Michigan State has developed rubrics and procedures for evaluating products’ accessibility more effectively.

The decision whether or not to cave in to a ransomware attack may be less a philosophical decision and more a cost-benefit analysis.

Two institutions share their experiences rolling out online tutoring services, from garnering faculty and student buy-in to measuring outcomes.

For the next-gen learning management system, Educause’s Malcolm Brown envisions component-based architecture connected via open standards.

Even as tech proliferates, new barriers are throwing themselves in the way of effective implementation.

6 Ed Tech Blogs You Should Be Reading

Ransomware and More

George Siemens

6 CHALLENGES SLOWING TECHNOLOGY ADOPTION IN HIGHER ED

DEPARTMENTS

2 | LOGIN 6 Ed Tech Blogs You Should Be Reading
3 | CAMPUS & INDUSTRY Ransomware and More
32 | C-LEVEL VIEW George Siemens
36 | ABOUT US
37 | INDEX
IF YOU'RE like me, you don’t have time to read many blogs — it’s hard enough to keep up with the news in today’s politically charged climate. But over the years, I’ve followed a handful of sites that offer a wealth of insights on technology in higher education. Here are six worth your attention.

**e-Literate**
Co-authored by consultants Michael Feldstein and Phil Hill, e-Literate covers a variety of education technology trends, with a leaning toward market analysis. In particular, it’s a great place to gain a better understanding of the evolving LMS landscape. Other recent topics include personalized learning, higher education policy and data privacy issues.

**Hack Education**
Audrey Watters calls herself “an education writer, an independent scholar, a serial dropout, a rabble-rouser, and ed tech's Cassandra” — descriptors that offer a peek into what her Hack Education blog is like. In addition to long-form essays, talks and research projects, Hack Education features a weekly roundup of ed tech news, categorized by topic and presented with smart, often acerbic commentary. Recent topics include education politics, ethics in the ed tech business, data analytics and open education.

**Bryan Alexander**
Consultant and futurist Bryan Alexander’s eponymous blog explores all the ways technology is transforming education, from politics to infrastructure to pedagogy. He has a knack for dissecting current trends and understanding their potential impact on the future. Recent topics include digital literacy, the high cost of college, virtual reality and the Trump presidency.

**Digital Bodies**
Co-founded by Maya Georgieva, ed tech strategist and former associate director of the Center for Innovation in Teaching and Learning at NYU’s Stern School of Business, and Emory Craig, director of e-learning at The College of New Rochelle, Digital Bodies focuses on virtual, augmented and mixed reality, wearables and other innovative technologies and their impact on media and education. In particular, the duo follows the cutting-edge devices and tech that seem like science fiction today, but may soon become part of everyday life in and out of the classroom. Recent topics include mind-controlled VR, VR headset hacks and Magic Leap.

**ProfHacker**
On The Chronicle of Higher Education’s ProfHacker blog, a cadre of higher education faculty members and ed tech professionals offer tips and commentary on technology, education and university life. It’s an interesting window on the faculty perspective — and freely available outside of the Chronicle’s usual subscription wall. Recent topics include digital annotation, time management, note-taking and e-mail apps.

**JCYCIO**
From the IT perspective, executive digital adviser Joanna Young’s JCYCIO blog covers topics such as leadership, digital transformation, tech purchasing and IT management. Young formerly held CIO positions at Michigan State University and the University of New Hampshire, and she is a prolific communicator on social media. CT

Continue the conversation.
E-mail me at rkelly@1105media.com.
Ransomware surged 16,700 percent from 2015 to 2016, though unique malware samples declined over the same period, according to a report from network security firm SonicWall. That growth of nearly 17 times represents a swell from about 4 million ransomware attacks in 2015 to approximately 638 million last year. Contributing factors include the use of exploit kits for delivery, the ability to more easily obtain and deploy ransomware as a result of RaaS, easier access to the underground market, the low costs of ransomware attacks and the low risk of being caught. Read the full story online.

Textbooks for Less. The City University of New York is turning to online bookstore provider Akademos to help address the rising cost of textbooks. Students from the 12 CUNY colleges will now be able to purchase new, used, rental and electronic textbooks through a custom-branded version of the Akademos online bookstore, where they can save up to 60 percent off the list price on course materials. A peer-to-peer marketplace option will allow students to buy textbooks from third-party sellers at a significant savings — often the same sellers found on Amazon.com. Read the full story online.

