

Innovation in Education

IT Modernization for Campus Re-entry

As colleges and universities prepare for a return to normalcy, IT is front and center for delivering the technology services that can position schools to be stronger now than before the pandemic.



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Campuses Emerging Stronger

Now that faculty, staff and students have a taste of remote work and learning, it can never entirely go away. Here's why.

HIGHER EDUCATION IS AT A CROSSROADS. In one direction, students are increasingly questioning the cost of getting their degrees and the value of their investments, even as a college education has proven over and over to be **financially beneficial**. A survey published earlier this year by **Third Way and New America** found that nearly six in 10 students (57%) agreed that college “is not worth the cost” – up from 49% in August. A big part of the problem was staying motivated to learn, mentioned by 60% in the same survey, no doubt exacerbated by too many anemic remote learning experiences over the last year.

It doesn't help that some of the same serious challenges hitting institutions before COVID-19 continue to linger. Pre-pandemic, along with a declining population of high school graduates and shrinking international enrollment, six-year degree **completion** hovered around just 68% at public four-year institutions; the outcomes were worse (42% and 54%, respectively). Now, **enrollments have dipped** by 3% over last spring, and the decline is nearly 10% for community colleges, serving as an indicator that we may see accelerating drops as the number of students in those feeder schools shrinks.

And yet, in another direction, some colleges and universities are poised to emerge from the pandemic stronger than they went in. In large part, they have used the last year to accelerate adoption of online education where it makes sense, keeping the physical classroom time dedicated to experiential forms of learning.



As a **McKinsey report** noted, “Remote and online learning are here to stay. The need is to determine what combination of remote and in-person learning delivers the highest educational quality and equity. As institutions refine this hybrid model, they have a once-in-a-generation chance to reconfigure their use of physical and virtual space.”

Success requires a combination of favorable conditions:

- Rethinking how institutions address student services and support to make delivery more sustainable and the processes more efficient, effective and engaging;
- Strengthening research operations to keep up with a tidal wave of COVID-19-related research opportunities;
- Delivering an industry-grade learning experience to students no matter where they're working and what equipment they have access to; and
- Embedding a cybersecurity culture into every corner of the campus to make data and information impenetrable to those unauthorized to access it.

Technology to Expand on the Institutional Mission

A theme in each of these conditions is the need to understand what the IT infrastructure can support and how well it's holding up as institutional demands ebb and flow.

A Campus Technology “pulse survey” among IT leaders and professionals found that while the impact of remote learning and work made their jobs harder rather than easier (by 11 percentage points), the outcomes have been worth the effort. Four times as many participants agreed than disagreed that their organization's response to the pandemic was improving the way they deliver services to students, faculty and staff. And more than 7 in 10 respondents (71%) reported that they considered the majority of their students “satisfied” with the IT services.

The areas that have needed the most attention during the pandemic probably wouldn't surprise anybody, starting with updates in IT support, cited by 55% of institutions. That was followed closely by three other categories of technology:

- VPN/remote access, mentioned by 48% of respondents
- Wireless network (47%)
- Learning & collaboration software (46%)

A third of schools saw updates in their learning management systems (37%) and telecommunications (32%).

Campus Re-entry

Campus Technology • PULSE SURVEY

4x

as many respondents agreed than disagreed that COVID-19 improved IT service delivery



School tech updates made during the pandemic:

55%
IT support

48%
VPN/remote access

47%
Wireless networking

46%
Learning & collaboration software



7 in 10

IT professionals believe most students are satisfied with IT services they're receiving



The impact of remote work and learning on IT workers:

44% said it made work harder

33% said it made work easier



Source: Campus Technology

And just a quarter refreshed their cybersecurity tools (24%) and storage systems (23%) or saw new tools and practices applied to learning assessment (23%).

Navigating higher ed adaptation will continue to fall hard on the shoulders of IT. Fortunately, this is a campus unit that's well-suited to strategic innovation, even as it deals with tactical needs. Members of the IT organization were at the forefront in developing creative ways to outfit students with the devices and connectivity they needed when everybody was sent home. They've worked online one-on-one, in small groups and in large forums to make sure faculty were equipped and trained to teach remotely. They've hardened the systems for supporting a remote workforce. And they've responded to a number of

short-term actions linked to keeping the lights on and the school moving forward through the emergency.

Now IT is poised to help the university envision a future where technology can expand on the institutional mission: providing new ways to connect prospective students from under-represented groups with advisers and virtual campus tours; reaching deeper into the local K-12 community; streamlining credit transfer; bringing alumni and the wider community guest lectures and extension learning; developing hybrid study-abroad opportunities; and melding programs from multiple schools, bootcamps and massive open online courses.

As one college leader **declared**, technology is no longer "an either or... It's both."



