WAINHOUSE
Research

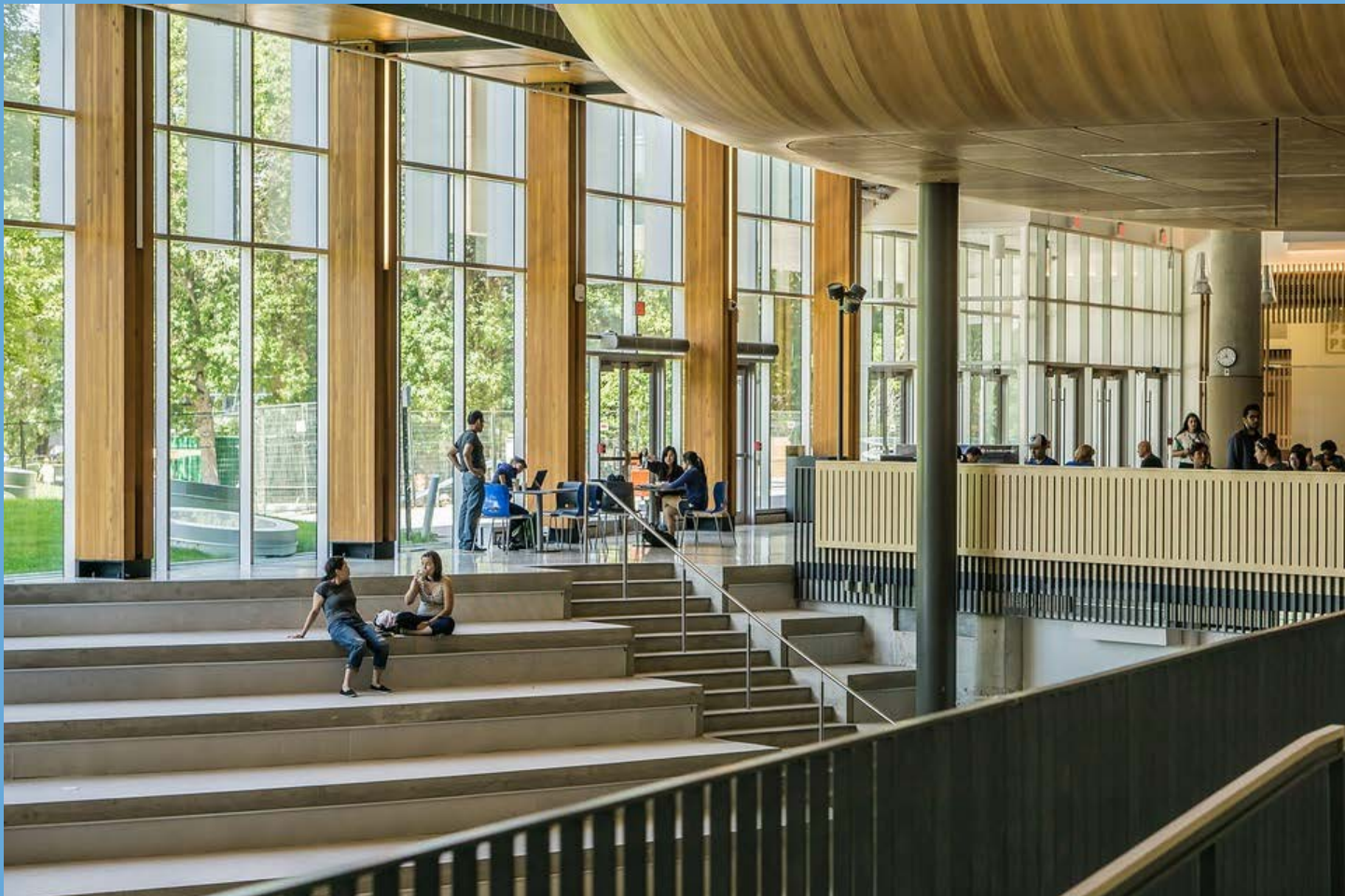# Higher Education at the Crossroads
Leveraging Educational Platforms for Institutional Transformation

Alan D. Greenberg
April, 2017

Contents

Tables

Introduction

Just as no two campuses are alike, no two institutions of higher education are the same. From the largest university in the world (the massive Indira Gandhi National Open University in India, 3.5 million learners strong)[1] to the smallest (a religious college in Alaska, 38 enrollments),[2] every school has its own unique needs. Yet whether brick-and-mortar only, distributed with campuses and online programs throughout the world, or online only, institutions share the same basic needs. During the current academic year, U.S. colleges and universities are expected to award 1 million associate's degrees; 1.9 million bachelor's degrees; 798,000 master's degrees; and 181,000 doctoral degrees. Worldwide, Wainhouse Research (WR) estimates that there were almost 185 million total enrollments as of 2015.[3] That's a lot of learners to support, calling for a lot of services.

> These days higher education is at a crossroads. Faced with serving their customers while constantly needing reinvention and retooling, often via campus initiatives, many colleges and universities are struggling to deal with complexities.

The magic to delivering those services well may be in how they are envisioned, integrated, and delivered. Start with infrastructure: a physical campus must worry about roads, plumbing, electrification, technology, and buildings. Facilities planners typically must consider all of those in conjunction with one another. *College Planning and Management* expects $11 billion of new construction spending in 2017 in the U.S. alone. Layer on top of infrastructure the people elements – faculty and staff fulfilling the mission of education. Layer on top of that the policy and pedagogy necessary to deliver education – rules and approaches, departmental and discipline guidelines, certifications, standards in the U.S. like the *Family Educational Rights and Privacy Act* (FERPA), the *Health Insurance Portability and Accountability Act* (HIPAA), and the *Americans with Disabilities Act* (ADA), as examples. The result? Tremendous complexities that every institution faces in its own unique way.