Feedback Helps. Dashboards that report on course progress are more motivating for underperforming students than for those who are doing well, according to a study from the University of Michigan and Blackboard. The researchers conducted interviews and simulations with 47 U-M undergraduates to find out how course feedback and dashboard tools can best support students. After putting students through various feedback scenarios, the researchers found that students with lower GPAs were more likely to turn on a summary feedback feature, check it regularly and take immediate action. Read the full story online.

IoT Training. A new Internet of Things program at Northeastern University-Silicon Valley seeks to address the growing demand for IoT skills in the workforce. The institution is collaborating with Cisco to launch the program, which will "combine hands-on, experiential learning opportunities with essential coursework to prepare today's workers for the demands of IoT technology," according to a press release. Courses will be delivered in a part-time, hybrid format, with most lecture-oriented instruction available online. Cohorts will also meet in person for lab work, hack-a-thons and other experiential opportunities. Read the full story online.
ADAPTIVE MOOCS. Harvard University (MA) has begun testing the use of adaptive functionality in massive open online courses (MOOCs). The experiment took place in a single HarvardX course, “Super-Earths and Life” (now available as an on-demand course), deployed in the current academic year. The initial finding: Students using the adaptive assessments learned more than those who didn’t — and spent less time overall getting through problems. Read the full story online.

MAKING IN GEORGIA. Students at the University of North Georgia have a new facility for taking projects from concept to reality. The institution partnered with 3D printing company Industry+Campus.
MakerBot to open the UNG MakerBot Innovation Center, a multi-disciplinary “learning and creation lab” open to all majors and departments across the university. The space boasts 32 pieces of equipment and technology, including a large array of MakerBot Replicator 3D printers as well as the MakerBot Innovation Center Management Platform, software that “links the [printers] together, streamlines productivity and staffing of the center, and provides remote access, print queuing and mass production of 3D prints,” according to a press release.

Read the full story online.

Webinars on Demand

Register for the latest Campus Technology webinars online.

**High-Performance Computing: Fueling the Next Great Discovery**
Experts share top considerations for designing a high-performance computing environment to help drive innovation on campus.

*Sponsored by Lenovo*

**Central Support and Faculty Buy-in Are Key to Student Response System Success**
Learn about the evaluation, selection and implementation process behind the University of Texas at El Paso’s decision to standardize on one student response system campuswide.

*Sponsored by i>clicker*

**Texas A&M Innovates by Delivering Digital Learning Environments to Transform the Student Experience**
Texas A&M University discusses how it moved from physical labs to virtual learning environments across 14 different departments.

*Sponsored by Citrix*

**PRODUCT FOCUS**

Apple has introduced the Pro Apps Bundle for Education, which offers Final Cut Pro X, Logic Pro X, Motion 5, Compressor 4 and Mainstage 3 as a $199.99 package to K-12 schools and higher ed institutions.

Read the full story online.

With Sony’s new Vision Exchange collaboration tool, students can share content from their devices wirelessly and teachers can add remote users via video to collaborate with the classroom.

Read the full story online.

Four new multimedia projectors in NEC’s PA Series feature the company’s Scaler Chip, an integrated picture processor that manages 4K/60p input and provides image noise reduction, de-interlacing, scaling and full 10-bit color processing.

Read the full story online.
Building Accessibility Into IT Procurement

Michigan State has developed rubrics and procedures to help its information technology procurement officers evaluate products’ accessibility more effectively.

FOR MANY YEARS, Michigan State University in East Lansing has had a clear policy about what is expected in terms of technology accessibility — whether for a faculty member teaching online or for an administrative department buying computers and software. But in 2015, MSU revamped how accessibility is integrated into information technology procurement, giving purchasing officers a risk-assessment rubric and a new accountability structure.

“I have been working on this personally for most of my career and have watched lots of approaches to this in higher education,” said Brendan Guenther, director for academic technology. “This is the first time that I really feel we have something that scales and is adaptable enough to accommodate all the kinds of things a university needs to do.”
“Essentially, the university purchases a lot of things, and we need to be able to provide a certain level of engagement in terms of accessibility with all those things,” said James Jackson, Electronic Information Technology (EIT) accessibility coordinator for MSU IT Services. But MSU’s resources are limited, especially with the central team that has the highest degree of knowledge about what constitutes an accessible product. University leaders decided to create a process in which almost every product gets assessed, with particular focus on products that are going to have the highest degree of impact.

