to around 2,050 in 2017, according to EducationSuperHighway, a nonprofit

> "The kids who start with fewer advantages end up having less opportunity, which is the exact opposite of what we want our schools to be doing."
>
> **Christopher Mitchell, Director, Community Broadband Networks Initiative, Institute for Local Self-Reliance**

that supports upgraded internet access for K-12 classrooms. Yet, as the gap has narrowed, rural schools have become the overwhelming majority of those that still need to be connected. Just two years ago, rural schools comprised around 57 percent of those without fiber. In 2017, more than three-quarters (77 percent) of the remaining schools without fiber were rural.

Similar statistics are not available for community colleges, but two-thirds of all two-year institutions serve rural areas. Even though most were connected long ago as distance learning initiatives ramped up, rural education institutions often face the same "expensive, slow and unreliable" service as their communities, says Harold Feld, senior vice president of the nonprofit public interest group Public Knowledge.

Campuses, K-12 schools, libraries and health care providers often serve as technology anchors in rural communities. According to a 2018 study by the Schools, Health and Libraries Broadband Coalition (SHLB), as many as 60 to 70 percent of these rural "anchor institutions" lack "robust and scalable" broadband connections. That's in large part due to limited competition in rural areas. Nearly 60 percent of K-12 districts that receive either one or no bids for broadband services are in rural areas, according to the Consortium for School Networking (CoSN) 2017 Infrastructure Survey.

Limited connectivity is a challenge for rural institutions, which rely on the internet for everything from digital curriculum and assessment to distance learning initiatives.

Rural schools now represent the overwhelming majority of education institutions that still need high-speed internet access.

U.S. Wired Broadband Availability by Speed and Geographic Area, Mid 2016

Percentage of Housing Units

	Rural	Non-Rural
Any Speed	86%	99%
>3 M DL/768 K UL	81%	99%
>10 M DL/1 M UL	72%	98%
>25 M DL/3 M UL	59%	97%
>100 M DL/10 M UL	34%	76%
>1 G DL/Any speed UL	7%	9%

WWW.JUSTELECOM.ORG/BLOG/GAPS-REMAIN-BROADBAND-AVAILABILITY-RURAL-VS-NON-RURAL-AREAS

"Many rural and remote districts are small, have difficulty recruiting and retaining teachers, and can't offer the broad variety of courses that students in more urban districts may take for granted, such as AP courses or computer science," says Susan Bearden, CoSN's digital equity director. "Broadband access can level the playing field and help ensure a high-quality education for rural students."

Limited connections also constrain institutions' future plans.

"We're going to see virtual reality and augmented reality," Jeff Devere, IT director for Colorado Northwestern Community College in Rangely, told the *Denver Post*. "We're going to have to stay competitive with our technology — and for a rural community college, that's a big challenge."

The greater issue, however, is that as technology drives teaching and learning online, students without internet access at home are increasingly disadvantaged. This so-called "homework gap" doesn't just impact K-12 students. Online enrollment at community colleges increased 8 percent in fall 2017 from the previous year, according to the Instructional Technology Council's 2017 survey of community colleges.

Federal funding for broadband through programs like E-rate and its health care-focused counterpart bans these institutions from using networks to extend service to nearby residential and business customers. The irony, rural advocates say, is that can hinder broader efforts to expand broadband access to communities.

"If you build a high-quality network to connect residents, that will almost always connect the anchor institutions as well," says Mitchell. "If you build a network for anchor institutions, it doesn't always connect the residents. If someone comes along and takes the [anchor institutions] away, there's less reason to invest in [connecting] residents."

The Solutions

There's no doubt that wiring every household in rural America would be expensive — just connecting the anchor institutions in rural communities would cost between $13 and $19 billion, according to SHLB, and even more if these efforts weren't done in a "single, coordinated multi-year effort."

"Many rural and remote districts are small, have difficulty recruiting and retaining teachers, and can't offer the broad variety of courses that students in more urban districts take for granted. ... Broadband access can level the playing field and help ensure a high-quality education for rural students."

Susan Bearden, Digital Equity Director, CoSN

Yet progress continues to be made. The 2014 revamp of the federal E-rate program focused on broadband and wireless access and allowed K-12 districts to build their own fiber networks for the first time. In response, a number of states began matching E-rate broadband funding, while others have formed consortia to negotiate for better service and prices. CoSN gave Montana Gov. Steve Bullock and Arizona Gov. Doug Ducey its 2018 Award for Excellence in Public Service for their states' matching fund programs. In Montana, which previously ranked 49th nationwide in broadband connections to schools, the percentage of schools connected to fiber increased from 65 to 85 percent; in Arizona, more than 67,000 students were connected through state efforts, according to Bearden.

Beyond school-specific programs, broader state initiatives also rely heavily on matching funds. Generally, they subsidize broadband projects in geographic areas that have limited or no broadband, although the details vary from state to state. However, in places where incumbent providers have clout in the legislative process, markets with existing services often have been protected from competition, argues Public Knowledge's Feld.

"The definition of broadband tends to be set at a low bar, and initiatives tend to be targeted at

"Ideally, you would leverage the broadband that is provided for education to the rest of the community."

Harold Feld, Senior Vice President, Public Knowledge

unserved rather than underserved communities, meaning you have to have no broadband, not just slow and unreliable broadband, to get the subsidy," says Feld. "For all these reasons, we have a lot of state initiatives that end up not doing much."

Among the solutions to these issues with state plans, according to rural advocates: competitive bidding processes that don't favor incumbent providers, open interconnection policies, coordinated regional and national efforts, and a focus on underserved as well as unserved communities.

Mitchell points to Minnesota's insistence on scalability for any project that receives state funding and Colorado's requirement that incumbent providers match the quality and price of any competing proposal. Other states have made efforts to encourage new — and not-so-new — players to enter the broadband space.

Mitchell argues that electric co-ops provide a potential option for many communities; many of these not-for-profit, community-

based utilities have already won USDA connectivity grants.

"People have this sense that we can't drag a wire to rural America, forgetting that we have already [done that] to every home in America," he says.

While more than 350 communities are now connected by rural co-ops, Mitchell says that many have to be convinced by their stakeholders to pursue offering broadband.

"When they have meetings, I hope someone from the school is talking about how essential it is," he says.

In some places, localities have been given broad power to become providers themselves. In recent years, several communities in western Massachusetts have used state grant funds to create their own publicly owned fiber-optic networks.

"Fiber-optic cable is the type of decades-long infrastructure investment that municipalities are generally good at managing, such as sewer systems and roads," Mark Howell, CIO for the town of Concord, wrote in an op-ed.

Doing so provides leverage: When an existing cable provider

offered to build a hybrid fiber-coaxial network in Shutesbury by tapping the state grant funds, as had been done elsewhere in Massachusetts, the town rejected the company's proposal and opted to build its own fully fiber network instead.

Other localities are exploring public-private partnerships. On Maryland's Eastern Shore, Kent County rewrote tower leases to encourage providers to offer reduced-cost internet plans to families of low-income students, Bearden says. The

Health Care programs to allow schools, libraries and health providers to extend their networks to nearby residents and businesses through self-funded initiatives.

To that end, SHLB promotes what it calls the "to and through" approach — funding broadband to anchor institutions as a jumping-off point to extend deployment to the residential and business communities around them. Doing so would ensure that 95 percent of the U.S. population would be within the same ZIP code

followed by TV white spaces in more populated rural areas, and traditional fixed wireless and fiber connections in the densest rural communities — could save up to 80 percent over using fiber alone.

The Imperative

There's little doubt that limited connectivity is impacting rural students and their communities. The percentage of rural high school graduates who attend college immediately after graduating remains lower than their urban and suburban counterparts. In 2016, 59 percent of rural graduates went on to college, compared to 62 percent of urban and 67 percent of suburban graduates, according to National Student Clearinghouse statistics. Beyond K-12, a presentation to the Florida Higher Education Coordinating Council found a correlation between broadband access and postsecondary attainment in that state — counties with limited broadband are also home to smaller percentages of degree and certificate holders.

> "Teachers and librarians are more aware of the importance of universal access than most. They need to be active in those conversations."

Christopher Mitchell, Director, Community Broadband Networks Initiative, Institute for Local Self-Reliance

county's own fiber network connects a range of anchor institutions, including fire stations, parks and the local humane society, all of which serve as homework hotspots and provide free Wi-Fi for students.

Libraries are often the unsung heroes of addressing the homework gap in rural communities, providing connectivity, and in some cases, allowing students to check out portable hotspots. In other places, districts and community providers have experimented with solutions for out-of-school internet access, including equipping buses withWi-Fi for long student commutes and partnering with local businesses.

"People are being inventive, but we're making it needlessly hard to leverage broadband connections," says Feld. "Ideally, you would leverage the broadband that is provided for education to the rest of the community."

Doing so would require considerable policy changes at the federal level — among them, changing the E-rate and Rural

as a connected anchor institution, helping address the "last mile" issue.

"Community colleges not only provide educational programs to their students, but also serve as vital centers of their communities at large," Jim Hermes, associate vice president of government relations for the American Association of Community Colleges (AACC), said in a statement. "Deploying broadband to and through community colleges will help them fulfill both aspects of this mission and improve the economic, civic and cultural well-being of communities that currently lack sufficient access to broadband."

New technology also may help address the high costs of connectivity. Microsoft and partners are experimenting with providing internet access using the so-called "white spaces" in the TV broadcast spectrum in a dozen states.

According to a study conducted by Boston Consulting Group for Microsoft, a hybrid approach — starting with satellite internet coverage in the most isolated areas with the fewest people,

These pressures will only continue to increase as education grows more personalized and reliant on technology.

"As we move to curricula online and the state or locality provides tablets or laptops and there's no connectivity, that limits the utility of these things," says Public Knowledge's Feld. "Schools are under a lot of pressure to find [solutions] quickly, but they need to consider their options carefully."

To that end, educators need to become involved in broader solutions in their communities, advocates say.

"Teachers and librarians are more aware of the importance of universal access than most," says Mitchell. "They need to be active in those conversations."

The reason goes far beyond needs in the classroom or campus.

"Internet access is such an important part of participating in society," says CoSN's Bearden. "It's a moral imperative." ○

Q&A
GETTING EDUCATED ON PRINTER SECURITY

Today's printers and copiers look a lot like computers. They're outfitted with chips embedded with firmware, a network connection to the internet and even email addresses. Yet, while few people would consider using a PC without security protections, this isn't always true for printers and copiers, which makes them far more vulnerable to hacking.

In this Center for Digital Education Q&A, Elliott Levine, director of education and distinguished technologist for HP, addresses the main barrier to setting up robust printer and copier security, discusses how school districts can protect devices and examines an essential addition to printer procurement criteria.