> *Across higher education there's a sense, and the national climate reflects it, that parents and students and government are asking higher education to be more accountable and provide return on investment and that students will be gainfully employed. Lifelong learning is a piece of this, and we are trying to experiment with innovative programs, new academic offerings, inter-disciplinary approaches, and the whole notion of blended and more online learning.*
>
> – Mur Muchane,
> Vice President for Information Technology
> and Chief Information Officer (CIO),
> Wake Forest University

The issues discussed in this paper touch on *virtually every college or university or institutional system*. WR believes that the interdependencies within an institution are such that a platform approach to technological infrastructure can provide the greatest set of efficiencies and greatest opportunity for dealing with complexity. While no one vendor can deliver on everything a campus needs, we think campus technology vendors can be differentiated in three key ways:

> One of many reasons a platform approach matters is that it can provide the greatest opportunity for efficiencies and system scalability.

1. How they take an integrated approach – with elements like networking and analytical technologies embedded in their platforms: sensors, alerts, and notifications that can monitor the health of a living, breathing institution.
2. How they partner with institutions – taking the same stance towards the mission-critical nature of education as they take towards their business customers.
3. How they bring other technology and program partners to the table to create seamless solutions. If they do not specialize in all things, and who does these days, at least they can help an institution achieve a solution through partnerships.

Efficiencies and scalability are increasingly important because of the rapid adoption of digital technologies both inside and outside the classroom – and the need for them to remain affordable. Inside the classroom, you find rapid adoption of collaborative technologies supporting online and blended learning – and the expectation that the ROI of those technologies needs to be measured to show value. Outside the classroom, technology is just as pervasive, from digital signage to the Learning Management System (LMS) and Student Information System (SIS), from campus Wi-Fi to cybersecurity, and from Admissions and recruiting to campus security systems.

> Efficiencies and scalability are increasingly important because of the rapid adoption of digital technologies both inside and outside the classroom.

Broad agreement exists across administrators at the *Association of American Colleges and University* member institutions that most of the teaching faculty at their campuses should be using more digital learning strategies in undergraduate courses – nine out of ten in a recent survey agree.[4] Faculty of course are playing catchup to their students – almost four out of five students (78%) say they agree that the use of technology contributes to the successful completion of their course[5], but fewer faculty would agree. Thus, any strategy for a *Digital Educational Platform* must account for the need to support faculty and learners, not get in their way.

This paper describes the challenges facing educational institutions across the spectrum, and explains how the relatively new concept of an integrated Digital Educational

Platform can help institutions of higher education address the challenges of fulfilling their missions in the coming century.

Methodology

Wainhouse Research interviewed a set of leading educational technologists within higher education on the concept of the Digital Educational Platform and how it might address today's and tomorrow's challenges. Those interviews, along with our own internal database of information and secondary resources noted in the endnotes, contribute to this paper. Wainhouse Research thanks those who participated in this project – and notes that all quotes are the thoughts of specific individuals and do not represent the perspectives of their affiliated institutions.

Digital Transformation

Challenges Facing Higher Education

Higher education faces a series of challenges that can be grouped into three areas of concern: 1) how to control costs and improve return on investment; 2) how to retain and support learners and improve outcomes; and 3) how to address a constant need for reinvention – and the burden that places on people (all stakeholders) and the campus (all infrastructure).

> *One of the big challenges across higher education is the access and affordability question, and how that intersects with our operating challenges. Many institutions are having to devote more operational resources to financial aid. The challenge is: how can we be more operationally efficient to reallocate resources to financial aid and be more affordable – and operationally lean – for an increasingly diverse student body?*
>
> – Mur Muchane, Wake Forest University

First, there is the matter of costs.

- *Tuition increases* hover between 2.9% per year for public four-year universities and 3.7% for private non-profit institutions.[6] Add room, board, books, and expenses, and the total bill can be painful for many families.
- *Rising tuition has not yielded rising operational security for institutions of higher learning*. Yet rising tuition has translated to higher student debt, while the perception that a college degree may not yield a higher-paying job casts doubt on the value proposition of higher education for some families.

Then there is the matter of outcomes – or the inability to achieve desirable outcomes due to obstacles to success for some that otherwise might be addressable via intervention.

- Evidence exists that approximately 21% of adults over the age of 25 – approximately 44 million individuals – have some college credit but lack degrees.[7]
- The *mismatch* between potential employer expectations and universities producing the future workforce has been well documented. Business leaders complain that colleges and universities are not producing capable job applicants; studies show a delta exists between the capabilities recent graduates believe they bring to the workforce and the capabilities employers find those graduates to be bringing.[8]
- A consensus exists that *measurement and evaluation* can help inform how well an institution is making its impact; institutions, however, are only beginning to understand the possibilities made available via big data and efforts at removing the siloes that traditionally have existed on campuses.

> A recent survey of university presidents indicates that they know they must change. They say they want change…and they wanted it yesterday.

Finally, there is the burden of institutional reinvention or adaptation to an ever-changing competitive landscape.

- It is difficult for institutions to keep up with the *drive for innovation and change* at every level of post-secondary education.   A recent survey of university presidents indicates that they know they must change. They say they want innovation and change, and they wanted it yesterday: almost seven in ten (67%) say they believe American higher education needs massive or moderate disruption in the next ten years.[9] Yet such change is not easy.
- New programs must be researched, evaluated, and planned for. A recent *Chronicle of Higher Education* article on the topic of strategic initiatives says it well: while some institutions just "float out new programs to see what they get," the most important approach is to examine if "what's being considered fits an institution's mission and identity…research the demand for the innovation…and determine if it can take advantage of the new strategy."[10]
- The consensus among forward-thinking educators is that, in this century, decisions should be data driven. Most likely the most well-thought-out initiatives based on solid evidence are most likely to succeed. Yet even creating secure, trusted pathways for the flow of data can be a challenge on most campuses.