Accessibility Throughout the Procurement Process

Jackson and his colleagues identified five places in the procurement process to engage accessibility:

- Procurement terms;
- Initial screening;
- Accessibility evaluation;
- Alternative access; and
- Accountability structures.

For instance, under procurement terms, they make sure accessibility — specifically WCAG 2.0 or Section 508 compliance — is referenced in all IT products purchased. The terms also require the vendor to provide documentation on accessibility.

Purchasing agents conduct the initial screenings. “They are provided a rubric for risk assessment created by our legal counsel, paying attention to specific language in the most recent settlement agreements,” Jackson explained. “If a product falls into the medium- or high-risk range, they forward it on to my team — the digital content and accessibility team — and we take some additional steps,” he added. The purchasing agents can handle the low-risk products on their own. If a product might
be used by only two researchers in a lab, for example, “We know who they are. If either of them needed accommodation, we could provide it for them,” Jackson said.

“Procurement and counsel have always helped us with contract language, but we used to have to market that contract language directly to the department requesting the procurement, to get them to include it in their procurement language,” Guenther explained. “But some people didn’t notice we asked them to include this, or they didn’t ask the purchasing agent to do anything, and the purchasing agent took a passive role in this.” The rubric has equipped them with a tool they find helpful, he said. “They are not accessibility experts, and they don’t have to be to use this. They are able to incorporate the rubric in their standard gauntlet of things they put a vendor through.” With this now part of their process, they are accruing experience with accessibility.

“Most of our purchasing agents are starting to be able to distinguish between companies able to give you this information and others that are making it up and don’t know what they are talking about,” Guenther said. “They are beginning to differentiate and provide good advice. That is a powerful effect.”

Part of the accountability structure is an EIT Accessibility Acknowledgement form. Basically the person signing the form commits to accommodating users with disabilities, and creates an “Equally Effective Alternative Access Plan.”

If a product is not usable by a blind student, for instance, the plan specifies how the student will be accommodated. “Then a department can pull the plan out and execute it,” Jackson said. “That cuts down on the wait time to a solution. That is critical when we are talking about students who need access to do coursework. A delay of a week is a real challenge. Rapid response is critical.”

The purchasing agents use the rubric to forward high-risk products to Jackson’s digital content and accessibility team, which interviews the vendor, does hands-on testing and brings its findings to a monthly meeting of the Accessibility Review Committee, which was created in 2015. The committee includes people from legal counsel, the library, disability services and ADA coordinators.

Guenther noted that the committee can decide when more communication is needed with the vendor to mitigate risk. “We want to do active vendor management and cajole them to make a commitment, even up to a legally binding commitment, that software will be improved. That makes it safer to proceed with an implementation because if there is a limitation, there is probably a finite time period we have to live with it.”

Talking With Vendors About Accessibility
When it comes to accessibility, vendors tend to fall into three categories, according to Jackson: The first doesn’t know much about accessibility at all; the second knows a little but tries to pull the wool over your eyes; and the third is knowledgeable and highly engaged. “It requires technical know-how to ferret out which [category] they fall into and how far you can trust the statements they are making,” he said.

Even if you do not have a high degree of knowledge about accessibility, tell vendors you want to do hands-on demos with the product rather than a canned demo.

Accessibility Review Committee, which was created in 2015. The committee includes people from legal counsel, the library, disability services and ADA coordinators.

Guenther noted that the committee can decide when more communication is needed with the vendor to mitigate risk. “We want to do active vendor management and cajole them to make a commitment, even up to a legally binding commitment, that software will be improved. That makes it safer to proceed about accessibility, tell vendors you want to do hands-on demos with the product rather than a canned demo of them running a screen reader over it, Jackson advised. “It is easy for them to go through a best-case scenario or run a mouse over words. But your user is not going to be using a mouse. Have them use a keyboard,” he said.

Most important, Jackson said, is to ask vendors about their processes for addressing issues and complaints. He
recalled one company that had relatively good documentation. “We did an inspection and found accessibility problems, but nothing major. Where they fell short was in process. They didn’t have a roadmap for fixing things. Quality assurance didn’t include accessibility.”