Mastering the Art and Design of Remote Work

Remote work and study aren't going away; NVIDIA virtual GPU technology is essential to ensure a quality learning experience from any place and at any time.



Ismet Nesicolaci
Sr. Product Specialist, NVIDIA

WHEN COVID-19 STRUCK and remote learning and work became the new norm at the University of Colorado School of Dental Medicine, IT, with the help of NVIDIA, was ready:

- Faculty and students could continue teaching and learning.
- Compute-intensive electronic health software, clinical orthodontics and radiology applications remained accessible.
- IT performed work remotely without having to touch end-user computers or visit clinic chairs.

This was all made possible by the University of Colorado's existing virtual desktop infrastructure (VDI) upgraded with NVIDIA virtual GPU technology (NVIDIA vGPU). As one member of the school's IT team put it, once VDI was deployed with NVIDIA vGPU, "the user experience improved significantly. The greatest change was excellent system performance and responsiveness."

While the benefits are clear, the role of NVIDIA vGPU in virtual environments isn't commonly understood. NVIDIA is famous for its graphics processing units (GPUs) that accelerate applications such as gaming, film production, graphics-intensive design and research. But in a world where remote rules, the vGPU technology is only recently becoming an essential component.

On a traditional physical computing device like a workstation, PC or laptop, a GPU typically performs all the capture, encode and rendering for power complex tasks, such as 3D apps and video. NVIDIA virtual GPU technology virtualizes GPUs installed in the data center to be shared across multiple virtual machines or users. The rendering and encoding are done on the virtual machines' host server rather than on a physical endpoint device.

The basic idea is to share the GPU functionality with multiple users and give them the same experience as they'd have if they were running applications on dedicated workstations. The advantage is this: Instead of having a

one-to-one connection – one GPU per computer – you get one-to-many. The physical GPU runs in a server and the vGPU software dynamically slices it up to allow multiple users to access its power (up to as many as 64 users per GPU).

The Benefits of NVIDIA vGPU

To take advantage of the NVIDIA vGPU, education institutions need three elements: 1) a server with NVIDIA GPUs installed; 2) virtualization software from VMware, Citrix, Red Hat or another VDI company; and 3) NVIDIA vGPU software.

Once in place, the NVIDIA vGPU approach offers numerous benefits:

REMOTE ACCESS TO HIGH-POWERED SOFTWARE.

Students can access the high-end programs their classes require no matter what kind of hardware they have at their fingertips. No going to a dedicated computer lab; no having to ship out workstations. With NVIDIA vGPU, even tablets and Chromebooks can take advantage of industrial-grade engineering design programs. They're delivered as a service.

IMPROVED USER EXPERIENCE. The NVIDIA vGPU handles three important GPU tasks: capturing, rendering and encoding. What's sent down the wire to the remote user is optimized and latency is dramatically improved. Even the transmission of video gets better.

A BOOST IN EXISTING VDI INFRASTRUCTURE. Up to now, IT may have to pick and choose what's run in VDI, which means users have to be able to get back to workstations to run anything not on the list. With vGPU, that isn't necessary. Any and all can run through the VDI setup.

EXTENDED MACHINE LIFE. Machines in computer labs typically have a three- to five-year lifecycle before everything needs to be upgraded. With the addition of NVIDIA vGPU to the VDI infrastructure that equipment gets a longer lease on life. The same is true on the software side too. The migration from Windows 7 to Windows 10 increased the number of graphics calls by 50% to 55%. The use of NVIDIA

vGPU ensured that users didn't take a performance hit; the virtualization software absorbed the extra burden.

Use Cases in Action

While the University of Colorado School of Dental Medicine offers one dramatic case for the value of NVIDIA vGPU, it's not the only success story.

The **University of Maryland's Terrapin Works** adopted NVIDIA vGPU for its digital manufacturing lab, a space available for students, staff and industry – companies that were university partners. In this scenario, the virtualized environment enhanced with NVIDIA vGPU made it possible for team members to collaborate no matter where they were located.

Georgia Tech has leveraged NVIDIA vGPU offerings on Amazon Web Services, as part of an engineering school program for training robots. Anytime there's a requirement to run an application that needs the power of an NVIDIA GPU, users can head to AWS, where it's ready and waiting for them.

The **University of Arkansas** decided to centralize desktop services for its many colleges. IT built a VDI infrastructure as a service available across the entire institution, allowing any student at any of the colleges to access applications and bring

up a desktop to run whatever work was required. While this was a big payoff for students, the deployment also offered a major advantage to the IT staff too. Each of those colleges has its own smaller IT group that was spending a significant amount of time managing endpoints, whether they were a desktop, laptop or lab. Reducing the maintenance work freed up time and resources for the IT groups to engage in the higher value projects for their organizations. And by streamlining maintenance through a virtualized environment, IT delivered better service to faculty and staff across campus. Members of IT no longer had to return to their own desktops to get the job done; they could access their tools from anywhere.