ELLIOTT LEVINE
Director of Education and Distinguished Technologist, HP

Q. What are some of the barriers school districts face in securing their printers and copiers?
The fundamental challenge is that procurement or facilities departments are often responsible for printer and copier contracts — not IT. Oftentimes, school districts will look at how much they can save on each piece of paper they print. What they're not thinking about is addressing issues of data privacy or preventing a ransomware intrusion. Printing and copying must be treated with the same level of security as other end-user devices like laptops.

Q. What makes printers and copiers vulnerable to attacks?
Most printers can be easily compromised. Malware can rewrite the firmware on most units. This can be done either by inserting an infected USB drive or printing a seemingly harmless file with malware embedded in its print stream. It is important to have print features like self-healing BIOS, firmware authentication and continuous monitoring. But procurement staff at many school systems aren't versed in these issues, and unfortunately they can be overlooked.

Q. Where do you suggest schools and districts start to address these vulnerabilities?
The most common response we hear when we talk printer security in schools is, "IT says our firewall protects us." It absolutely, positively does not. One thing that HP does, working with CDW, is conduct an initial assessment. Our security experts will try to penetrate 20 of a district's printers and copiers. It usually doesn't take more than a few minutes before they're successful.

Many printers — especially teachers' personal devices — have default logins that have never been changed. It is not difficult for hackers to find the default login to your printer within a matter of seconds through a simple web search. Once they do this, they can log in remotely and see everything you're doing.

The first thing a school district needs to do is inventory its school-owned and individual-owned devices. Then IT department leaders should evaluate the level of security they have versus what they need.

Q. Do you have any advice for printer procurement criteria?
School districts need to strike a balance between security and cost efficiency. They may think they are saving money by buying printers without built-in security features. But if that lack of security means they fall victim to a ransomware attack and they lose thousands of student accounts, how much does it really save? Buyers have to stop focusing on cost-per-page and consider the hidden costs associated with shortcuts.

For more information, visit **cdw.com/hpprinting**.

Equity Starts **EARLY**

How a focus on Pre-K is changing the future of San Antonio's children and creating a model for improving equity in education nationwide.

BY JUSTINE BROWN

In 2011, former San Antonio Mayor Julián Castro convened a taskforce of chief executive officers, superintendents and education professionals to identify the most effective method to improve the quality of education in the city. Following a year of investigation and deliberation, the taskforce recommended a program focused on high-quality prekindergarten (Pre-K) services for four-year-old children.

Today, **Dr. Sarah Baray** is chief executive officer of that program, dubbed Pre-K 4 SA. Pre-K 4 SA is a full-day Pre-K program dedicated to improving equity in education and building a world-class workforce through high-quality early learning.

Educational equity is a longtime interest for Baray. Prior to her current position, she was a professor at Texas State University, where she directed the Ph.D. in School Improvement program and served as a researcher and instructor in the Educational and Community Leadership program focused on educational equity.

Converge recently spoke with Baray about the importance of educational equity, the role technology can play in promoting equity and why high-quality early education is critical to future success.
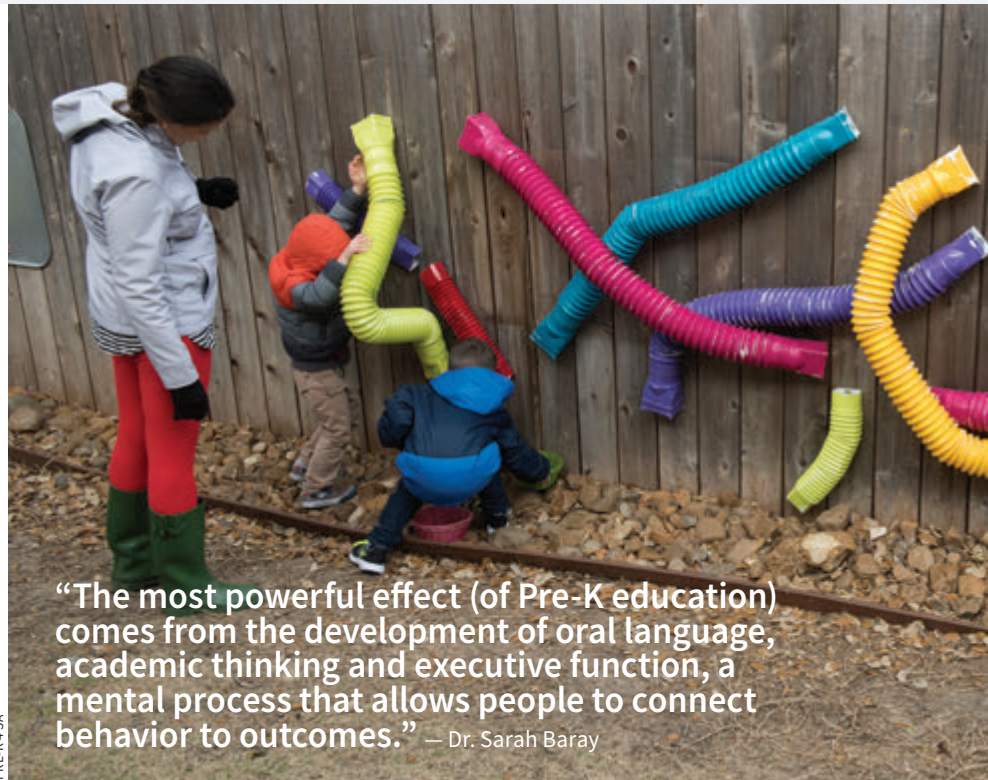
Pre-K 4 SA CEO Dr. Sarah Baray

Can you tell us more about Pre-K 4 SA and its goals?

Pre-K 4 SA is a comprehensive initiative designed to benefit every four-year-old throughout San Antonio. We do this through four components. The first component is our model education centers. We have four centers that serve 500 students each. Every center has 25 classrooms staffed with a master teacher and assistant teacher serving 20 students. The centers serve as demonstration sites that show what is possible when you educate children — many of whom are considered educationally vulnerable — at very high levels.

The second component of the program is our professional learning division. Our 15 professional learning specialists work with early learning educators throughout San Antonio to increase the quality of learning not just in our own education centers, but in all Pre-K through third-grade programs in the city. We know that while one year of powerful Pre-K has lasting effects, those effects are amplified if children go into high-quality kindergarten, first-, second- and third-grade classrooms.

Competitive grants is the third aspect. This year alone we provided $4.2 million in grants to other early learning programs in public schools, charter schools, private schools, parochial schools and child development centers. The focus is to increase the quality of those programs so even more children have access to high-quality early learning.

"The most powerful effect (of Pre-K education) comes from the development of oral language, academic thinking and executive function, a mental process that allows people to connect behavior to outcomes." — Dr. Sarah Baray

PRE-K 4 SA

The last component is family engagement. We're helping families — both those we serve in our education centers and throughout the community — understand how they can serve as educational advocates for their children and how they can help move the needle when it comes to high-quality education in San Antonio.

Are there challenges unique to San Antonio that make this effort more critical?

Texas overall has several challenges. The National Institute of Early Education Research rates Pre-K programs in each state every year based on 10 quality indicators. Texas only meets four of the 10 quality indicators. We don't require our assistant teachers to have any kind of credentialing; we don't limit the number of children in a classroom; and we don't have curriculum supports. In San Antonio we also have a high number of children who live in poverty and many families with parents who have low education levels. We are lucky our city council, business community and philanthropic community have a strong interest in investing in children and youth in San Antonio. That's what made Pre-K 4 SA possible — those three groups came together and decided high-quality Pre-K was too important to wait for the state to make changes. We needed to make this happen now.

Why focus on Pre-K?

The research is clear: High-quality early learning starting at age four or earlier makes a tremendous difference in long-term academic success, not just in K-12, but in college and career as well. The key is that it must be high quality. The

PRE-K 4 SA

"The research is clear: High-quality early learning starting at age four or earlier makes a tremendous difference in long-term academic success, not just in K-12, but in college and career as well. The key is that it must be high quality."

effect of high-quality Pre-K has also been found to be particularly advantageous for children living in poverty or children of color who have been disadvantaged or marginalized within the traditional school system.

Many people think what makes Pre-K education important is that it gives kids a head start on academics. That's true, but the most powerful effect comes from the development of oral language, academic thinking and executive function, a mental process that allows people to connect behavior to outcomes. Executive function is what allows us to set a goal or plan, carry out that plan, and then assess whether that plan helped us reach our goal and, if it didn't, to adapt. Executive function has been tied to better social skills and healthier adolescent behavior as youth transition from childhood to adulthood.

Executive function also helps people as they move into college. Schools often prepare teenagers for the academic part of college, but we don't always prepare them for other life events that can happen. For example, you don't get the class you want; your financial aid runs out; someone gets

sick, etc. Those things often cause young adults to drop out of college. But if they have strong executive function, they persist. We see the same thing in business when an individual changes careers or tries to move up the ladder.

The best time to develop executive function is in the three- to five-year-old range, because it's part of brain development. At Pre-K 4 SA we use the HighScope curriculum, which is designed to help young children develop executive function and self-regulation. Every day our children make plans, work those plans and evaluate those plans. By doing this as part of the work they do in the classroom, children develop critical-thinking skills, confidence

and efficacy to take charge of their learning and understand they are an important, active player in that education, not just the recipient of it.

Why is education equity important and how does Pre-K 4 SA help move toward this goal?

I'm at Pre-K 4 SA specifically because of its potential to impact educational equity in San Antonio. There's a lot of research that tells us what we need to do to create more equitable schools, yet educators don't always apply that research consistently.

Pre-K 4 SA was set up to make sure all children can be successful. We have an external evaluator who looks at our outcomes every year.

We are really proud of our results because we do not have discrepancies by race or gender. We outperform other schools and programs with students who are very similar and, in some cases, might be considered more advantaged. That's important because educational inequity has a profound impact beyond the classroom. Early education has been shown to affect educational attainment, income and even health, because the more people know, the better they are able to do for themselves and for their families.

There is a strong research base that shows there are big returns on every dollar you invest in high-quality early education. Economics Professor James Heckman has studied this area extensively and has calculated between a 7 and 13 percent return on investment. The earlier you start, the closer you get to the 13 percent. But even just one year of high-quality Pre-K yields a 7 to 10 percent return on investment, which is huge. There is no other educational investment with returns that high. That's why we are so adamant that we maintain our level of quality and that we pursue quality relentlessly.

Are you using technology in your model classrooms?

We have iPads in each of our classrooms and the children use them for open-ended activities that encourage critical thinking. The teachers use interactive whiteboards to show kids other places, whether that's in San Antonio or across the world. We also do a lot of physical activity in the classroom, so sometimes the teachers will use technology to access a yoga lesson, for example. But technology is just another material or resource in the classroom. It's not the star. In fact, I think it's possible to have a high-quality classroom without that kind of technology, although given that technology is so much a part of the world today, I think it's important we help our children develop healthy habits around it.