Digital Challenges Facing Higher Education

Many institutions of higher learning face digital challenges that sometimes can get in the way of addressing the higher-level institutional challenges. Those challenges relate to systems, data, and operations. Legacy information systems can date back years or even decades. Most campus CIOs tell us that some technology refreshes that once occurred every five to ten years are now annualized or occur every two to three years.

CIOs struggle with the upgrade cycles: not only with their legacy systems and supporting technologies, but also in keeping up with the needs of brick and mortar facilities. Upgrades have many moving parts:

- Core network infrastructure – wired and wireless connectivity and the underlying cybersecurity platforms to enable what is essentially the heartbeat of an institution. Everything that follows is dependent on a strong, reliable core network.

> The moving parts IT groups must attend to include core network infrastructure, cybersecurity, learning technologies, campus technologies, and a services and management layer.

- Learning technologies – the collaborative technologies that can consist of the LMS, Learning Record Stores (LRSs) necessary to integrate with content providers, virtual classrooms and on-demand learning environments, and real-time video conferencing and telepresence systems.
- Campus technologies that support massive operational needs – from high-speed computing and research capabilities to intelligent facilities, and from location-based services to physical campus safety systems. Let's not overlook SIS and ERP technologies.
- The services & management layer – ranging from daily need for help desks and training and administration, to planning needs enhanced by data analytics.

Table 1 demonstrates one view of the mix of campus technology requirements.

Campus Technology Requirements

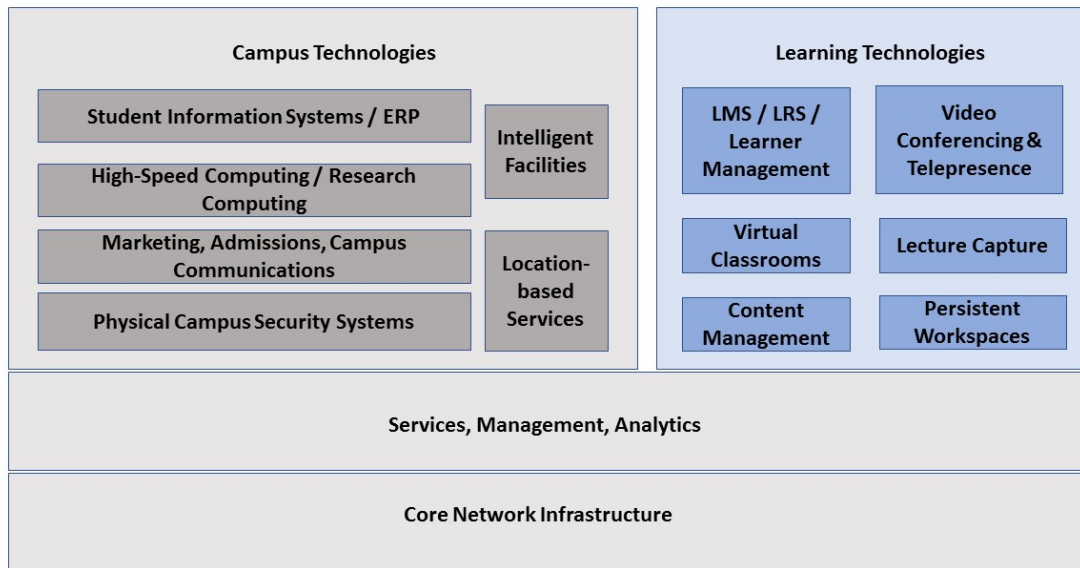| Campus Technologies		Learning Technologies	
Student Information Systems / ERP	Intelligent Facilities	LMS / LRS / Learner Management	Video Conferencing & Telepresence
High-Speed Computing / Research Computing		Virtual Classrooms	Lecture Capture
Marketing, Admissions, Campus Communications	Location-based Services	Content Management	Persistent Workspaces
Physical Campus Security Systems			
Services, Management, Analytics			
Core Network Infrastructure			

Table 1 Campus Technology Requirements

On top of these areas are the things every forward-thinking CIO needs to think about. How are we delivering cloud services? What platforms can we virtualize? How are we automating processes? Besides systems, siloed data can be a major problem. Wainhouse Research has interviewed IT and academic leaders at medium-sized institutions in the past with dozens of different functional areas – and all too often those institutions tell us their functional groups suffer from lack of data sharing, lack of system compatibility, and even lack of consistent, comparable platforms. And finally, there are operations which include the day-to-day business of supporting platforms, providing security, and offering rapid response to daily needs.

> All too often institutions tell us their functional groups suffer from lack of data sharing, lack of system compatibility, and even lack of consistent, comparable platforms.

Only recently could technology begin to scale to take a holistic, matrixed, solutions approach that – by integrating the disparate elements of campus technology – including campus-facing operations, teaching and learning, and data analytics – the result is a sum far greater than its parts. The idea of the Digital Education Platform is that it can help an institution address blind spots created by siloed information systems, while embedding the sensors and touchpoints within the network and the individual technologies for greater efficiencies.

The Promise of the Digital Education Platform

What constitutes a platform to help address the myriad challenges facing IT? Wainhouse Research believes it consists of well-integrated network capabilities that support *digital learning* and a *digital campus.* These two key areas can be embedded within the network – think of it as sensors embedded within specific hardware and software products that themselves become intelligent nodes within the network. They then can draw upon network services while also linking to one another as appropriate based on use cases. Each of those two key areas – digital

> WR believes well-integrated network capabilities that support digital learning and the concept of the digital campus can help IT address its myriad challenges.

learning and the digital campus – is comprised of both physical and virtual elements that interplay and connect. Table 2 on the next page breaks down each of those areas into its core components, beginning with use cases and the supporting technologies.