The Power of Graphics Virtualization

While plenty of schools already have NVIDIA GPUs for graphics processing, not all are exploiting the power of the virtual GPU. What many are finding is that NVIDIA vGPU solutions are revolutionizing the way universities and colleges help students learn and work in a remote world.

Ismet Nesicolaci is the senior product sales specialist for NVIDIA Virtual GPU, with specialization in higher education.



BUILDING A BORDERLESS CAMPUS FOR EVERY STUDENT

Support New Ways of Learning
with NVIDIA® Virtual GPU Solutions





Easier Identity and Access Management

The last thing IT should burden students with is a fog of logins. The use of an identity cloud makes accessing their digital lives easier and more secure.



Ryan Schaller
Senior CIAM Developer
Specialist, Okta

LEARNING HASN'T BEEN EASY FOR STUDENTS.

In the past, the biggest worry may have been confusion about the latest assignment or concerns about financial aid. Now, they're just as likely to be boggled about whether it's their day to go into the classroom, wondering how their projects will be done when half the team is working strictly from home, or dealing with the fallout of a positive COVID test or food and housing insecurities.

In a realm where technology has become essential, the last thing the IT organization should burden students – or any other users on campus – with is a fog of logins. Yet it can't be helped. Nowadays, the college experience requires a litany of applications. The basics include network access, the SaaS-based productivity application suite, the learning management system, a videoconferencing program or two, and maybe library collections. Then, depending on the major, there's software for statistics, design, math and science, simulation and business. And let's not forget university services for advising, financial, tutoring, plagiarism checking and help desk. Every single one of those programs or services needs to authenticate the user before granting access.

The Problems of IAM Sprawl

Single sign-on (SSO) has long been a boon for making the authentication process more efficient. Yet, because of their distributed structures, most institutions haven't gone all the way with SSO. It may be that program control for the identity and access management (IAM) layer is maintained for some applications by central IT and for others by a given college or department. IT may lack the staff to keep up with the programming requirements and/or the sudden influx of new demand. Or the college or university may be working with other institutions, each operating autonomously even as they need to share people, programs and research data.

Then there are the security aspects. While SSO makes

for a centralized approach to application access, that access also poses a big risk: If a cybercriminal gets unauthorized access through the SSO, they will be able to access all of the associated applications.

Embedding multi-factor authentication (MFA) into the login process adds a needed level of protection to authentication processes to keep accounts truly secure. But students are still stuck with multiple logins, and institutions have to try to keep up with a sprawling and complicated IAM system.

The Power of an Identity Cloud

Tackling identity and access management in an IT modernization initiative can do a lot of good for campus users. Not only will it improve the learning experience and lessen software access frustrations, but the right solution can add an extra layer of security up front through deeper identity proofing and by enabling organizations to track and manage changing user roles based on predetermined policies.

The **Okta Identity Cloud** serves as an independent and neutral platform that securely connects the right people to the right technologies at the right time, reducing the effort required by IT to balance the needs of access and security.

The Okta Identity Cloud incorporates **Single Sign-On**, **Adaptive MFA** and **API Access Management**. But the magic ingredient is really the architecture, which empowers organizations to unify services across disparate organizations through a hub-and-spoke model that serves as a centralized identity layer:

The **hub** acts as the centralized identity provider, using standards such as security assertion markup language (SAML) and OpenID to integrate with numerous downstream applications, whether those are in the cloud or on-premise, to provide access and provisioning capabilities across the network.

Each **spoke** represents a unique campus, school or

department, whether part of the same institutional system or a separate university or college. The spokes tap Okta's **Universal Directory** for storing information about the user profile and group. The **Org2Org** connector enables spokes to share user profiles with the hub or other spokes, allowing SSO and **multi-factor authentication** to work across all shared applications.

Each campus can marry its own Active Directory repository on one side of the hub with the advantages of SSO, MFA and provisioning on the other side, giving users efficient and secure access to college or university applications – both their own and those of their institutional partners.

Lightening the Load

The benefits are numerous. Nailing down IAM makes login frictionless. The result is that students spend more time on learning instead of chasing after IT help. IT spends less time provisioning users, configuring applications to work with certain profile attributes, pursuing investigations and maintaining a fleet of dedicated IAM servers.

Just as importantly, an Identity Cloud helps schools keep pace with the fluid nature of user identities by taking a more meaningful view of the full identity lifecycle – the student who's a learner as well as an intern one day; a graduate and alumnus

the next; and then a master's student, part-time professor and donor. The use of a centralized user repository provides enhanced visibility and useful insights on what's happening and when across the entire user lifecycle. Integrations with new applications and gateways or new groups go much faster. And institutions can manage user identities at scale, rather than on a one-off basis.