PRE-K 4 SA

Can technology help promote equity among students?

Absolutely. Technology can give students access to places and things they wouldn't otherwise see. Also, things like coding can help children understand the science behind technology and what makes it work. We're starting to think about how we can add that into our curriculum. But I absolutely think — especially for children who may not have access to technology at home or in other parts of their lives — that having access to it in school is important because it helps students engage with and understand its power.

What is the key component in ensuring equity among students?

There are two places where inequities in education originate — outside school and within it. Inside the classroom is obviously where we as educators have the greatest control. Within the classroom the greatest inequity we have in our education system is the distribution of teaching expertise. It's about teacher quality and teacher knowledge. At Pre-K 4 SA we work hard to make sure every teacher in every one of our classrooms is of the highest quality.

In the early years it's normal for children to be at varying levels of learning and development. Our job is to continue to build the next step for them and approach students as the capable learners they are and not focus on diagnosing children or determining who needs remedial this or remedial that. Having high-quality teachers is huge. And that's what I've seen in my research throughout the years — the teacher is the deciding factor in the classroom, because when you have a high-quality teacher, the inequities in the classroom disappear. When we address the teacher skill level, we are addressing the educational equity issue. Technology can certainly play a role in developing teacher skill in early education and beyond. ○

How the Cloud
Can Help Safeguard Data in Higher Education

Like many higher education institutions, Virginia Tech initially had concerns about moving to the cloud. Protecting valuable and sensitive data was a top priority. But, as the university adopted a growing number of cloud-hosted applications and platforms, its leaders came to appreciate the security benefits the cloud provides.

"A cloud provider's success absolutely depends on providing services that are secure," says Scott Midkiff, Virginia Tech's CIO and vice president for information technology. "And they have the scale in people, expertise, and tools to do the job more effectively than we can."

Security remains a key concern for other higher education institutions considering remotely hosted platforms, infrastructure, and applications. In fact, nearly half (48 percent) of 113 higher education respondents to a 2017 Center for Digital Education (CDE) survey on data security and regulatory compliance in cloud

37% of higher education respondents reported that cloud technology had a positive effect on their ability to comply with federal security regulations.

environments reported that moving applications to the cloud increased their data security concerns.

However, as institutions like Virginia Tech continue to discover, moving applications and data to the cloud can enable better data protection, lower costs, and provide greater IT flexibility. In this paper we explain how cloud-based solutions can strengthen information security, improve regulatory compliance, and enhance data management and visibility.

Why Moving Sensitive Data to the Cloud Can Make Your Data Safer

When hackers attacked the University of Central Florida's computer system in February 2016, they accessed the names and Social Security numbers of as many as 63,000 current and former students and staff. It was every university IT professional's worst nightmare. The university was hit with a class action lawsuit and had to contact every person affected and offer them a year of free credit monitoring.

But external threats like hackers and natural disasters aren't the only risks institutions face in protecting their data. Human error and insider threats are also real — but often overlooked — threats to data security. While 42 percent of higher education respondents to the CDE survey were concerned about external threats to data, only 20 percent were concerned about insider threats, indicating these vulnerabilities may need more attention.

Dealing with multiple threats to data can be overwhelming, expensive, and time consuming. A cloud provider can help institutions avoid internal and external threats with monitoring tools that automatically catch and remediate changes that violate security policies — even in institutions with widely decentralized IT operations.

In fact, cloud service providers offer an array of data security capabilities and tools to safeguard institutional data, including:

- The ability to manage users and user permissions
- Visibility into where data is stored and who may access it
- Automated data classification and reporting tools
- Automated alerting on unusual access patterns
- Built-in compliance support
- Sophisticated monitoring tools
- Data encryption
- Rigorous compliance and certification processes for data storage facilities
- Security compliance attestations (i.e., SOC 1, SOC 2, ISO/IEC 27001)
- Monitoring tools designed to detect unusual or unauthorized activities and conditions, server and network usage, application usage, and unauthorized intrusion attempts

Cloud technology has a positive effect on the ability to comply with federal security regulations.

Tips for Choosing a Cloud Provider

Key features to look for:
- Encryption services
- Sophisticated monitoring tools
- Automated data classification and identification
- Redundancy
- Cross-replication
- Compliance support
- Regions and availability zones
- Fault tolerance and low latency

Questions to ask:
- Where will my data be stored and how secure is the location?
- How does the location of my data affect network latency and regulatory compliance?
- Who can access my data, and how is that determined?
- How will my data be protected in the case of a natural disaster?
- Do you perform routine security audits?
- What are your security compliance attestations?
- What data redundancies do you have in place to mitigate the risks of data loss?

Why Compliance Can Be Easier in the Cloud

From the Health Insurance Portability and Accountability Act (HIPAA) and the Federal Information Security Management Act (FISMA), to the National Institute of Standards and Technology (NIST) guidelines for research, complying with federal and industry regulations is an important and complicated part of data security.

More than one-third (37 percent) of CDE survey respondents reported that cloud technology has a positive effect on their ability to comply with federal security regulations. Here's how:

- Institutions can configure cloud tools based on security requirements to meet regulatory mandates. For example, institutions can encrypt stored data within a web services interface. This task can be difficult in traditional on-premises IT operations with limited budget and personnel.
- Institutions can meet internal and external compliance requirements by working with a cloud provider to develop and implement automated security policies and controls based on proven, validated designs.
- In the cloud, institutions can access compliance reports and reduce the threat surface area they to need to audit and protect.

Why the Cloud Offers Better Control Of and Visibility Into Data

Understanding where and how sensitive data is stored is fundamental to strong information security. Yet, 37 percent of CDE survey respondents didn't know if they had an inventory of stored sensitive data. Additionally, responsibility for managing data often was dispersed among multiple people.

This is another area where the cloud can help. Cloud service providers offer capabilities that give colleges and universities better data control and visibility. Here are a few examples:

- Cloud providers can automatically enforce strict security policies where actions can't be performed on data without explicit permission. This is a difficult task for many traditional higher education data centers.
- Cloud providers can help institutions determine what they should store in the cloud and classify its risk score.
- Cloud providers can offer insight into how resources are being accessed, by whom, and from where.
- Cloud providers also give institutions control and governance over where their data is stored. For instance, institutions can choose the region where their information is housed.
- Shadow IT — IT systems and solutions used inside organizations without management approval — is a challenge for higher education institutions, particularly in highly decentralized organizations. Cloud providers offer clear visibility and control over systems and applications, allowing colleges and universities to find and shut down rogue behavior.

Virginia Tech's Cloud Experience

Virginia Tech has been using software-as-a-service (SaaS) for several years, and recently added infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS) to its toolbox for delivering solutions and services.

CIO Scott Midkiff says his institution's strategy isn't "cloud first," it's simply "cloud appropriate."

As he explains, Virginia Tech adopted SaaS, IaaS, and PaaS solutions because they met the school's functional needs under the constraints of a tight budget and limited staffing.

Cost-Effective and Scalable Solutions

"We can cost-effectively consume compute and storage infrastructure from the cloud," explains Midkiff. "IaaS and PaaS allow us to focus on what is unique or differentiating for Virginia Tech and rely on cloud services to provide what is common or commodity."

The university's first enterprise-level, locally developed IaaS deployment was a research administration system called Summit. Off-the-shelf software couldn't meet the project's needs, but a cloud implementation — built on Amazon Web Services (AWS) — made a lot of sense.

"We've been able to scale capacity relatively easily," says Midkiff. "And, running in the AWS Cloud has worked well with the agile and continuous integration/continuous delivery (CI/CD) methods for this project."

Security and Support

In the beginning, Midkiff says the idea of moving services and solutions to the cloud was met with concerns around security. But he and his team have "gotten most of the institution past the notion that the cloud is less secure to recognizing that it is as secure as what we can do on premises, with the right conditions set and the right design."

"Cybersecurity is a full stack problem," adds Midkiff. "It has to be a priority from the network to the operating system, to the application, to the user and everywhere along the way. So, the cloud doesn't eliminate the university's security responsibilities. But it does shift part of the security workload to the service provider, which can provide efficiency through scale and repeatability."

Operating in the cloud also brings clarity to the roles, responsibilities, and organizational interfaces related to security, says Midkiff. The chief information security officer and team must develop expertise to understand issues in the cloud, he adds. When this works, it creates a structure where they can work effectively.

"In my opinion, the most important aspect of security, whether in the cloud or on premises, is to understand your data," says Midkiff. "What is sensitive data and what is not? Who can access data and how? How does the data move and where and how is it stored? Those are questions that need to be understood, whether operating in the cloud or on premises. If you are doing security well on premises, you can do it well — and perhaps more effectively — in the cloud."

Migration to the Cloud is Easier Than You Might Think

Major IT migrations can raise concerns around disruption and change management. But institutions can adopt the cloud incrementally and realize security and economic benefits at each step of the process.

Once a higher education institution decides which data to migrate, there are two primary paths they can take to move to the cloud, depending on which best suits their needs:

- **Software as a service (SaaS):** SaaS refers to remotely hosted end-user applications, such as web-based email or word processing. With a SaaS offering, an institution doesn't have to worry about application updates and maintenance or how the underlying infrastructure is managed.

- **Infrastructure as a service (IaaS):** With IaaS, an institution can build its entire infrastructure virtually from the bottom up. It can scale up or down in minutes depending on its needs. An institution can also deploy and manage applications, but doesn't have to worry about managing the underlying infrastructure (hardware and operating systems). The cloud provider takes care of resource procurement, capacity planning, software maintenance, patching, etc. The IaaS option provides the most flexibility and management control over IT resources.

Cloud providers can offer insight into how resources are being accessed, by whom, and from where.

Sharing the Burden of Data Security

Moving to the cloud can enhance data protection by giving higher education institutions access to greater security resources, tools, and expertise. Because a cloud provider can help with some of the security heavy lifting, your data is safer, compliance is easier, and you gain better control and visibility into your information and systems. With support from a cloud provider with expertise in data security, you can focus on tasks and projects that truly benefit and support the growth of your institution.

This piece was developed and written by the Center for Digital Education Content Studio, with information and input from Amazon Web Services.

Produced by: 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. The Center provides education and industry leaders with decision support and actionable insight to help effectively incorporate new technologies in the 21st century.
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For: aws

Amazon Web Services (AWS) Worldwide Public Sector helps government, education, and nonprofit customers deploy cloud services to reduce costs, drive efficiencies, and increase innovation across the globe. With AWS, you only pay for what you use, with no up-front physical infrastructure expenses or long-term commitments.
aws.amazon.com/education/higher-ed/

PASSION PROJECT

Florida State University's Campus Reimagined looks to Disney and data to help students not just navigate the college experience, but find their futures. By Mark Toner

WHEN FLORIDA STATE UNIVERSITY (FSU) sought to redesign the student experience for its 41,000 students, officials looked to another familiar Florida institution for inspiration.