Digital Learning			Digital Campus		
Connected Classrooms	**Virtual Classrooms**	**Connected Research**	**Connected Campus**	**Smart Workspaces**	**Campus Security**
Online courses & workspaces	Flipped learning	Secure research computing	Connected infrastructure services	Intelligent facilities	Physical and cyber security
Blended courses via lecture capture, telepresence & video conferencing	Web conferencing, lecture capture & LMS integrations	Multilayer / multiservice switches & multilayer fabric switches	Connected vehicles, connected parking systems & services	Identity services, energy services, virtual workspaces, digital signage	Video surveillance & storage, IP cameras, video analytics, campus emergency communications services
Mobile learner access via scalable tech, WAN optimization, Wi-Fi	Secure external collaboration & Global learning	Secure cloud & metacloud computing	Connected buildings – classrooms, offices, dormitories, sports & entertainment venues	Location services, mobility services, cloud-controlled network services	Threat intelligence, advanced malware protection, identity services

Table 2 Essential Areas Potentially Addressed by a Digital Education Platform

For the sake of time, we explore here several specific use cases and inter-related technologies, with the understanding that any institution exploring a Digital Education Platform solution might take these ideas and customize them to its own environment.

Digital Learning

Connected classrooms for greater reach and security. Using web conferencing for virtual classrooms or video conferencing for real-time distance learning is not new. What's new is how – within the framework of a Digital Education Platform – these and other learning technologies can be blended to create an optimized, completely live,

> *We can see telepresence activity as it crosses the network. From my office, I can blacklist an IP address, but we keep most of our DoS tools downstream from the information systems on campus to prevent routers and switches from being exploited.*
> – Bob Turner,
> Chief Information Security Officer,
> University of Wisconsin – Madison

synchronous online learning environment *with extra layers of security*. As an example, imagine a class being delivered by video conferencing to multiple locations then adding experts via web conferencing, with end-to-end security provided by network services that prioritize and protect student and class data. Such an environment in theory might take away the worries of poor Quality of Service (QoS) and weak network security if the hooks exist into a set of robust core network services and network management tools that support operations at various network touchpoints. Equally important is the ability to blend brick-and-mortar classrooms, online courses, blended courses, and virtual classrooms into a single platform – with hooks into an LMS for scheduling, access to learner/class records, and streaming of on-demand content post-class. The efficiencies can lead to more successful learning outcomes and greater IT resiliency.

Connected computing for research initiatives. Using secure, high-performance computing might seem to be table stakes for many institutions, but even Tier 1 universities wrestle with how to socialize and educate researchers regarding the availability of high-speed computing. Because demand for computing resources is often incremental, many campuses draw upon flexible computing architectures that support

> *We have supported more than 9,700 research projects since 2015. A high-speed computing cluster like this is a great intermediate step, because for many researchers going from a desktop computer to a supercomputer is a huge leap, insurmountable for some. Our researchers can get local support from us and then grow into a supercomputer environment with little effort. And we keep bureaucracy down, which we've found drives increased usage.*
>
> – Chet Langin,
> IT Research Coordinator,
> Southern Illinois University

campus data centers, research clusters, and cloud computing services – and achieve better management, user control, scalability, and efficiency. Southern Illinois University (SIU) describes a core network infrastructure and a 40-node high-speed computing cluster it calls "BigDog." Blending Unified Computing Systems from Cisco with very high speed processors and NVIDIA graphical processing units (GPUs), a Nexus switch, and terabytes of storage, BigDog has been running continuous advanced computing services for SIU stakeholders since Fall of 2015. The SIU IT group taps into other parts of the Digital Education Platform, using web conferencing for training efforts and instant support, and this R2 university leverages both the distance education tools and their research computing environment for computer science education. In this way, SIU is leveraging its Digital Education Platform to multiple purposes.

Digital Campuses

Mobility and Wi-Fi are now understood to be essential – but much work remains to improve these services on most campuses. Already improvements in Wi-Fi and other wireless technologies are enabling seamless roaming via intelligent access points, resulting in better end user experiences on many campuses. With high-performance mobile features embedded in both mobile devices and access points, students and staff should be able to experience a seamless environment where the technology is as much a part of daily life as sunlight or coffee.[11] Campus roaming is constant, meaning voice, video, and data need to be supported via system-wide, continuous discovery of devices that can reach High Density states at any time, and by intelligent techniques that support bandwidth optimization.   New services now deliver greater location accuracy than ever before, often combining sensors and multiple types of wireless technologies (such as Bluetooth LE beacons) for near-real-time refresh rates. Why does this matter? Like the real-time, connected class discussion earlier, imagine large numbers of learners participating in their classes remotely via web conferencing or on-demand video, all at the same time and on their mobile devices, while others are gaming or SnapChatting or otherwise conducting themselves like typical youthful mobile device users. A campus wants data prioritization for QoS without sacrificing security.

> A campus wants data prioritization without losing QoS, security, dynamic support, and the ability to adjust as needed. Learning technologies, however, will not be left in the cold.

Learning technologies, however, will not be left in the cold. Companies like SMART, Google, Microsoft, Slack, and Cisco have introduced team and classroom workspace products in the past few years that enable learner collaboration. Within a Digital Education Platform, there is no reason why workspace learning technologies should not be embedded within a mobile operating system (iOS, Android, Windows 10 Mobile) to improve accessibility, launch, and seamless performance. Within the concept of the Digital Education Platform, workspace learning technologies can easily become more than just virtual extensions of a physical classroom – and instead be additional embedded elements in an intelligent network. The key is that everything that is embedded must be secure and should work seamlessly together: the network, wireless, voice and video endpoints, and collaboration workspaces.