Nobody is having an easy time on campuses these days. But students are getting hit the hardest. Investing in efforts to simplify and secure their digital identities and make them more effective as learners will see the biggest payoff. That starts with adoption of a robust Identity Cloud.

Ryan Schaller serves as a customer identity and access management (CIAM) specialist for Okta, with expertise in higher education and healthcare.

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Modern identity solutions for education institutions

The Okta Identity Platform provides easy, centralized, and secure identity and access management for all key campus user groups: students, staff, partners, parents, applicants and alumni.

Simplify campus complexity

Streamlined access for campus users

Automate on/offboarding for all campus users

Enhance campus cybersecurity

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Evolving with IT to Support Research

Modernizing the campus approach to IT infrastructure for supporting research has never been so urgent.



Damien Eversmann

*Delivery Strategist for Higher Education,
North America Public Sector, Red Hat*

WHILE INSTITUTIONS HAVE EXPRESSED continuing concern about wobbling tuition and ancillary dollars, one source of revenue remains

healthy for higher education: COVID-19 research funded by federal and state programs. The full measure, from community colleges to Research 1s, are at the forefront of projects to develop vaccines; uncover the sources of coronavirus and its evolving replication patterns; create new initiatives for public health response; understand the impact of the virus on various populations; study the physical and mental health and learning effects of prolonged quarantine; and explore numerous other facets..

However, the heightened attention on campus research comes with a continuing challenge: how to keep up with IT infrastructure needs, typically assembled once the grant funding arrives. Since many of these recent grants are short-term, turnaround time can be tight. In many cases, research teams are going from near-zero infrastructure to running as quickly as possible – and not just serving applications to users, but storing, processing and sharing astronomical amounts of data.

In addition, the workloads for these research initiatives are constantly changing. It's no longer about starting up an application and letting it run for days, weeks or months. The researchers need to do their data crunching quickly and then move on to the next job – in other words, spin up huge amounts of compute as quickly as possible and then spin it back down.

“Containing” the Challenges

Researchers have pursued two routes in addressing their needs, each with its limitations:

- Going out and buying as much compute as possible to accommodate peak demand. Those resources may then sit unused during the times when researchers aren't running their applications.
- Turning to the public cloud. Even then, not all data

can be maintained in the cloud; some of it has to stay on-premise by virtue of its sensitivity, restriction or regulation.

Neither solution fully allows researchers to put the right workload in the right place at the right time and do so efficiently without wasting IT resources.

Here's where containerization – the next evolution in helping IT make more efficient use of existing technology – comes into play. The container concept can serve as either an alternative or a companion to virtualization. All of the code and its dependencies, such as configuration files and libraries, are packaged or contained. The benefit is portability: The software is abstracted away from the operating system and runs consistently and reliably on whatever infrastructure is available – on-premise, in the cloud or in a virtualized setting.

The container concept can serve as either an alternative or a companion to virtualization. All of the code and its dependencies, such as configuration files and libraries, are packaged or contained.

Hardware that was formerly running multiple virtual machines (each with its own instance of the operating system [OS] and instance of the application) now can host dozens or even hundreds of applications, all sharing the same OS kernel in a lightweight approach. As a result, universities can migrate applications from monolithic systems to containerized applications and repurpose hardware they already have to run those applications more effectively.

Open Source Management Oversight

Since nobody lives 100% in the cloud or on-premise, what's also needed is a platform that accommodates management across the board. **Red Hat OpenShift** has found a home in many schools for good reason: It includes an enterprise-grade operating system (Linux) with a heavy emphasis

on security. At the heart of OpenShift is Kubernetes (aka, “kube”), an open source platform and the de facto standard in container orchestration technology that automates the manual work of deploying, managing and scaling containerized applications. OpenShift clusters groups of hosts running Linux containers and streamlines development and administration. Moreover, multiple OpenShift clusters can be managed via Red Hat’s Advanced Cluster Management for Kubernetes, whether those exist on AWS, Azure, IBM Cloud, some other cloud, on-premise or as a mix.

The advantages of choosing open source can’t be overestimated. As numerous institutions have found, Red Hat’s products and services eliminate costly vendor lock-in and represent the best thinking of the community, which the company participates in, fosters and works with.

Modernizing the campus approach to IT infrastructure for supporting research has never been so urgent. Fortunately, that’s where Red Hat shines – in helping reduce the effort and expense of building, moving and managing workloads, to keep the insights and discoveries coming.

Damien Eversmann is a delivery strategist for higher education, North America public sector, for Red Hat.

ANSIBLE FOR ENTERPRISE AUTOMATION

As colleges and universities have sought ways to make their processes more efficient, a lot of them have turned to the use of **Ansible**, Red Hat’s automation platform, which is relevant for both IT and business users. The idea is simple: Take repetitive tasks that are a time sink and involve infrastructure, applications, networks, security or business functionality, and automate them – whether that’s on-premise, virtual, cloud-based or in a container (or some combination).