At Disney World, some 250 miles from FSU's main campus on the Panhandle, cloud-connected mobile apps help guide people through a maze of pathways and buildings and map out activities based on their interests. Florida's largest tourist attraction gave FSU a data-driven model to become the destination of choice for the next generation of college students.

"Every square foot of a Disney theme park is designed with intention, while leaving the path chosen up to the individual," says Bill Lindner, director of the Campus Reimagined initiative at Florida State University. In similar fashion, he says, "a student at the reimagined FSU will be able to marshal knowledge resources and social opportunities which match the profile and algorithmically anticipated needs of that student."

The 167-year-old campus is in the early stages of a digital transformation which borrows liberally from Disney's obsessive focus on the visitor experience. Members of the FSU advisory board and technologists working on the project are called "reimaginers," a reference to Disney's "imagineers." Whereas park visitors have wearable "MagicBands," every college student is tethered to a smartphone. And instead of Disney's "Fast Pass" that allows visitors to jump the line for rides, FSU plans a "Fast Path" to quickly get students into the right programs of study.

Behind the lighthearted comparisons is a serious reality. The college experience often is difficult for students to navigate. Students — particularly those who are the first in their family to attend college — can struggle through the complexities of knowing what classes to attend and where to go for help. For their part, institutions are just beginning to leverage technology to identify friction points that signal a student is going off track.

The Campus Reimagined initiative addresses these issues, its leaders say. But by applying the same kinds of artificial intelligence (AI) that power Spotify and Netflix recommendations to a massive connected store of campus-wide data, FSU also is hoping to help students discover what they love — for classes, future careers and their lives.

"When we focused our listening, research and imagination on the student experience itself, we discovered repeatedly the power of the moment students connect their passion with their studies as the cornerstone to ongoing success," Lindner says.

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>
> **Bill Lindner, Director, Campus Reimagined, Florida State University**

Beyond the Digital Campus

Imagine a student walking across the FSU campus with a few hours to kill before her next class. As she passes the library, an alert pops up on her mobile device telling her there's a lecture on nanotechnology about to start halfway across campus. That's no accident — nanotech is listed as a career goal in her profile, and she's attended similar events in the past. The student responds to the lecture invite and her smartphone displays maps to determine how best to get there — by bike, on foot or by bus.

That's the vision of the Campus Reimagined initiative. Its goal is "providing the most outstanding student experience in America," Lindner says. "We will do so by discovering, developing and aligning the passion of the student with the knowledge resources of the university."

The initiative has its roots in earlier "digital campus" efforts at FSU but has since broadened its scope to focus more expansively on the student experience, as informed by an advisory board of students, active and retired faculty and staff, and external experts. That's no small change in thinking, according to Lindner.

"So many ideas center in a digital campus of some sort, and therefore, everyone is thinking about technology from the first minute," says Lindner, who had stints in state government before coming to FSU to lead the institution's distance learning and professional development initiatives.

"This leads to incremental refinements in the end."

The initiative became a full-fledged department at FSU in February, followed by hires for its "Reimaginers Lab," which includes experts in data science, developmental psychology, AI and human interface development. Despite the broad scope of the initiative and the technological changes, the key is its single-minded focus, according to Lindner.

"The core ideal of the profound value of documenting the passions of a student and matching it with a

FSU's 167-year-old campus is in the early stages of a digital transformation which borrows liberally from Disney's obsessive focus on the visitor experience.

more fungible matrix of university knowledge resources allows us to build with what we have today, and enhance the interface as technology evolves," he says.

The 'Passion Profile'

At the heart of Campus Reinvented is what FSU calls a "passion profile," a self-assessment incoming students will take to identify their interests starting this fall. Each student's profile then will be algorithmically matched against a database of all campus classes, facilities, extracurricular activities and events — collectively known as "knowledge resources" — to identify areas of connection.

The system itself will become "an ecosystem that is both smart about its individual students and all of its available resources to align the two," Lindner says.

Some connections are obvious, like recommendations of courses and majors. Others will be more subtle and granular, such as the example of guiding students to aligned lectures and extracurricular activities based on their interests, and in some cases, location. The system also could ultimately draw from peer and faculty recommendations, event calendars, location-based information and social media sources.

The approach represents a broader vision of the online advising resources that are becoming a priority for campuses throughout the nation, but Lindner argues it also has the potential to transform the entire concept of early warning systems and interventions.

"By moving from generic delivery and intervention to discovery and personal pathways, the focus for some predictive triggers will more

often call for individualized profile refinement than standardized intervention," he says.

For example, if the data early warning systems commonly monitor — like GPA, attendance or other measures of engagement — show signs of trouble, the system would trigger a follow up by a human adviser, as current systems do. At the same time, however, it also would prompt the student to consider if his or her major is still a good fit.

"It would be as if the analytics generating your Netflix queue had determined your profile was a fit for Star Wars movies, but eventually showed you never completed watching any of them," Lindner says. "Campus Reimagined would dynamically reinvestigate the assumption this was still a good [fit] for you, versus solely intervening to ensure you had the skills to understand the [course]."

The goal of the Campus Reimagined initiative is "providing the most outstanding student experience in America."

The end result, he says, will be a "renaissance of face-to-face opportunities versus the opposite."

Security — and Serendipity

Much work remains to make Campus Reimagined a reality, including creating a data lake capable of analyzing disparate sources of siloed information from throughout the institution, as well as the machine learning, AI and mobile user experience design required for students to make use of the consolidated information.

The original goal was to have the system up and running for the class of 2030, but "the internal goals for key deliverables are far sooner because so many of the key technologies are sufficiently mature," Lindner says. The initiative, he adds, is focused on "building with what we have today, and enhancing the interface as technology evolves."

To address challenges around privacy and security, a data governance committee has been formed. FSU also has established policies that will give students control over the use of their data and determine who else in the campus community has access to "what data, at what time, under what circumstances, via what methods, and for what purpose to assure the fair and ethical use of student data," according to a presentation on the initiative.

Given students' ability to opt in or out of data use, security will be critical. "Campus Reimagined works because it is personal," Lindner says. "It must be trusted to function, and it must be absolutely private to be trusted. Therefore, we have put security at the forefront of its design."

Another key issue that's worth recognizing in this era of AI-powered predictive analytics dates back to Lindner's own experience as a college student decades ago.

"I started out as a mechanical engineer and was taking classes as such for years until a chance encounter exposed me to architecture — the degree I ultimately completed and the first career I chose, which better aligned with my true passion at the time," he says. "This will be a system that supports and optimizes that serendipity."

Interoperability in K-12 Education

How Districts Can Improve Teaching Efficiency and Student Success

Teachers at Regional School Unit No. 10 (RSU No. 10), a school district in Dixfield, Maine, were struggling with technological challenges. Siloed systems for testing, grades and class content made it difficult to assess, evaluate and analyze student performance. Having to remember multiple logins and juggle multiple applications also took away from critical teaching and planning time.

Parents were frustrated too. "They didn't know how their students were doing in the classroom and they didn't know what the classroom content was," recalls Reinette Chenard, RSU No. 10's data manager.[1]

RSU No. 10's technology challenges aren't unique. A study by Digital Promise found 74 percent of districts use more than 26 different education technology products; 17 percent of districts use over 100.[2] And only 33 percent of districts report that they have linked more than half of their teaching and learning tools to their student information system (SIS).[3] This means teachers in districts throughout the country spend critical classroom time managing a variety of technologies and integrating data from multiple systems.

This lack of interoperability is holding back districts and schools from fully communicating with students and parents on past and current performance. It is also making it difficult for teachers to use their time efficiently or gain a complete view of student performance so they can make better instructional decisions to foster student success.

This brief looks more closely at these challenges and discusses how an interoperable solution can help schools and districts unify their applications and systems on a single platform.

What is a Truly Interoperable Solution?

There is often confusion about the difference between a plug-and-play solution and an interoperable solution. Plug-and-play is determined by how technology connects and interacts with other connection points. For example, a plug-and-play application will work seamlessly on a Windows operating system, but because its data remains siloed from other applications running on the system, it does not provide interoperability.

An interoperable solution, on the other hand, has these three elements of commonality:

1. **A common identity**: A single sign-on can be used to access all applications within the solution, such as a learning management system (LMS), SIS, gradebook, enterprise resource planning (ERP) system, special education tool, registration or assessment system.

2. **A common user experience:** All applications have a common interface, including between top and side navigation, as well as a common nomenclature to direct users to different areas.

3. **A common data model:** The data model is shared across applications, eliminating the need to import/export data from one application to another.

Some plug-and-play solutions may offer a single sign-on user experience or share data through application programming interfaces (APIs). However, these types of "surface level" interoperable solutions don't fully eliminate login and data-sharing inefficiencies — increasing the security risks of managing data exchanges between different vendors and platforms.

The Challenges of a Fragmented Classroom

Most schools and districts use multiple products with multiple logins and disparate data platforms. This creates several challenges at both the classroom and district levels.

Lack of real-time visibility into student data and performance. When data isn't integrated into a central view from all applications, employing predictive analytics and gaining actionable insights can be challenging. Teachers, parents and students may lack real-time visibility into student performance, limiting their ability to make informed adjustments in their instruction.

Inefficient processes. When applications are on multiple systems, teachers often have to duplicate data entry, which wastes valuable teaching and planning time. In research conducted by Finn Partners, 97 percent of teachers and administrators agreed that having all of their classroom applications unified in one place would allow them to spend less time on administrative activities and more time with students.[4]

Higher maintenance costs. A disparate IT environment complicates new implementations, requiring additional IT resources for deployment and training. More IT resources are also needed to maintain and support applications. At the same time, there may be a lower realization of investment as end-user adoption lags due to the complexity of integrating applications.

The Advantages of an Interoperable Solution

For teachers, students and parents, an interoperable solution streamlines access to applications and provides greater visibility into student performance, because data from assessments, gradebooks and class rosters sits on one platform shared by all applications.

Only
33%
of districts have more than half of their teaching and learning tools linked to their student information system.

RSU No. 10 realized these benefits when the district adopted an interoperable solution that combined its SIS, learning, gradebook and assessment solutions on one platform.

"I love that it can score assignments, give students immediate feedback and record the results of their work automatically in the gradebook," says Chandele Gray, a high school science teacher for RSU No. 10. "I also really like having a one-stop location for students and parents to check grades, access lessons and assignments, and communicate upcoming events. It is really nice to not have to have students (and parents) remember multiple websites, logins and passwords."

A common user experience also reduces training time. Once familiar with the navigation and nomenclature of the solution, teachers, parents and students don't need to be retrained when new functionalities are added.

"I like having a one-stop location for students and parents to check grades, access lessons and assignments, and communicate upcoming events. It is really nice to not have to have students (and parents) remember multiple websites, logins and passwords."