At the same time, it's now possible to achieve **smart campus features with location-based services using the Internet of Things (IoT)** for improved network services. Think analytics. Many already understand that analytics can influence outcomes through

better understanding of student behaviors. But the future will be about how analytics can help colleges and universities deal pragmatically with regular and non-routine stakeholder behaviors. As an example, hyperlocation network services let institutions analyze regular user and visitor activities and better serve these different groups. Digital Education Platform analytics should be able to answer how much time are learners spending, on average, in the library, and where are the

> The future will be about how analytics can help colleges and universities deal pragmatically with regular and non-routine stakeholder behaviors.

greatest points of congregation? How can traffic around campus be routed more efficiently? What assets are under-utilized? A college or university might decide to offer more virtual librarian hours or place collaboration areas in strategic locations across the campus. As another example, connected transportation services including real-time fleet and visitor vehicle data based on GPS, Wi-Fi, and RFID technologies can help an

institution understand the ebb and flow of campus traffic and campus assets – and find efficiencies in managing both day-to-day and special events. Connected campus buildings and infrastructure – with networking technologies monitoring activity and the dashboards to understand everything from lighting to parking, concert halls to stadiums – now means an institution can have a view into its entire operations today – and get data for tomorrow.

These days there are discussions on many campuses relating to social, mobile, analytics, and cloud (SMAC)

> *We have a common security ops center that looks at all the tools. Advanced malware detection absorbs data from about every type of device we have on campus, and ingestion, absorbing data from an advanced, contextual threat detection package – which includes a threat and intelligence capability that reads endpoints, along with a tool for endpoint management, which is prevention oriented, and a threat cloud intelligence service. We are very impressed with Cisco's Advanced Malware Protection and Active Threat Analytics, which extend our protective measures and ability to view and understand what's happening in the network.*
>
> – Bob Turner,
> University of Wisconsin – Madison

technologies. There is widespread belief that emerging technologies such as IoT, artificial intelligence (AI), machine learning, and autonomous vehicles will drive the next computing cycle in higher education and the enterprise.[12] What do those four areas have in common? *They all rely on resilient core network services.*

Campus Security

On the campus of every institution, there are the administration's **knowledge and mandate that campus security** is important, and the IT organization's challenge to

"deliver the goods." Security resides in both physical systems and cyber systems, and IT increasingly is expected to support both network and brick-and-mortar systems. Physical security starts with emergency notification. No campus can exist without robust emergency notification and alert systems, supported by well-integrated video surveillance, access control, and ideally emerging technologies like facial recognition. No less essential are the elements of cybersecurity, in a world in which the threats of hacking, ransomware, malware, DoS attacks, and even "lowly viruses" are constant. With the wide variety of threats that now exist and the constantly changing landscape of security attacks, the top constraints to adopting advanced security products and solutions, per a recent cybersecurity study, are budget, product compatibility, and talent. Yet almost half (49%) of security professionals surveyed said their organizations have had to manage public scrutiny following a security breach. This creates an environment that practically begs for high-level integration and a super-aware, multi-layered set of network tools.[13] A Digital Education Platform can provide the multi-layered support necessary to protect an institution.

> According to the Cisco 2017 Security Capabilities Benchmark Study, most organizations use more than five security vendors and more than five security products in their environment. Fifty-five percent of the security professionals use at least six vendors and 65 percent use six or more products.

Digital Transformation and Academics

Reinventing and transforming education begins by knowing and understanding the universe of today's learners. While some are traditional students (18-22 age range, straight out of high school), increasingly most are post-traditional (what we previously have called *adult learners*). As online and blended learning have opened new avenues for delivery of education and transformed the competitive landscape in higher education, a range of policy and legal, institutional reinvention, learner management, content management, communications, security, and teaching and learning issues all have risen to the top of administrators' concerns. Following is a

> *It's a human failing: the tendency to focus on the need to get research or work done and overlook/get ahead of security. I saw elsewhere a nursing school with students running clinical rotations – they had been storing actual clinical notes with identifiable patient info into the LMS, which is not a system secured to HIPAA standards. And there was no filter for scanning for identifiable information, whether it's a screen shot or PDF or some form of text file. They simply could not control the chaos…From the minute (patients in health education situations) are involved in video connections and recording, a school is hitting on several elements of security issues.*
>
> – Bob Turner,
> University of Wisconsin – Madison

short list of "touchpoints" where a Digital Education Platform might influence teaching and learning:

- Whenever educators begin to use a technology, whether for research or teaching and learning, they begin to collide with **policy concerns.** Policy becomes an essential element included in configuration of a well-integrated platform.

- The impact of **strategic initiatives** ripple throughout an institution at both the planning and implementation stages. Just as in the corporate world, many educational institutions seek business process improvement, platform efficiencies, and rational growth plans. This results in the need for information systems to support such initiatives by either drawing upon existing deployed technologies or seeking new technology partners that have open APIs and that are highly extensible. As a side note, vendors are better than ever at understanding the need to partner with their educational customers, so support becomes an ongoing component of deployment.

  We have gone to a business process improvement initiative. And we are adopting more cloud technologies and a traditional ERP system, all to make us operate better and achieve consistencies and efficiencies.

  – Mur Muchane, Wake Forest University

- **Learner management** has its origins in the LMS – a platform essentially designed for course delivery but now evolving to address more actual learner management. Learner management is coming to be understood as an essential element of improving academic outcomes. This is built around two major pedagogical movements: competency-based learning (CBL) and personalized and social learning, which includes finding ways of creating learner pathways, mentoring processes, and methods of intervening via diagnostic and predictive analytics. Within the concept of the Digital Education Platform resides the notion that a blend of SIS, LMS, CBL, and/or personalized learning platform can benefit from a solid network core, by drawing on other learner data in addition to grades or absences.

  All our network and wireless gear and boundary protection are Cisco tools. We are in the process of transitioning from a traditional Nortel PBX to a Cisco UCS platform. With telepresence, our faculty are beginning to reimagine the classroom.