There are two ways to deploy automation with Ansible. IT staffers can create tasks for themselves or other users in YAML (Yet Another Markup Language) and run them sequentially in “Playbooks.” Or users can pick what’s needed out of the self-service Ansible Services Catalog.



The Modern Campus: Security, Automation, Hybrid Cloud

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Your Starting Point for IT Optimization

Refreshing your IT operations can only begin after you get visibility into what your infrastructure is up to.



Brandon Shopp

Vice President, Product Strategy for Security, Compliance and Tools, SolarWinds

WHEN THE PANDEMIC CHANGED EDUCATION, the members of THWACK®, the SolarWinds IT community, did what they do best: reached out to help others. In many cases, that meant sharing examples of what came to be known as “crisis dashboards”: compilations of the data they had put together to monitor the new work-from-home/study-from-home experiments that had landed on every college and university in the world.

While the dashboards would be unique from campus to campus, they also had something in common: Each was intended to give IT professionals the immediate visibility they suddenly needed into various aspects of their infrastructure, to stay on top of operations for their higher ed environments. That might be data about the number of concurrent VPN sessions and VPN bandwidth usage, the average and peak loads on the CPU and memory loads, demand on core networking hardware, counts of concurrent users for critical applications, or any number of other specific details important for the institution doing the monitoring.

This information became essential for adapting quickly to changing conditions on the ground and allowing IT organizations to be proactive. Rather than waiting for a complaint from a college executive or fielding a flood of student support calls, these schools could shift into gear and take the measures to set them up for friction-free usage, prevent outages and help them be ready for whatever came next.

Gaining a clear view into data center details is the starting point for any IT optimization process.

Visibility that Evolves with Needs

Monitoring all the moving parts of the data center doesn't have to be complicated. The right kind of monitoring tools should be:

- Simple enough for non-specialists in the IT organization to use without a lot of training.

- Modular, so usage can grow as needed.
- All-encompassing, so users don't have to work with a bunch of different management products – just one, since that simplifies the work.

For example, the modules in the SolarWinds® **Orion® Platform** products address performance of every element in the IT stack through an interface designed to consolidate data from whatever sources are most important to you, whether that be network servers and applications, virtualization, NetFlow traffic, security and compliance, storage, IP address tracking, VoIP and WAN, devices and port usage, websites and databases, and patch management. The Orion Platform serves, as one user put it, as an “EKG” for your systems.

After the recent SUNBURST attack, SolarWinds has taken significant measures to further secure its internal environment and to enhance its product development environment to help ensure the security and integrity of its software.

Setting Up for Long-Term Success...

The university IT shop doesn't typically head to Best Buy when it's time to update infrastructure. Acquisitions have to go through internal planning and approval, budgeting and ordering – and it all takes time. Having visibility into usage trends enables the IT department to better plan, thereby preventing gaps in performance and operations and opening up ample time to line up the funding needed.

Best-of-breed monitoring takes that a step further, pulling in information from outside sources, so the IT crew doesn't have to wonder. SolarWinds **Network Configuration Manager**, for example, links up with the relevant hardware and software to notify you when a vendor has put an end-of-support notice out. If Cisco has issued an end-of-life message for a given switch, it serves as an early indicator for you to help plan timing of replacement.

...While Dealing with the Immediate Hazards of the Job

When a student or staffer is complaining about performance, IT has to establish the source of the issue. Two years ago, it might have been a lack of WiFi in a particular area on campus or a faltering virtual machine. Now it might be figuring out whether that laggy web session is a problem with Zoom or a snafu with the on-premise learning management system. Being able to focus just on those pieces of infrastructure seeing the greatest pressure makes response more efficient and effective.

That was the idea with the crisis dashboards – to bring clarity to decision-making. But the same solution can also help steer IT's larger journey.

As we all know, the IT roadmaps of 12 or 18 months ago have undergone drastic alteration. College and university leaders have had to re-examine what their organizations are going to look like going forward. Priorities have shifted, and in plenty of schools, those long-awaited digital transformations have moved from nice-to-have to must-have. Getting visibility is your first step forward for going in new directions.

Brandon Shopp is the vice president of product strategy for security, compliance and tools at SolarWinds.

4 TRIED-AND-TRUE SUGGESTIONS

Talk with others in your community. You'll get a lot of useful insight, advice, and feedback from your peers. Find out what they like and don't like about the various technologies you're considering. They're sure to be candid.

Follow up on vendor references. Make sure the ones you receive are equivalent to your school, by virtue of segment, size or IT structure.

Ask how many full-time employees will be required to run the application once it's deployed. After all, any commitment you make to this solution will suck time and resources away from other work on the IT roadmap.

Put the solution to the test. If it requires a set of professional services or a sales engineer to come on site – whether physically or virtually – to get the system configured and running, is it going to be sustainable once you're holding the keys?