– CHANDELE GRAY, HIGH SCHOOL SCIENCE TEACHER AT RSU NO. 10

5 Reasons to Implement an Interoperable Solution

1. **Reduced operational costs. Less IT staff will be required to deploy, manage and maintain an interoperable solution.**

2. **Improved data connectivity. Data can be seamlessly shared across all applications in the system.**

3. **Increased collaboration among teachers, staff, students and parents. Gain real-time visibility into all aspects of a student's performance when applications are unified on a platform.**

4. **Enhanced reporting. With access to multiple types of data, district personnel can create reports to better allocate funds, prepare for resource planning and receive maximum state funding.**

5. **Heightened student data security and privacy. With a single platform, there is no need to share data externally to different vendors and systems.**

Finally, an interoperable solution offers IT administrators greater security. Managing the exchange of data between different vendors and platforms increases vulnerabilities. An interoperable solution eliminates this concern because all data remains on the same platform. It also provides IT with a single source of accountability. When issues arise, there is one clear point of contact.

The Road to Interoperability
True interoperability requires going beyond plug-and-play solutions or simple API integration. A solution that meets global standards such as Learning Tools Interoperability® (LTI®) and Common Cartridge® v1.1 and 1.2 import and 1.3 export is a good start, but a solution should also:
- ✓ Connect teachers, parents and students to real-time data through the cloud to better support and drive student success
- ✓ Be certified and compliant, especially with state reporting standards
- ✓ Meet consistent interoperability data standards, making it easier to report student performance to states
- ✓ Enable personalized learning by giving teachers a real-time, holistic view of students' performance so teachers can make timely adjustments to the learning curriculum to meet individual student needs and motivations
- ✓ Offer flexibility and scalability across all schools in the district

When a solution meets these criteria, it can eliminate frustrations and inefficiencies that multiple systems with multiple logins and siloed data create. Instead, districts can move toward unified classrooms that promote student growth through greater insight and more time devoted to teaching.

Achieving True Transformation

When RSU No. 10 made the switch to an interoperable solution, the district overcame the barriers once cemented by fragmented classroom technology. This victory enabled effective teaching and impacted student growth.

The solution allows stakeholders, including teachers, parents and district leaders, to access user-friendly, consolidated dashboards that provide at-a-glance insight into student performance.

"I love the standards-based grading graph on the dashboard page," Chenard says. "I think this is the piece that our teachers use the most in order to see where the students are either failing or progressing and where they have to go back and reteach or have students move ahead."

Just as critically, this interoperable solution also helps RSU No. 10 meet new state reporting requirements and provides educators with tools to better meet their students' needs.

"Instructional time has increased significantly with the single sign-on. That means more time spent focused on the student," Chenard says. "Having the gradebook, class pages and assessment all in one program, efforts aren't duplicated and monitoring the progress of the student is fluid. Communication with parents is better than it ever has bee–n."

By unifying its technology, RSU No. 10 has not only eliminated inefficiencies and created more opportunities to boost student performance, the district has also fostered better communication among parents, teachers, students and administrators — a worthwhile goal for any district.

This piece was developed and written by the Center for Digital Education Content Studio, with information and input from PowerSchool.

Endnotes:

1. All quotes from "District Saves 100s of Hours with Unified Classroom," PowerSchool, accessed March 19, 2018, https://www.powerschool.com/casestudy/powerschool-unified-classroom-saves-hundreds-of-hours-for-rsu-no-10-educators/.
2. "The State of Data Interoperability in Public Education," Digital Promise, July 2017, http://digitalpromise.org/wp-content/uploads/2017/08/DataInteroperability_Final.pdf.
3. Ibid.
4. "PowerSchool National Teacher Study : National Online Survey of 800 Teachers and Administrators," Conducted by Finn Partners and sponsored by PowerSchool, May 2016.

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BEYOND
BYOD AND 1-TO-1

Digging beneath the surface of equity programs that work

BY MATT VILLANO

Reports of the end of the digital divide have been greatly exaggerated.

Yes, after nearly two decades of improved internet access and billions of federal E-rate dollars, the gulf that once existed between the haves and the have-nots in public education has diminished. And the rise of mobile technologies means that more students now own devices capable of accessing the internet.

Still, according to the Pew Research Center, about five million American households with school-age children don't have access to high-speed internet — a number that represents mostly low-income families. What's more, the 2016 E-rate and Infrastructure Survey from the Consortium for School Networking (CoSN) indicates that only 68 percent of school districts reported they fully meet the 2014-15 minimum internet bandwidth recommendations set by the Federal Communications Comission (FCC) in every one of their schools.

One way to address these ongoing challenges is a push for equity, a commitment to programs that strive to ensure every student has access to technology both in school and at

FACEBOOK/FULLERTON SCHOOL DISTRICT

The 1-to-1 program at Fullerton School District comprises 17,000 devices. The district has invested in enough backups that if a student or staff member brings his or her device in for repairs, he or she can access a loaner device until the original is fixed.

> ## "We consider this to be the civil rights issue of today. Just as every student has a right to education, every student has a right to use technology to access the education [he or she] deserves."
>
> **Keith Krueger, CEO, CoSN**

home. Throughout the nation, K-12 districts are implementing these sorts of programs. Early returns are positive — in districts where such programs exist, kids finally are getting the access to technology they deserve.

Most current equity efforts fall into two categories: 1-to-1 initiatives, in which the district provides a computer for every student, and bring your own device (BYOD) programs, where the district supports an infrastructure with enough bandwidth to allow every student to bring his or her own technology from home. Naturally, some of these programs work better than others. Each approach has strengths and weaknesses. Whichever flavor of equity districts embrace, one

thing is certain: Ensuring all students have equal access to technology is good practice for the future.

"We consider this to be the civil rights issue of today," says Keith Krueger, CoSN's CEO. "Just as every student has a right to education, every student has a right to use technology to access the education [he or she] deserves."

Technology decisions

The first big question about equity programs is how to manage the technology. In most cases, the deciding factor between choosing BYOD or 1-to-1 is simple: cost.

Because 1-to-1 programs require a district to buy a device for every

student, the programs usually have hefty price tags. BYOD programs are generally less expensive since districts rely on students to bring devices from home. Sometimes, however, this basic math can be deceiving, since both sets of programs require infrastructure investments and upgrades to ensure the district network can support a multitude of devices simultaneously.

Officials at Katy Independent School District, in suburban Houston, know all about the importance of bandwidth. The district has had a BYOD program since the middle of this decade, and has spent nearly $15 million improving and upgrading bandwidth so students and staff members can count on fast internet.

CIO John Alawneh says the district also has made sure every classroom has enough Wi-Fi access points to allow large numbers of students to connect simultaneously. Katy brought in a fiber network that runs 20 gigabytes per second on the backbone and 10 gigabytes to each school. All told, the district spends $500,000 annually on bandwidth alone.

"We are running 1 gigabyte to each of our access points — more than enough for students to access videos and do all of the other things they do," Alawneh says. "Every year we increase bandwidth slightly to accommodate the student traffic, and every year we're reminded of how important it is to remember devices are only as good as what network bandwidth will allow for them to do."

Another issue: maintenance. The 1-to-1 program at Fullerton School District in California comprises 17,000 devices, and the district has invested in enough backups that if a student or staff member brings his or her device in for repairs, he or she can access a loaner device until the original is fixed. According to Jay McPhail, assistant superintendent of innovation and instructional support, this type of system is critical to the success of a 1-to-1 program, largely because it builds in a failsafe that guarantees no user is ever without a device.

"Every year we increase bandwidth slightly to accommodate the student traffic, and every year we're reminded of how important it is to remember devices are only as good as what network bandwidth will allow for them to do."

John Alawneh, CIO, Katy ISD

"There's no point in building a program if you're not committed to making sure people have access to the technology at all times," says McPhail.

Beyond the technology

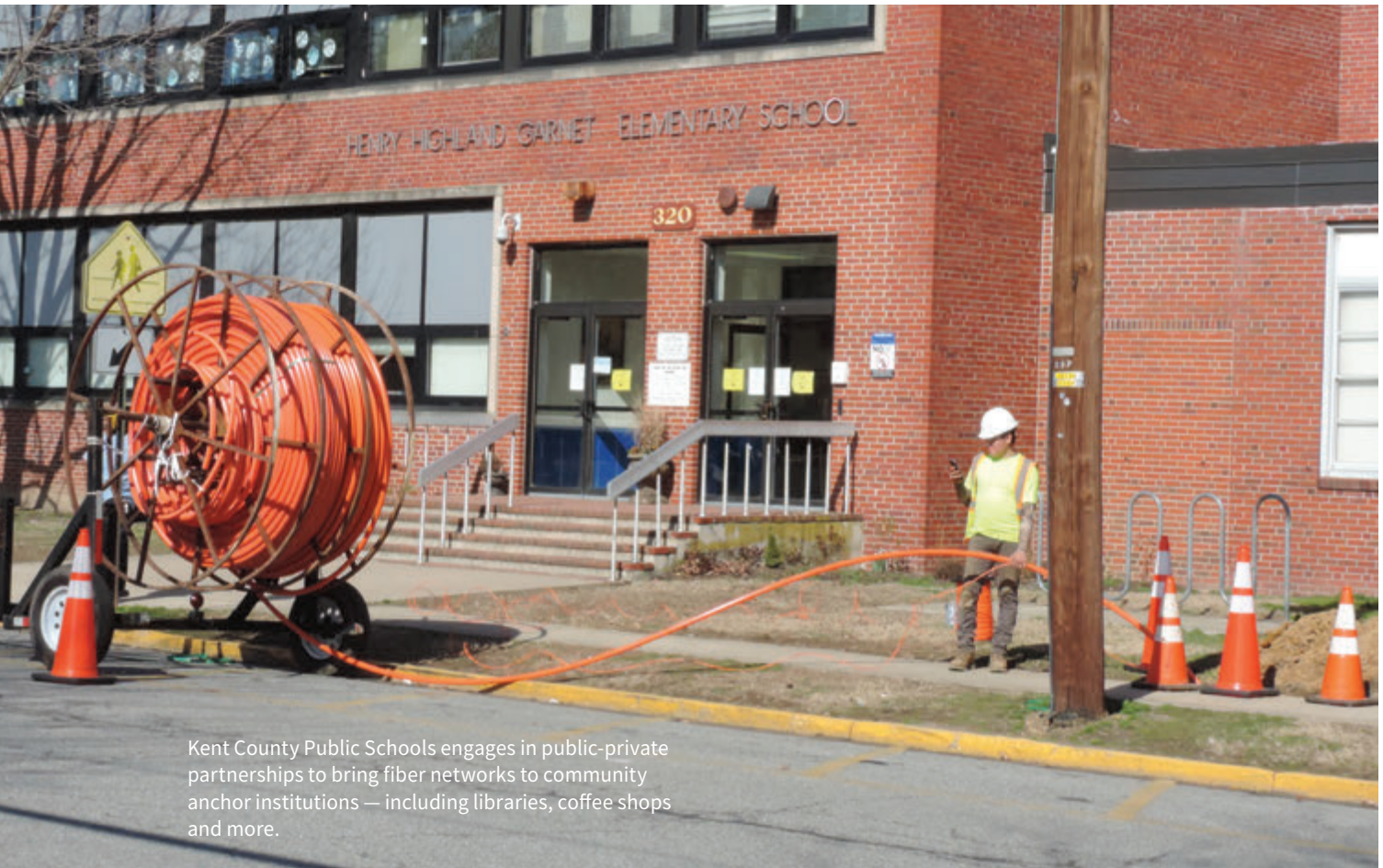Deciding on how to manage technology is one part of the equity equation. Innovating new opportunities for students and teachers (and parents and community members, for that matter) to facilitate greater equity is something else entirely.