  – Mur Muchane, Wake Forest University

- **Content management** is a similar issue to the extent that academics want access to a wide array of content materials for both research and teaching purposes. Often such content can consist of data-intensive HD video, high-resolution images, and access to virtualized services that nonetheless can place a burden on network integrity. For that

reason, robust content management systems that are well-integrated with a Digital Education Platform are essential to both protecting intellectual property rights via securitized access *and* delivering that data-intensive content reliably. Effective integration would mean no interruption of services.

- **Secure data** is not just an IT departmental issue; educators and even learners must understand and respect policies like FERPA, HIPAA, and ADA. To continue to support digital education, IT nonetheless is the first line of defense, and vendors are beginning to pay attention. One way to support educational customers, besides delivering cybersecurity platforms, is to meet the security standards of efforts like The Federal Risk and Authorization Management Program, or **FedRAMP**. This is a U.S.-government-wide program that provides a standardized approach to **security assessment** – and is designed specifically to help institutions make the transition to cloud computing services.[14] Given the amount of research and grant activity funded by the U.S. government – and the need for colleges and universities to protect their data assets – WR believes that a Digital Education Platform at its core network layer will support FedRAMP processes.

> One way to support educational customers is to meet the security standards of efforts like the U.S. government FedRAMP program.

- As campuses move from legacy voice technologies like traditional PBXs, they are discovering opportunities to introduce into the classroom and administrative environment alike Unified Communications (UC) capabilities that instantly offer greater productivity and cost efficiencies. As an example, it's not uncommon now to see presence-enabled group and individual technologies like voice, telepresence, group video conferencing, web conferencing, lecture capture, chat, and online team workspaces tied together. In a Fall 2016 survey of 160 higher education institutions conducted by Wainhouse Research, more than half of respondents said they are using an enterprise-grade UC platform.

> *The CirQlive integration we have now of WebEx and Instructure Canvas is very good. Because of the Canvas integration and dial-in capability, we've had zero calls into our Help desk. As we've used WebEx, it just works.*
> *– Kevin Reeve, Director, Teaching and Learning Technology, Utah State University*

- This idea of knowing where stakeholders are located and their roles within an institution is especially powerful when you consider how much learners have impacted campus networks and learning platforms. The Educause ECAR study quoted earlier also revealed that students are always connected – two thirds connect two or more devices to the Internet at any one time, and 61% use technology during class to make connections to learning

materials. Only a well-integrated Digital Education Platform can capture all the data necessary to scale and understand the learner experience.

Stakeholder Benefits

The benefits to an institution and its administrators, IT, faculty, and learners are significant.

For **administrators,** the ability to support business process engineering is likely the top benefit. Many tell us they are trying to be more thoughtful about how to measure ROI. Because systems are connected, integrated, and responsive to events and sharing data, it's far easier to make data-driven decisions. This does not come without effort – institutions are creating entirely new roles for data analysts to use that data – but the ability to make or respond to changing conditions is profound. For one thing, consolidated systems – WR spoke with one institution with *eight different approaches to faculty/staff recruitment* – means elimination of redundancies and unnecessary expenditures.   Then there are the campus efficiencies – which result in maintaining and improving on a healthy campus environment. Learning happens best when all not only feel but are safe; everyone on campus appreciates getting around campus easily; better fleet management results in lower costs. The Digital Education Platform is essential to managing an institution's resources by making it possible to track and assess actual usage.

IT stands to benefit when it can deliver on its mission of supporting an institution's educational mission via teaching and learning technologies – and can utilize the network security wrappers that are part of a Digital Education Platform. In Wainhouse Research's fall, 2016 survey of 160 higher education technology users, we explored the top concerns relating to networked collaborative teaching and learning technologies. Table 3 demonstrates those concerns considered most important in rank order – with an emphasis on network capabilities and technologies like LMS, mobility, content distribution, and Unified Communications.

> *One thing Cisco did as we inked our agreement: they assigned a specific team that covers across various university disciplines. I have a security person, a senior director level contact, and with one quick phone call I have an entire Cisco mobile squad to help me out. That's a signal of their partnership with the university. We're building a cybersecurity petri dish. And very few companies are interested in that kind of partnership.*
>
> – Bob Turner,
> University of Wisconsin -- Madison

Top Concern	Benefit
1. Maintain network security	Security is the number one issue for this mix of IT, educators, and administrators.
2. Integrate with the LMS	With the LMS as the central repository of course activity, this group understands the need for real-time and on-demand platforms to share data – which in practical terms translates to scheduling online course activities directly from the LMS.
3. Integrate with existing UC platforms such as Cisco Jabber and IBM Sametime	Integration of presence makes possible enhanced location-based services, and this group likely believes that as it adopts UC, it should have platforms like lecture capture and web conferencing and the LMS as part of that ecosystem.
4. Enable distribution of content to mobile devices	Educators understand that students now "live" on their mobile devices – and expect frictionless delivery of various types of content.
5. Performance monitoring	This mix of IT and administrators understand the need for real-time performance monitoring.
6. Delivery of content without harming networks	Historically video and other large files have faced delivery issues – think latency and buffering impacting the ability to watch – while also affecting overall network performance and other data activities. One benefit of a core network well-integrated with content platforms is the ability to better deliver content without affecting other mission-critical technologies.

Table 3 Top Higher Education Concerns Related to Networked Collaborative Teaching and Learning Technologies

Some educational technology vendors now understand that to build world-class technologies that can withstand real-world users, they need to partner with user institutions. It helps when platforms can include feedback mechanisms that get very specific – when IT can serve as a conduit to vendors for true end user feedback on the part of IT, administration, educators, and learners. That partnership ethos is rapidly becoming something to seek when evaluating vendor capabilities. Do they plan to provide not just Help Desk support but also regular directional guidance? Do they seek to be consultative not just pre-purchase-order, but post-deployment? The University of Wisconsin – Madison is building a security operations center and planning on using it for Tier 0 and Tier 1 "eyes on the glass" interns. The IT organization will become a conduit for placing the school's CS and MIS students into summer internships and eventual job placement, thus making them more marketable.