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Building the Virtualized Student Union

College no longer takes place just on campus. Virtualizing operations ensures that the student experience remains consistently excellent and secure, wherever it happens.



Herb Thompson
*SLED Strategist,
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Doug Harvey
*VP of State, Local,
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INSTITUTIONAL ROADMAPS FOR MANY COLLEGES

and universities have been turned inside out in the last year and carefully laid plans set aside or severely modified to focus on a single topic: student-centered education. What's going to remain as we emerge from the pandemic is the value that the institution of higher education provides its students. And that is a conversation in which the CIO is an active participant.

The IT organization has been at the heart of successful pivoting as remote teaching and learning have dominated. As a result, now that campuses are starting to return to normalcy, administration will rely on IT to continue enabling the work of enhancing the student experience. That's especially true if, as many experts predict, hybrid or blended learning will forevermore be part of the modernized college experience.

Integration is a big part of the solution. Forget about forcing students to figure out the dozens of different apps and websites they need to fully partake of college. IT needs to integrate the learning management platform, digital content, student support services, health and wellness, esports, collaboration, campus calendar and student information – enfolded them into a virtual student union.

This idea goes beyond the student portal, which has been around for a long time. What's new is the idea of marrying systems that may be PC-based, on-premise-based and cloud-based into a single hub and then wrapping that in a blanket of security that's transparent to the user. That becomes a game-changer for the student experience.

Success will ensure that small or mid-sized colleges increase their infrastructure efficiency, drive out cost and improve the user experience, better positioning them to compete against the national brands – institutions and MOOCs – by offering the best of virtual curriculum alongside the on-campus experience.

encompassing integration is following a cloud-like approach for delivering agility, which is replicated with software-defined networking.

VMware has never made hardware. It has always viewed the world of technology as something to be defined, controlled and managed by software through virtualization. That's just as true for networking, storage and cloud usage as it has been for servers. What we have learned in working with higher ed to broaden their perspective on virtualization is this:

- Modernization doesn't require a forklift. You need to be able to take a lot of what you're already invested in and build on that to expand your capabilities to meet current needs, while future-proofing IT.
- Institutions can't be experts in everything. Rather than trying to skill up and maintain the many different brands that make up the technology profile of your institution, turning to software-defined infrastructure provides an end-to-end framework that simplifies the management of your operations.

VMware Workspace ONE is a digital workspace platform that enables schools to deliver any app securely on any device. Workspace ONE, available as a cloud service and as an on-premise deployment, integrates three key components:

- Application management, which provides users with access to all of their apps in one place and with a consistent experience.
- Multi-platform endpoint management, available from a single console, to ensure consistent processes and policies across any operating system.
- Access control, to make sure users and devices get the appropriate resources and IT can do configuration, policies, patches, updates and troubleshooting.

The Digital Workspace

What's required for the institution to accomplish such all-

Secure Connections

Security is a crucial part of the platform. Achieving

zero-trust security requires a combination of endpoint management, detection and remediation, which starts by monitoring four dimensions: user identity, application access, network access and device.

Should anything vary from what's expected – suddenly, the student is logging in from another country – the security aspects of Workspace ONE, powered by Carbon Black, can throw a security question at the user. If he or she can't answer that, the fortress goes into defense mode.

What makes Workspace ONE so powerful and what holds those secure functions together is NSX, VMware's network virtualization platform that acts as a cloud firewall. NSX uses software-defined networking to support implementation of virtual networks on both physical networks and virtual server infrastructures. NSX serves as a security wrapper around network traffic, with instant recognition when good traffic turns bad and the ability to automatically eliminate access.

The Benefit of the Virtualized Student Experience

Institutions large and small have discovered the benefits of providing a virtualized experience to users.

One community college system has adopted Workspace ONE for its 24 different colleges and 80,000 students. The major concern was how to manage all of the devices that suddenly needed secure access to network services and resources, while delivering optimal learning to students and a robust remote work experience to faculty and staff. Workspace ONE has enabled the college system to integrate multiple curricular activities into the student experience.

A private, nonprofit technical college adopted VMware's digital workspace solution to give its students rapid, safe and effective access to collaboration tools and high-end computing programs for engineering, design, electronics and other programs, from their own virtual desktops, helping them to continue learning.

Adopting a platform approach to serve as a one-stop shop reduces the complexity of so many moving parts and simplifies IT operations. But it does this to support the kind of user experience that can satisfy every student.

Doug Harvey is the vice president of State and Local Government & Education for VMware. **John Punzak** is the senior national director of Healthcare & SLED Business Development for VMware. **Herb Thompson** is the SLED strategist for VMware.



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Accelerating Student Success with AI

As colleges and universities struggle with enrollment, Google Cloud Student Success Services is poised to reinvent how institutions support and engage their students.