Many districts have excelled at this, including Beaverton School District in Oregon. In 2014, voters approved more than $69 million

FACEBOOK/FULLERTON SCHOOL DISTRICT

Kent County Public Schools engages in public-private partnerships to bring fiber networks to community anchor institutions — including libraries, coffee shops and more.

for technology upgrades to the district. Over the last few years, these investments have created new opportunities to increase digital equity. The district started small, first holding informal monthly brown-bag lunch conversations during which educators could discuss systemic inequities in the district. Schools contacted local businesses and created a Wi-Fi access map that identified safe places to work outside of school hours. Libraries piloted small-scale hotspot check-outs and extended hours to provide places for students to connect before and after school.

At Kent County Public Schools in Maryland, officials opted for public-private partnerships to bring fiber networks to community anchor institutions — including libraries, coffee shops and more. County officials even changed permitting rules so telecommunications companies could place equipment on county property and use it to offer free or low-cost connectivity to district families.

As part of a 9,000-device 1-to-1 program, officials a t Mooresville Graded School District in North Carolina negotiated with a local telecommunications provider to offer free basic internet connectivity to families who have students in the free and reduced lunch program. Dr. Todd Black, assistant superintendent for secondary instruction and career technical education, says this option transformed the connectivity picture in the district. At last count, more than 95 percent of Mooresville students now have internet access at home.

"For us, especially with the effort to get everyone online, laptops have been the great equalizer," Black says. "We know we have lots of students who don't have the economic means to go on vacations or visit other countries, so the internet brings the world to these students instead."

"We're big proponents of trickle-up technology. We want to be facilitators and help maximize instructional technology, but we also want to listen to students and get them excited to work with each other."

Kelly Wade, Instructional Technology Director, Williamson County Schools

Both Black and McPhail note that this push to make connectivity more equal requires communicating with and teaching parents about how students can use the devices most effectively online. At both districts, this process includes parent education nights with lectures and hands-on training.

Letting students drive

The best kinds of equity programs evolve over time. At Williamson County Schools in Tennessee, the students themselves drive this evolution.

Technically, the district's program is a hybrid of 1-to-1 and BYOD; the district has 27,000 Chromebooks for its 40,000 students, but students also are encouraged to bring technology from home. Kelly Wade, the district's instructional technology director, says the district took this approach to cover all bases — to empower students who have devices to bring them and to offer devices to students who don't own them.

Wade says the program is built upon an open framework through which students have the power to suggest the district adopt new apps or software at any time. Once students submit formal requests, teachers send the suggestions to the instructional technology team, which vets nominations against a rubric established through a 170-page policy. When suggestions pass muster, they are made available to the entire district. According to Wade, this means students directly can influence the applications they're using at school.

"We're big proponents of trickle-up technology," she says. "We want to be facilitators and help maximize instructional technology, but we also want to listen to students and get them excited to work with each other."

Granting students ownership of district-wide technology adoption certainly is a big leap from the digital divide. Consider this proof that wonderful things can happen when technology is distributed equitably. ◎

ROLLING STUDY HALLS

Google knows a thing or two about buses. The tech company buses employees from San Francisco and San Jose to company headquarters in Silicon Valley, and it offers Wi-Fi internet connectivity on all rides. In 2016, Google applied the same philosophy to a partnership with a rural school district in North Carolina. The result sparked a revolution in connectivity across the country.

Dubbed "Rolling Study Halls," the program eventually will comprise 16 districts overall, turning school buses into roving wireless hotspots that afford students the opportunity to stay connected as they transition from the school to home every day.
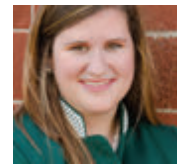
The effort is a partnership with CoSN and broadband vendor Kajeet. According to Lilyn Hester, Google's head of external affairs for the Southeastern region, it was designed to deliver a new type of equity. So far, it's working — in participating districts, test scores are up, discipline rates are down and overall engagement has gone through the roof.

"Bridging the 'digital divide' isn't just about providing access and devices — it's also about using that technology effectively," she wrote in a recent blog post about the initiative.

Ultimately, the goal of the program is to reclaim more than 1.5 million hours for thousands of students by the end of 2019. School districts will be able to determine policies to limit access to schoolwork only, and students will have the chance to work collaboratively — alongside an onboard educator — to complete their assignments. With options like these, 90-minute bus rides from school to student homes in the country don't seem like such a waste of time. This is what equity is all about.

Amplifying Equity Through Funding Transparency

ESSA provision may expose disparities in how districts divide their resources.

By Susan Gentz

We spend a great deal of time talking about the Every Student Succeeds Act (ESSA) and its impact on technology, which is certainly critical if we want to prepare our students for the next-generation workforce. However, if technology is to truly improve the success of all students, its distribution must be equitable. This means state and district leaders need to know exactly where funds are going to understand where inequities lie.

Under No Child Left Behind, funding transparency looked different. The law required state and local report cards to be available, but much of this information was provided in averages — including teacher salaries and expenditures.

ESSA incudes a little-known bipartisan provision — set to go into effect during the 2018-2019 school year — that requires states to report per-pupil spending at the school level. This provision may seem insignificant, but it allows district leaders to make decisions based on much more specific — and accurate — data.

Advocates and researchers predict this provision will expose disparities in the way many districts divide their resources. Prior to this change, decisions about resources were made based on assumptions and district-level data. The problem is there are often inequities within districts. Students who live in wealthy neighborhoods attend nicer schools because the school is largely funded through property taxes.

This is about more than compliance; it's about students' futures.

The ability to pare down data and focus on specific schools will help district leaders make better decisions when allocating dollars. Understanding where disparities lie is the first step to ensuring every student can access the technology and curriculum they need to be prepared and successful for life after high school.

Implementation Questions

ESSA is quiet on how districts should implement this change — and it will be no easy feat. Another challenge is that even though this provision passed into law, when President Trump took office the Department of Education rescinded regulations put in place under the Obama administration. Congress invoked the Congressional Review Act, which allows it to disapprove of regulations enacted, and if "a disapproval resolution is enacted, the rule may not take effect and the agency may issue *no substantially similar rule* without subsequent statutory authorization."

Essentially, if the Trump administration produces regulations for this provision, they can't look anything like the rules released under the Obama administration.

Navigating these policy challenges is complex. Even without the regulations, the law stands, which means districts must decide how to implement the changes in per-pupil funding expenditures by fall 2019. A lack of federal regulations and guidance means states need to make decisions themselves.

Districts should not be afraid to call the Department of Education to ensure their report card data will comply with the law. This provision should also not come down to only compliance. It was inserted into the law to help leaders make effective, data-driven decisions about the division of resources. This is about more than compliance; it's about students' futures. ⟳

REACHING
BEYOND
GDPR

Let the latest compliance regulation be the motivation your institution needs to educate everyone at your school about the data you have and how to manage and protect it.

Institutions are already grappling with security, privacy, and data and information governance issues related to regulatory mandates like the Family Educational Rights and Privacy Act (FERPA) and the Health Insurance Portability and Accountability Act (HIPAA). Now the latest compliance challenge they need to incorporate into those operations is the General Data Protection Regulation (GDPR), the newly enacted directive that applies to personal privacy rights of European Union (EU) residents. For colleges and universities, this regulation touches on data handling related to education programs that enroll European students; applies to EU-based operations of foreign institutions, including semester-abroad programs; and could even influence recruitment campaigns targeting prospects in the EU.

Instead of tackling each new mandate reactively, it's time to adopt a broader and more proactive approach to information governance that bolsters compliance, strengthens data protection, and improves student and faculty experiences.

A BRIEF EDUCATION IN GDPR

The starting date for the General Data Protection Regulation (May 25, 2018) has come and gone, and many U.S.-based institutions are just beginning to understand that these European privacy rules will impact their operations too. According to the American Association of State Colleges and Universities (AASCU), failure to comply with GDPR could cost American colleges and universities millions of dollars in fines.

At the heart of the new rules is the requirement that schools take extra steps to protect the personal information of people who reside in the EU, covering educational, financial, employment, health, photographic, phone number and IP address data. That includes being on top of what data institutions store and where, and how it's used — and being ready to facilitate its retrieval, correction or erasure (the right to be "forgotten") if so requested by the person behind the data. This applies to personal data no matter where in the world it's located and regardless of whether the processing takes place in the EU.

For example, a working group tackling GDPR at the University of Michigan (UM) has identified these activities, among others, that could be subject to GDPR:
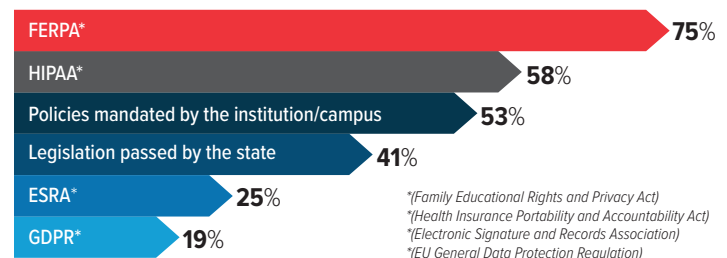
- Research involving people living in the EU, whether the data is collected by UM researchers directly or by others in the EU then transferred or sold to UM
- UM apps marketed to people in the EU
- Browser-based data or cookies and admissions data of people in the EU
- Data for people living in the EU who have been recruited by the university
- Data of faculty members teaching abroad
- Data of students studying abroad
- Data collected about people in the EU during UM fundraising activities
- Phone records, hospital records and even metadata related to mail headers, door access logs and library records

While no one is sure exactly how much of an impact GDPR, specifically, will have on American educational institutions, the regulation is influencing technological advancements among third-party providers and has changed best practice recommendations for information governance. Also, the idea of treating personal data with the highest possible regard will likely become a service differentiator in a world that is more sensitive to data privacy.