Educators benefit when they find themselves in a fluid environment where teaching and learning are supported, not hindered by technology. This can mean an institution needs to support teaching and learning elements like collaborative educational technologies even as they support related initiatives, such as high-speed computing so important to research-oriented universities. In WR's past "adoption support engagements" with colleges and universities, we have seen that clunky user interfaces often become the single biggest barrier to widespread adoption, followed closely by weaknesses in the ability to embed a technology into an educator's workflow. Research initiatives offer a secondary method of embedding the Digital Education Platform into a researcher's workflow.

> Over and over we have seen the need to avoid poor user experiences and the lack of ability to embed a technology into an educator's workflow as the biggest barriers to adoption.

Finally, **learners** benefit when three things exist: 1) system or people interventions can take place to help keep them on track; 2) they can learn when they want (in- and out-of-class); and 3) they have access to the content and delivery methods that fit them best. Data resides in well-protected, secure databases that nonetheless gives the right people (instructors, advisers, mentors, and the students themselves) appropriate, role-based access to their data. Real or virtual counselors can intervene with suggestions or alerts for help when the system sees the student disengaging. This can allow an institution to better serve learners by eliminating silos that are created by separate, disconnected functional areas. WR has seen many situations in which student data resides on an individual desktop computer in Microsoft XLS files – or even notebooks and hard copy only.

> *Cisco is well positioned if they can develop a vision for how these technologies can be seamless and have economies of scale and efficiencies. This is precisely where higher education struggles, and the business sector is further along.*
>
> – Mur Muchane, Wake Forest University

Ensuring student data is a well-protected but available asset means an institution can make progress on several important initiatives that will improve student success. One is in providing the ability to create virtual, blended, and online learning as an institution evolves its offerings. By providing more content on-demand and via various media types, students are empowered to learn how and when it is best for them. Another way is by providing learners with anytime, anywhere access to people, content, and course materials. As colleges and universities grapple with how to take programs online, they need an intelligent platform that enables them to take the learners online as well. The issue, however, is not just online access, but intelligent information systems that eventually – as higher education progresses through the adoption curve – delivers on the promise of emerging technologies like AI and machine learning.

This is the Digital Education Platform on the horizon. Cisco is one of the few vendors that have delivered on the promise, as envisioned in Table 4.

Table 4   Cisco's Approach to the Digital Education Platform
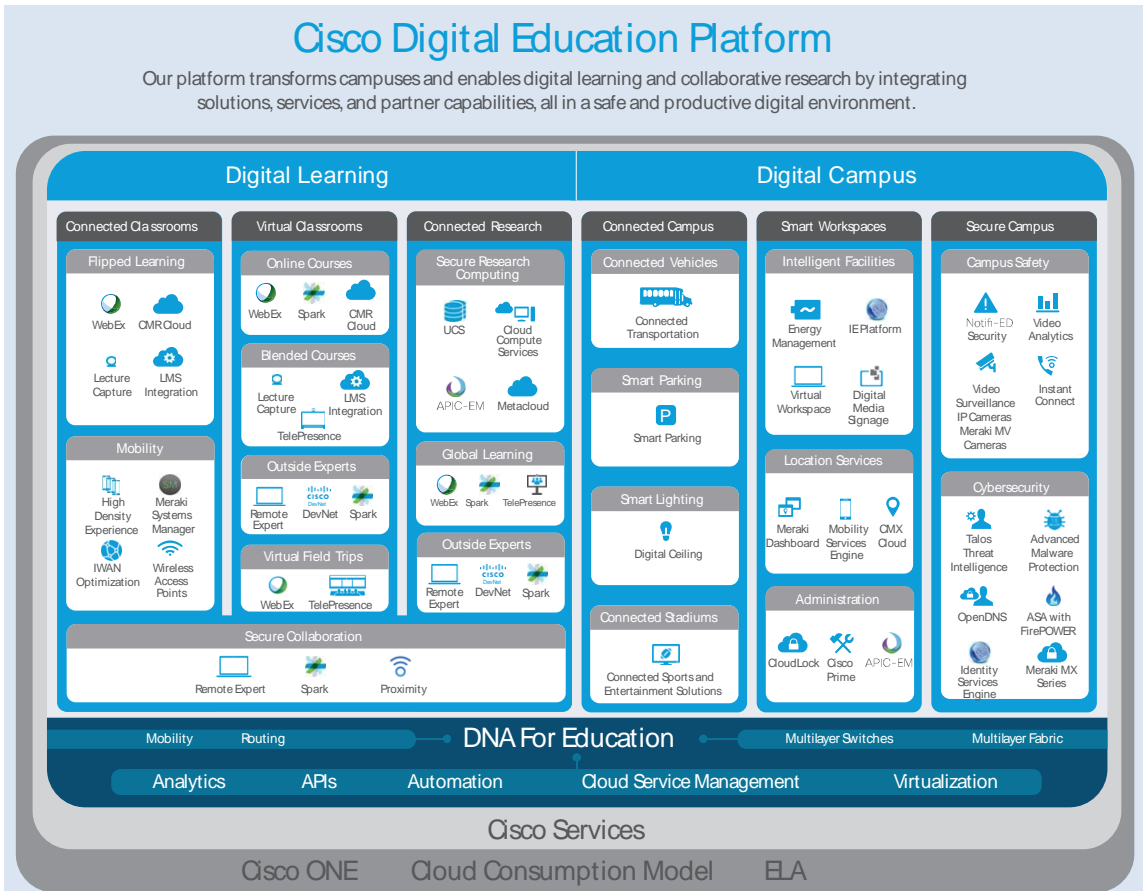
Cisco's solutions and services for Digital Learning and the Digital Campus are enabled by the Cisco Digital Education Platform, which is comprised of a secure core network, unified voice, state-of-the-art wireless, and security everywhere. Specifics underlying the Cisco approach:

- A trusted, comprehensive portfolio of solutions, along with end-to-end management, services, and support, to help realize all the advantages of the Internet of Things.
- Integrated, validated, and secure architectures, with end-to-end solutions that you can implement quickly and securely.
- Industry-leading expertise in delivering connected government, public safety, secure government cloud, and connected learning solutions in real-world deployments, with a global ecosystem of partners delivering services, applications, and expertise to provide complete solutions.
- A range of Cisco Capital programs that help institutions take advantage of innovations today and shift priorities from capital expenditures to operational budgets.