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A S GROWTH IN UNDERGRADUATE CREDENTIAL earning has come to a standstill over the last year, colleges and universities are seeking new ways to draw in the right candidates while also holding onto the students they have by bolstering student success efforts. Numerous institutions of higher education are finding success in strategic aspects of the academic lifecycle by embedding the use of artificial intelligence and machine learning.

There are several areas where Google sees the potential for “quick wins” in student success initiatives:

OPTIMIZED ENROLLMENT AND ADMISSION: For performing targeted outreach among those individuals who are most likely to convert from prospect to applicant to enrolled student. Automating the activities of credit transfer analysis, document analysis and personalized course planning can simplify the process of admission and registration, removing the hurdles in the way of successfully launching the student into his or her college experience.

VIRTUAL ASSISTANCE: For delivering 24/7 online tutoring and support in multiple languages answering common questions about required courses, financial aid and other topical subjects; and then using that digital interaction to expand the knowledge base and generate data for better decision-making, such as which new courses to launch or existing courses to expand upon.

STUDENT ENGAGEMENT: Tracking engagement and predicting which students are at risk, to maximize retention. This is done through analysis of LMS data, measuring instructor readiness, gauging adoption of individual teaching tools to correlate usage with student outcomes, and even performing sentiment analysis to understand whether a given student is satisfied or frustrated.

Google Cloud Student Success Services in Action

To address these pressing needs, Google Cloud has developed a set of services that reinvent how institutions

support and engage their students. With **Google Cloud Student Success Services**, each school can start by activating just the functionality it needs. As requirements evolve and colleges and universities advance in their student success efforts, they can add more tools.

These services are proven. Currently, more than 10 schools internationally have adopted Student Success Services, including these institutions:

Penn State World Campus is using **virtual assistants** to get students the routine information they need more quickly while also freeing their academic advisers to handle the more complicated requests.

Recently, the University of Minnesota announced **NXT GEN MED**, a program that brings together cutting-edge technology and learning tools from Google Cloud to engage students virtually and match them with mentors at the Mayo Clinic for immersive learning experiences. The intention is to compress a four-year degree process into two years.

Another institution adopted the Google Cloud solution specifically to address enrollment challenges, as the school saw a decline in the number of out-of-state and international students enrolled. Now that college has changed how it recruits local and in-state students, to help fill the enrollment gap.

Implementation Lessons

As our professional services consultants – both from Google and from certified partners – have worked with customers to introduce Student Success Services, we’ve learned a few things:

EVERY INSTITUTION IS DIFFERENT, AND SHORT AND QUICK IS BETTER. There is no black box that will work for everyone. Therefore, when a school opens an engagement with us, we sit with stakeholders to discuss what their top priorities are and what their current infrastructure looks like. The feasibility study is meant to determine what Student Success initiatives to try first, based on what will bring quick but meaningful wins.

DESIGN AND PLANNING HAVE TO INCORPORATE

CONTINUAL REEVALUATION. Institutions don't like being locked into long, complex and expensive projects where they don't see a return until the very end. While the implementation is staged, at each phase the institution can reevaluate based on what they've learned so far and choose to pivot because priorities have changed or student preference has evolved.

INTEGRATION WITH EXISTING SYSTEMS IS ESSENTIAL.

A successful solution must play well with an institution's existing applications, including student information, learning management and content management; human resources; constituent relationship management; and reporting and analytics. That makes the solution easier to implement and it generates more value out of the existing investments. We have partnered with industry consortia, including Unizin and RHEDcloud, to produce many of the connections required; but sometimes custom connectors are also needed.

STUDENT SUCCESS INITIATIVES CAN BE FOUND IN ANY KIND OF SCHOOL. We have found success in community colleges, research universities and private liberal arts colleges. In each case, we have brought the technology – AI models trained through public data sets – while the individual school has supplied the local knowledge and its own data for retraining the model to generate the most value. The good news is that training the model doesn't require much technical knowledge. It

can be as simple as loading new questions and answers into a Google Doc, and the solution will automatically learn from that document.

STUDENT SUCCESS DOESN'T HAVE TO COST A

LOT. Institutions look for solutions that are sustainable and affordable – this was a strong driver in the development of Student Success Services. We want this technology to help all types of institutions, even the ones that aren't currently using Google Workspace for Education. As with everything we do at Google, we don't want anybody using a tool we've built because they have to, but because they want to.

As schools struggle to fill the enrollment gaps and keep current students on track, artificial intelligence and machine learning can lend a helping hand. Google Cloud Student Success Services combines best-in-class security, application choice, ease of use and a high-touch student experience to help transform the academic lifecycle, from attracting and enrolling students, to supporting them in their learning efforts, and then watching them graduate, move into their careers and eventually return to the college as alumni, supporters and fans.