A Center for Digital Education (CDE) survey recently queried higher education leaders in information technology, academia, libraries and research to understand their familiarity with GDPR. What surfaced was a disconnect between how schools have treated student, faculty, research and other data in the past and what they're expected to be able to do under the new regulation.

While most colleges and universities are well-situated to deal with data under FERPA, HIPAA and institutional policies, they lack attention on GDPR.

WHICH OF THE FOLLOWING GUIDELINES INFORM YOUR INSTITUTION'S DAILY DATA MANAGEMENT PRACTICES?

Guideline	Percentage
FERPA*	75%
HIPAA*	58%
Policies mandated by the institution/campus	53%
Legislation passed by the state	41%
ESRA*	25%
GDPR*	19%

*(Family Educational Rights and Privacy Act)
*(Health Insurance Portability and Accountability Act)
*(Electronic Signature and Records Association)
*(EU General Data Protection Regulation)

DATA AND POLICY OVERLOAD

The survey found that institutions are burdened by policies and a growing stream of data they don't always know how to control. GDPR could become the mandate that exposes "sloppy practices," as one expert termed it.

GDPR is different because of its breadth. No single privacy or data security law in the United States governs all the various issues covered under GDPR. Figuring this one out calls for an all-hands-on-deck approach. A variety of individuals are responsible for data security compliance, including those with little understanding of data security. Stakeholders include experts not just in IT, but also in administration, research, marketing, purchasing, the registrar's office and other units on campus — any role that has a stake in using people's personal data for their jobs.

The first step toward addressing GDPR — and more effectively addressing other evolving privacy mandates — is acknowledging that data compliance isn't just an IT task.

Compliance-related activities typically have been considered an IT responsibility because they are frequently viewed as data security problems. After all, when a FERPA- or HIPAA-related data breach occurs, it's often the IT's information security team that swoops in to oversee resolution. Respondents to the CDE survey confirmed this approach. Two-thirds of institutions (64 percent) said IT staff "generally" played the primary role in data security compliance work; 44 percent also pointed to the chief information officer (CIO).

Complying with expansive new regulations such as GDPR demands that higher education institutions implement risk-based compliance strategies that provide better data management practices. This includes spelling out how people deal with data retention and disposition schedules, and how data types align to specific data policies.

"When you step back," says Julia Funaki, associate director for the American Association of Collegiate Registrars and Admissions Officers, "the GDPR is really about good data hygiene."

CLOUD CONSOLIDATION AS A COMPLIANCE ACCELERATOR

The advantages of a multi-tenancy approach to cloud consolidation aren't well known in higher education. CDE's survey of institutional leaders found that just 16 percent of campuses are using or exploring multi-tenancy for research and data intelligence activities; two-thirds of respondents (62 percent) said they didn't know what it was.

Multi-tenancy allows multiple users — they could be within departments, units, research groups or student project teams — to work within the same computing environment, but with their own self-contained data, interfaces and services. These users may even share the same applications but can only access certain data elements: One group may be able to view only demographic information about students; another group may need access to the family's financial details.

Multi-tenancy has come to the forefront as institutions have moved more of their applications to the cloud. The benefits to higher education are many:

- Applications built from the start to be deployed on a shared infrastructure can be quickly extended to new sets of users, since the infrastructure, configuration and software is already in place
- Upgrades happen seamlessly as new software features are rolled out
- Consolidation of data into cloud services necessitates a data inventory that can help to accelerate compliance

Campuses that have set up on-premises data protection, retention and security strategies want to be sure those policies extend to the data maintained in the cloud — and preferably take advantage of the native functionality built into the programs they're running.

As you're evaluating options, get a progress report from your data management vendor. Recently, as an example, Commvault and Microsoft announced expansion of integrations within their respective product lines: Commvault's Data Platform, Endpoint Protection and Sensitive Data Governance, and Microsoft's Office 365. These updates help customers accelerate their migrations by archiving redundant, outdated on-premises data prior to migrating to Office 365; reduce storage consumption and costs through built-in data deduplication and compression, enable the use of Microsoft Azure Stack as a hosting target for Office 365 data management (including the ability to perform backup and restore operations on Azure SQL Server databases), and provide the kind of data control required by regulations such as GDPR.

THE RISK OF NON-COMPLIANCE

The costs of not confronting GDPR and other compliance regulations can be high. Although most observers believe the first wave of judicial action will focus on the largest companies — think Facebook, Google and Amazon — eventually, the oversight, investigations and enforcements will turn to other kinds of organizations.

Colleges and universities already face the considerable expense of clean-up and the dent to their reputations when shoddy data practices are the cause of a security breach. If the complexities already inherent to a breach weren't enough, GDPR also contains a 72-hour breach notification requirement to supervisory authorities after first becoming aware of a data breach; and data controllers — those who determine the purposes and means of processing personal data and are responsible generally for decision-making and policy for the data — are required to notify potential victims within a month or without undue delay.

Under GDPR, regulatory fines also are a real possibility. According to the American Association of State Colleges and Universities, EU member states will have the authority to impose administrative fines of up to four percent of a violator's global revenues, based on the severity of noncompliance. In addition, individuals who believe they've been victimized can seek compensation through separate legal actions. And regulators could require cessation of business activities in the EU as a result of egregious breaches.

4 LESSONS FROM THE EXPERTS

Forward-looking institutions view GDPR as the opportunity they need to get in front of data privacy and protection. By laying a solid foundation for information governance, institutions are better able to confront their current challenges and prepare for future requirements. The goal of information governance is to set up processes and policies for managing the availability, usability, integrity and security of the data you use. Here's what the experts advise.

▶ **Get your institutional arms around the data.** Multiple stakeholders maintain some slice of the total data produced by university activities. Your information governance council already may be working to inventory and prioritize this information. But a dedicated team of administrative leaders needs to push this part of the work across the finish line. Without support from the top, data inventory efforts will stall any time someone is protective over the data under their control. And if you can't see the data, you can't comply. The data inventory should identify:

- What the data describes and its type
- Its flow — where the data comes from and where it goes
- The legal or justifiable reason for the information to be collected, stored or processed
- How much is collected or generated
- Growth rate
- How and where it's saved and protected
- What software is used to produce or use it

▶ **Bring in legal counsel early and often.** Parsing the rules of GDPR or similar data regulations isn't for everyone. Your attorneys are best situated to understand the legal terms of the regulations and identify what data within your inventory is affected by various compliance laws. They can also help you deal with seemingly conflicting legislation to identify defensible positions for the best overall legal coverage. And they can help individual departments understand what to do in given situations. Several higher education organizations, including the American Association of Collegiate Registrars and Admissions Officers, collaborated on developing a GDPR guide that walks readers through exercises for admissions; enrollment reporting; international programs; and scheduling, enrollment and advising. For example, for admissions, would an opt-out option in a recruitment message be sufficient for GDPR compliance, and does that opt-out require the institution delete that individual's student record from the student information system or the customer resource management system? Many of the scenarios incorporate questions that legal counsel should be able to help your departments answer.

▶ **Move beyond the training mindset.** When asked by CDE to identify the biggest gaps in their institutions' security systems or protocols, 44 percent of respondents mentioned employee training. Yet, as Commvault's

Patrick McGrath, a higher education veteran with a focus on archiving, search and analytics, has observed, mandatory compliance training can only go so far.

"It's just not enough because people are concentrating on their own work," he says. "Dealing with data and policy are almost unfunded mandates for them, which means it slips to the bottom of the priority pile."

Frequently, McGrath adds, people don't know much about the data they're handling, even when it's in their job titles.

"The complexity of data, particularly when it comes to unstructured data, has led to several large-scale data breaches despite the best intentions and assumptions of those handling it."

Due to the explosion of data volumes and the fragmentation of the data environment now, the only safe approach, he suggests, is to augment user training with automated discovery, data policy and compliance tools. For instance, the right system can highlight data risks, prompt action and even automate activities related to retention options (such as removing unnecessary sensitive data before it poses a problem); ensure that data is encrypted in transit and at rest; and provide a single console for data oversight and monitoring.

▶ **Don't go it alone.** Just seven percent of respondents to the CDE survey said they felt "very prepared" for GDPR. The institutions represented by these individuals are the leaders in undertaking information governance work. Tap into what they've learned face-to-face over meals at Commvault GO,[1] Microsoft Ignite[2] sessions or during EDUCAUSE[3] breaks. Also consider calling on the data management companies with experience in higher education since their consultants will know what other schools are doing and how well their decisions played out. They'll be able to guide you as you become an expert yourself in corralling and managing your data.

It may also be time for your institution to consider having fully dedicated resources on campus working specifically on information governance and data stewardship.

THE IMPORTANCE OF YOUR DATA WORK

Data is an institutional asset; yet it can only work its magic when it flows across departments as freely as possible. Those who control the data are unlikely to share it unless they are confident of its protection; and those who could use the data will choose not to unless they trust its quality and integrity.

Well-played information governance:

- Ensures there is an "official" version of data. This creates consistency across uses, regardless of which department or unit is working with the data, and streamlines processes used by students, faculty and staff.
- Identifies decision and policy makers for the data and spells out their requirements for how data is used and handled.
- Helps clarify who's responsible for collection and management of a particular store of data, who should have access to it, how it may be used and how changes to the data structures should be communicated.
- Advances data analytics work by requiring capture of and access to data that's accurate, complete and reliable.
- Allows campus researchers to more easily apply for grants that require a data management plan; they can confidently tag along with the school's own plan.
- Allows the student's learning outcomes to be shaped and enhanced with the appropriate use of data from their interactions with the institution.

The outcome of this work results in building better student and faculty experiences, addressing the needs of researchers more effectively and offering more nimble response to new mandates, including GDPR.