Digital Learning solutions provide educators with the ability to create online courses, better connect their classrooms and lecture halls, and deliver anytime, anywhere learning for students. Professors can deliver blended and hybrid courses to students, and they can use Cisco technology to flip their courses. This enables them to offer up lectures for students to preview, and then provide an opportunity for students to engage with their professors, and one another, during class.

Digital Campus solutions provide the ability to create a digital overlay on their existing physical campus environment. Customer investments in a unified core network with security everywhere allow them to easily connect transportation systems, lighting, parking, HVAC systems, stadiums, and digital signs. They can use our technologies to make their physical environments intelligent with location detection services, campus safety applications, and "smart" learning and working spaces.

Concluding Thoughts

Every institution interviewed for this paper mentioned that cost efficiencies are a consistent part of the equation when it considers introducing new technologies and pursuing new initiatives. And every institution indicates that the idea of the Digital Education Platform shows promise in driving cost efficiencies – and more. In keeping with how we started this paper, we'll remind the reader that each, however, has its own needs based on size, mission, geography, areas of focus, culture, and more.

- Southern Illinois University, based in Carbondale, Illinois, is a large RU/H Research institution (high research activity) located in a very rural area in southern Illinois. With almost 16,000 enrollments, the university offers more than 300 academic degree programs. It has leveraged its high-performance computing cluster to further achieve its research mission.
- University of Wisconsin – Madison has more than 43,300 enrollments and over 21,600 faculty and staff. It is considered an RU/VH Research University (very high research activity) in the Carnegie Classification of Institutions of Higher Education.
- Utah State University, that state's only land grant institution and serving over 28,000 learners, delivers education to multiple campuses and learners across the state. Often its learners may be in low bandwidth environments – and the university has invested significantly in creating a seamless distance learning environment.
- Wake Forest University is a private, independent, nonprofit, nonsectarian, coeducational research university in Winston-Salem, North Carolina. It has multiple campuses in the Winston-Salem area as well as a presence in Charlotte, NC. Just under 8,000 students attend at the graduate and undergraduate levels.

While the physical campuses of these institutions may resemble their general look-and-feel from 50 years ago, each of these institutions – along with thousands of others in North America and throughout the world – are in a continuous cycle of reinvention. No doubt in coming years concepts like the Digital Education Platform will be in full force and full deployment.

About the Author

Alan D. Greenberg has more than 25 years of experience as consultant, analyst, communicator, and strategist in the field of educational and collaborative technologies. He has authored dozens of reports, analyses, research notes, and profiles related to distance education, online learning and e-Learning, web and video conferencing, interactive whiteboards, Learning Management Systems, and lecture capture, and contributes to the Wainhouse Research Blog. Alan also consults to colleges and universities as well as regional networks on matters related to adoption, policy, and deployment of learning technologies. He can be reached at agreenberg@wainhouse.com

About Wainhouse Research

Wainhouse Research, www.wainhouse.com, is an independent analyst firm that focuses on critical issues in Unified Communications and Collaboration (UC&C) and collaborative educational technologies, including learning, talent, and education markets. The company conducts custom research studies, consults with end users on key implementation issues, publishes white papers and market statistics, and delivers public and private seminars as well as speaker presentations at industry group meetings.

About Cisco,
sponsor of this paper

Cisco and our partners help colleges and universities create a completely integrated digital environment with the Cisco Digital Education Platform. Whether flipping, capturing, or enhancing courses, faculty members can quickly and simply create and schedule classes and use our video and collaboration tools to fully engage students. Administrators can leverage the same infrastructure to optimize and streamline access, wayfinding, lighting, parking, and transportation. And, all of this can be done with education-friendly pricing and purchasing models.

End Notes

---

[1] http://www.therichest.com/rich-list/the-biggest/10-largest-colleges-in-the-world/

[2] http://www.toptenz.net/top-10-smallest-colleges.php

[3] WR estimates based on multiple sources: World Bank, U.S. NCES, WolframAlpha and internal data aggregation.

[4] Recent Trends in General Education Design, Learning Outcomes, and Teaching Approaches, American Association of Colleges and Universities / Hart Research Associates, January, 2016

[5] Educause ECAR Student Study 2016

[6] Bieda, Anthony S., "Closing the Gap between Career Education & Employer Expectations: Implications for America's Unemployment Rate," December 2011, The Accrediting Council for Independent Colleges and Schools.

[7] U.S. Census Bureau American Community Survey, 2013
http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk

[8] Falling Short? College Learning and Career Success, Association of American Colleges and Universities / Hart Research Associates, January, 2015

[9] The Innovative University: What College Presidents Think About Change in American Higher Education

[10] http://www.chronicle.com/article/How-to-Make-Strategic-Big-Bets/239233

[11] In 2015 Apple and Cisco announced a partnership by which they have created a "fast lane" for iOS traffic – a benefit on Apple devices – and integrated Cisco Spark into iOS for an improved on-device collaboration experience. This is an example of how integrations of different technologies within the different layers in of a Digital Education Platform can improve QoS.

[12] http://marketrealist.com/2017/02/why-is-cisco-eyeing-the-internet-of-things-space/

[13] Cisco 2017 Annual Cybersecurity Report

[14] https://www.fedramp.gov/february-2016-fedramp-pmo-newsletter/