Jesus Gomez is a strategic business executive focused on Student Success Services in Google Cloud's public sector, with responsibilities for education and research.



Student Success Services



Attract and support the next generation of students while optimizing operations and improving financial sustainability

Learn more



A Conversation with Jen Leasure

The Quilt's President and CEO discusses how her organization's members — state research and education networks — are helping colleges and universities build and maintain new learning environments

You have a partnership with Carahsoft. Can you talk about what that partnership is all about and how it serves higher education?

Jen Leasure: Individual higher ed institutions turn to their regional networks to be their technical advisors, and in the case of smaller institutions to also be an extension of their technical staff, in understanding the solutions that are out there and helping them navigate their procurement and implementations for their institutions. VMware was one of those solutions everyone was interested in. We selected Carahsoft out of an RFP, to serve as our partner for VMware, and then the program really accelerated.

New solutions were coming to market, often created with the purpose of being bundled with VMware for maximum impact. Some of our member institutions helped us define those unique bundlings specifically of interest to higher ed.

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So, we did another subsequent RFP for VMware and related services in 2019. And out of that Carahsoft was selected again as our partner.

As a result, we provide a pre-competed contract vehicle for VMware and the related services, which is really important to higher education institutions — especially public institutions that have strict state procurement or institution procurement guidelines that they have to follow. This removes a lot of that administrative burden in having to conduct their own RFP for the same services. So, it really is an efficient way to purchase solutions of common interest.

Carahsoft has been an amazing partner to us in this process, giving individual institutions access to solutions and discounts that they may not necessarily get if they're purchasing on their own. Plus, they get access to the expertise that Carahsoft brings on its own and with its solution partners, answering questions, offering solutions and finding ways to make sure that they're meeting all the requirements.

In the big shift to remote work and remote teaching and learning, have you seen pickup among the institutional members of your members taking advantage of this community of vendors?

Absolutely. As everything went online and was done with technology, institutions needed to invest in new solutions to support their researchers, their faculty, their students, their administration, in conducting their business — and with limited budgets. We know that everyone's been having particular budget constraints, and they're looking to maximize the benefits of these types of programs and their discounts. This type of program has been especially important during COVID.

And remote and hybrid learning isn't going away, as we know. It's difficult to foresee a world where hybrid becomes an option instead of a requirement. Folks don't like options taken away once they're there. And so, the investment in these types of solutions is going to continue to support future directions.

Cloud access especially has become important for institutions to support their students. That's one area where we have seen a lot of growth in the last year.

Are there other aspects of the Carahsoft contract that really stand out?

The answer is Martin Gavin, who serves as our program manager from Carahsoft. He absolutely has invested himself in understanding and supporting our community. It feels much different from a typical kind of vendor relationship. It's really a partner relationship. He has made an enormous difference in terms of building the trust and being a reliable partner for all of our Quilt members.

Here's an example: one of our members' members, a



higher ed institution, was having a really difficult time with procuring a particular solution. They had spent probably six or eight months trying to work through a contract directly with the service provider. By talking with Martin, our Quilt member was able to work out the issues within a couple of weeks.

Because Martin knew all the parties involved, he could understand and translate where those friction points were

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and help connect the dots to an agreeable solution for everyone. So, this member of ours sings the praises of Carahsoft, in terms of the type of support and partnership that we have with them.

A lot of purchases go through the program, but for some

of them, it just comes down to that relationship.

Are there any community projects going on right now that will help institutions adapt to this current environment they're facing?

A few of our members are working on some wireless projects involving Citizens Broadband Radio Service. CBRS is being brought in to provide for connectivity in hard-to-reach and rural communities, to get those students the internet connectivity needed to access their online learning. These are projects that are really important and are in the early stages. This is an area that we're working on with Carahsoft, which is building out its portfolio of private LTE (pLTE) spectrum solutions.

How do interested institutions take advantage of The Quilt's benefits?

Any institution that's interested needs to get in touch with their statewide research and education network, the Quilt member. Those regional network partners will know exactly how to support them and take advantage of the program.






















Learn more on The Quilt's website.

The Quilt & Carahsoft

Supporting Higher Education IT Requirements

The Quilt is a non-profit coalition of 38 regional research and education networks across the U.S. that leverages the collective purchasing power of its members to cost-effectively purchase advanced networking technology and services.

Members who leverage The Quilt's Master Service Agreement benefit from Carahsoft and our reseller partners' decades of experience providing products and services to meet the technology needs of Public Sector and Education institutions. This publicly sourced contract provides exclusive pricing for Education institutions on a complete portfolio of pre-competed and awarded solutions, including Cloud, SaaS, PaaS, Software, Hardware, Support, and Managed Service Offerings from Carahsoft's technology and reseller partners.

To learn more, call (703) 673-3518, email TheQuilt@carahsoft.com or visit carahsoft.com/The-Quilt.

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