END NOTES

1. https://www.commvault.com/go#Home
2. https://www.microsoft.com/en-us/ignite
3. https://events.educause.edu/annual-conference

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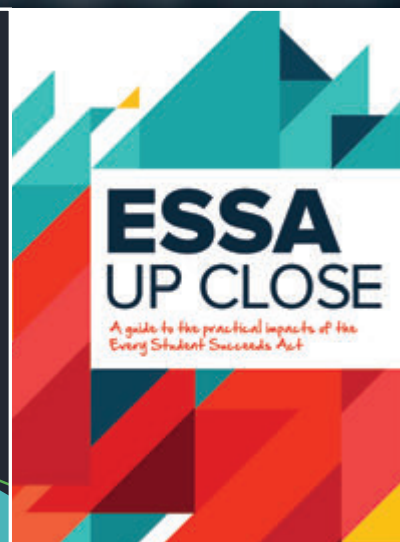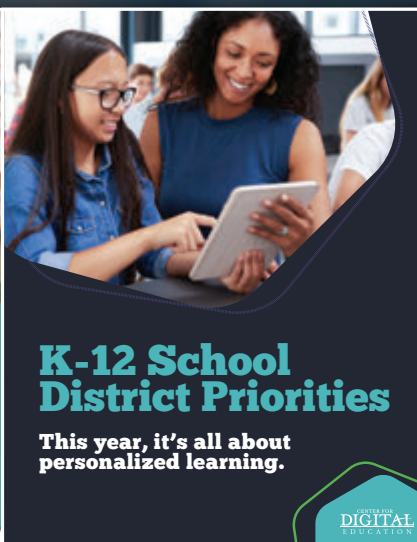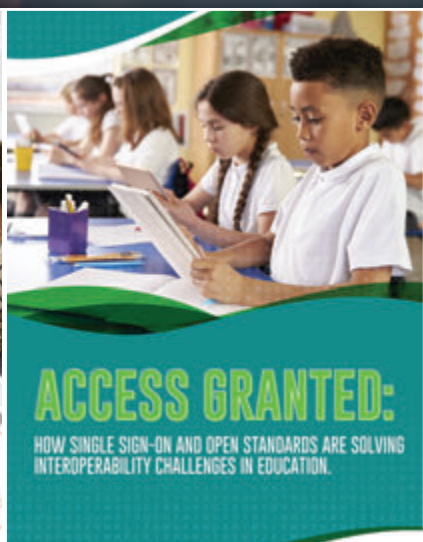
Commvault is a leading provider of cloud backup & recovery, and data & information management solutions. We help organizations protect their data and derive greater business value and insight from it. With the Commvault Data Platform customers modernize IT operations, significantly increase efficiency, and better leverage their data. Commvault solutions comprise one of the industry's leading portfolios in application and data protection, disaster recovery, cloud, virtualization, governance, search/analytics and endpoints. For more info, please visit: **www.commvault.com/government-and-education**

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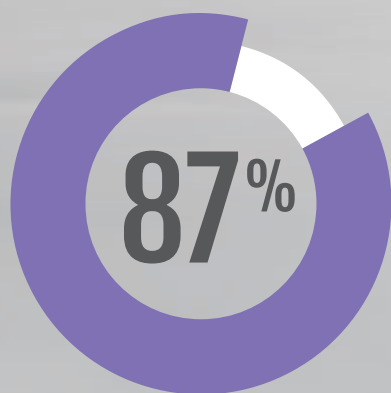
www.govtech.com/education/papers

EQUITY IN PRACTICE:

School Districts and Community Colleges Work to Expand Technology's Reach.

The Consortium for School Networking (CoSN) calls digital equity "one of today's most pressing civil rights issues." Having access to technology today is akin to being taught to read a few centuries ago.

The Center for Digital Education's 2017-2018 Digital School Districts Survey and 2017-2018 Digital Community Colleges Survey polled academic leaders about their programs, initiatives and implementations. The results paint a picture of what these institutions are doing to help ensure all students have access to the technology they need to succeed.

Action in K-12 School Districts

50% collaborate with local government/ other organizations to offer free Wi-Fi for students at home and/or community centers.
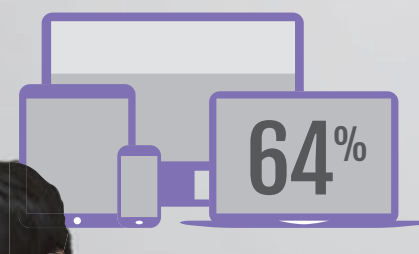
87% of districts are upgrading their networks to be ready for increased instructional demands, enriched digital content, multi-media rich video content or cloud-based applications.

46% provide opportunities for students to have wireless internet access at home.

64% want E-rate to allow funding for a wider variety of technology purchases and projects.
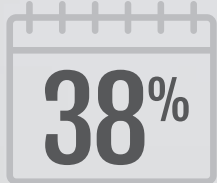
Action in Community Colleges

62% of community colleges are upgrading networks to be ready for increased instructional demands, enriched digital content, multi-media rich digital content or cloud-based applications.

38% plan to in the next 12-24 months.
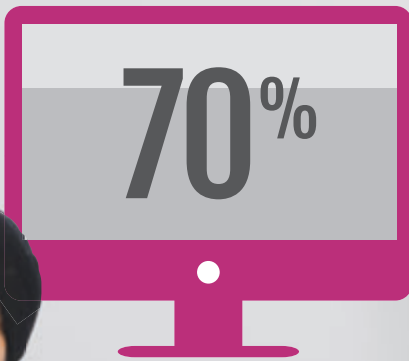
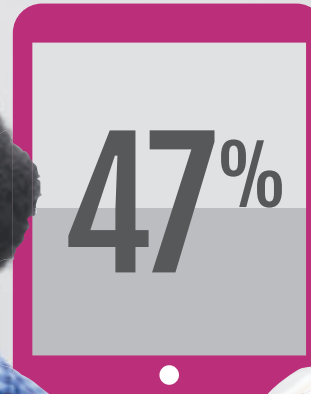**12%** have deployed massive open online courses (MOOCs).

9% allow students to receive credit for MOOCs at other institutions.

70% of community college libraries have a program to help train students in digital literacy.

47% have a discounted laptop/tablet program for incoming students.

Q&A:
Tackling Cybersecurity Head-On in Texas

George Spencer   Todd Kimbriel

The Texas Department of Information Resources (DIR) recently announced a comprehensive Managed Security Services (MSS) contract that gives state agencies, local governments, school districts and other public entities cost-effective access to powerful resources for helping to protect vital systems and data. *Government Technology* recently spoke with Texas CIO Todd Kimbriel and George Spencer, AT&T Public Sector Assistant Vice President – Texas, about how the MSS contract helps Texas agencies respond to an increasingly hostile security environment.

Q How has the cybersecurity landscape shifted over the past few years?

Kimbriel: Cyber threats continually evolve and we now know that cybersecurity is a lifetime commitment. The sophistication of attacks requires thoughtful planning and response. This has led to a growing maturity and awareness across Texas. Our state leadership has made it clear that cybersecurity is a priority. We just had a 22-page cybersecurity bill pass that outlines 16 new requirements and is driving new activity for DIR around expanding reporting and managing risk. Cybersecurity is part of the underlying fabric of everything we do, and as a state we have decided we would prefer to respond rather than react.

Q What security services are available through DIR's MSS contract?

Spencer: The MSS offering consists of three major components — security monitoring and device management, incident response, and risk and compliance — each of which includes multiple services that agencies can choose to meet their IT security needs.

Security monitoring and device management includes network and web application firewalls, intrusion detection and prevention, and end-user device management. Incident response includes services that help agencies plan and prepare upfront to manage security incidents. It also offers an automated service that lets agencies request incident response help through DIR's MSS portal. Risk and compliance includes penetration testing to analyze where security vulnerabilities might exist,

enabling agencies to address weaknesses before cybercriminals exploit them. This category also includes services to help agencies understand and comply with complex security regulations.

These capabilities are provided through a pre-vetted, pre-competed contract for security services. Agencies can go to the DIR portal, identify the services they need and place an order for them. This model also simplifies the management of security services because DIR monitors vendor performance and sees to it that contractors comply with contract terms.

Q Why is the MSS contract so important versus going it alone?

Kimbriel: Consistency of service and strategy is an important component for us. Some of our agencies have the resources and capabilities to manage cybersecurity in house and some don't, so how do you protect the state in that environment? One of the things we provide through this service is assurance that the contracts we issue with organizations like AT&T have been thoroughly vetted so the customers using these don't have to do that themselves. Another advantage is having a bird's eye view of the whole environment. For instance, if our managed security services vendor delivers a certain cyber service to one agency and detects a threat, it immediately can apply a solution to all agencies who use its services. Or there may be an advanced persistent threat against several agencies but it only impacts each one minimally and wouldn't catch the attention of an individual CISO. The managed security services provider has the bigger picture to intervene and improve the overall security posture.

Q Explain how AT&T can provide this 'bigger picture' threat intelligence.

Spencer: As a global network provider, we're uniquely positioned to understand the cyber threat environment. The AT&T global network carries more than 200 petabytes of data traffic on an average business day. A single petabyte is like streaming an HD movie for 45 years — it's a phenomenal amount of data. This traffic is monitored in our Global Network Operations Center, where we can see early warning signs and react quickly to threats. From that vantage point, we can spot changes in worldwide network traffic and identify potentially harmful activities, and then share that intelligence and take steps to help mitigate potential attacks. In addition, AT&T has eight Security Operations Centers (SOCs) worldwide that operate 7x24x365 to protect our managed security services customers. There's really no way a single government agency is going to get that perspective on its own.

Q Who can participate in the MSS contract?

Kimbriel: In addition to state agencies, the MSS contract is available to any taxpayer-funded organization in Texas. This was a key part of the strategy because smaller, funding-challenged organizations, for example, may not know what to do when they experience an attack. To have a qualified incident response team step in and guide their reaction is monumental. We don't expect everyone to be interested in the services, but it's advantageous to those organizations that don't have a CISO or trained cyber professional on staff.

Q Why is it important for small and medium-sized agencies to strengthen security protection?

Spencer: There was a time when agencies could do cybersecurity by obscurity because they were too small to be a target. But with the automation of threats, everyone is at risk. The bots and malicious programs aggressively come after all vulnerabilities.

The MSS contract gives government entities throughout Texas easy access to powerful threat intelligence and security capabilities through a simplified procurement model. It also delivers long-term benefits because agencies only pay for the portion of a service they use, and they don't need to make a big capital investment in capabilities they may not need.

Q Can this be applied to any type of infrastructure?

Kimbriel: There is no particular type of infrastructure targeted for this. We have a consolidated data center program that many state agencies participate in that's based on an on-premises infrastructure, and this contract can deliver services to those customers. We also have our hybrid cloud where we connected the on-premises consolidated data center program to five cloud environments and these services are also available to any customers that participate in that. For the most part, the infrastructure environment is not relevant to the services available.

Q What does the cyber landscape look like in the future for Texas state and local governments?

Kimbriel: Cybersecurity will continue to be a key area for us; and mitigating risk associated with cyber will continue to be high on the priority list. We are looking forward to interacting with state leadership and giving them the information they need for informed policy decisions. The bill from last session required us to set up a Texas ISAO (Information Sharing and Analysis Organization), so we are looking for our cybersecurity coordinator to spearhead that effort. This ISAO will deliver threat dissemination services, forensic analysis and other services — many of the same capabilities offered through the MSS contract — but this is through a nonprofit organization that is primarily focused on the private sector. We haven't seen anyone else put together something as broad or comprehensive as what we are envisioning, so it's exciting to see that come to reality and bridge the gap between public and private sector.

To learn more about the Texas MSS contract, please visit the following resources:

> MSS catalog: att.com/texasmss

> MSS contract page: http://dir.texas.gov/View-Search/Contracts-Detail.aspx?contractnumber=DIR-MSS-SCP-001

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