Be sure to ask if vendors have staff trained in accessibility. What standards are they familiar with? How do they respond to complaints? “They may not have a process,” Jackson said. “That gives you useful information for judging a vendor. But if they do have a clearly defined process, then if we encounter an unforeseen problem, we should get turnaround quickly. That is where accessibility is slowly becoming part of vendor processes, and asking those questions can tell you where the vendor is.”

**Moving Forward**

MSU is constantly trying to refine its model, said Jackson. “Now that we have a year of data, we can look at how frequently products fit into our risk categories, what we did about it, and what percentage of my staff’s time is necessary to maintain this level of scrutiny,” he explained.

“We have eyes, ears and muscle in lots of places, which allows us to accomplish forward progress in this work,” added Guenther. “That isn’t possible when you have one isolated team trying to help everybody.”

Both Jackson and Guenther believe smaller universities could adopt a similar approach, even though they have fewer resources. “The benefit of a prioritization-based approach is that you focus on the most crucial work first,” Jackson said. “Even a small university has a procurement office that could do the triaging. Reach out and engage as many places on campus as you can. It is not necessary to be the size of MSU to do that.”

*David Raths is a freelance writer based in Philadelphia.*
Ransomware: To Pay or Not To Pay?

The decision whether or not to cave in to a ransomware attack may be less a philosophical decision and more a cost-benefit analysis.

PITY POOR Los Angeles Valley College (CA), one of the latest victims of a ransomware attack to make the headlines. The community college paid about $28,000 to cyber criminals to retrieve data that had been encrypted. After the payment was made, a “key” was delivered to regain access to the infected systems, whose “hundreds of thousands” of files are now being methodically unlocked, according to an FAQ issued by the school. The disruption hit computer, online, e-mail and voicemail systems. Fortunately, the ransom was covered by a cybersecurity insurance policy, which also is paying for the services of cybersecurity experts to uncover just what happened. Law enforcement is involved.

LAVC is hardly alone. Last June, the University of Calgary (Canada) transferred almost $16,000 in bitcoins to extortionists after its IT security team spent a week attempting to crack the ransomware that had infected a hundred of its computers. At the time, university vice president Linda Dalgetty told a reporter, “The actual process of decryption is time-consuming and must be performed with care.” And, she pointed out, “Decryption keys do not automatically restore all systems or guarantee the recovery of all data.” The institution paid, she noted, to make sure research work wasn’t lost.
It would be a brief story if that were all there were to say on the topic: Pay the bad guys and hope you get your stuff back.

A few months after the Calgary incident, Carleton University (Canada) faced the same decision when 3,200 PCs were hit. In that case, a graduate student told CBC Radio-Canada, the attackers gave a choice: “either two bitcoin per machine or 39 bitcoin total to release the encrypted files” — about $35,000 at today’s conversion rate. The university chose not to pay anything.

Which one of these schools took the right approach? You may not be able to figure that out until you’re staring into the stunned eyes of a desperate researcher, president, director, student or faculty member.

The Evolution of a Problem

BitSight reported last year that in a comparison of six segments, education “exhibited the highest rates of ransomware.” More than 11 percent of the ed industry had the Nymaim Trojan on its networks, the report stated, and almost 4 percent had Locky.

So how come so few colleges or universities have admitted to being hit? Currently, data breaches continue to garner the most attention: The attacks in which the goal is to gain access to personally identifiable information hit at least 11 institutions in the United States last year, according to tracking by the Privacy Rights Clearinghouse. None of those involved ransomware specifically.

Yet ransomware incidents are on the rise. According to the U.S. Department of Justice, this form of attack, in which quick extortion from the victim is the objective, has grown 300 percent since 2015, right alongside the continued proliferation of e-mail spam, infected macros, “malvertising,” botnet-driven processes, exploit kits and the expansion of “affiliates” that pay others to do the infections for them. As an example of just one of those categories, ransomware attached to spam increased from less than 1 percent in 2015 to 37 percent in 2016, according to IBM’s X-Force security research team. In the first three months of last year, the FBI estimated that more than $209 million in ransomware payments had been made in the U.S., compared to $24 million in 2015.

Ransomware has been around for a long time, previously spread through floppy disks. This type of malware has found its sweet spot, however, with the explosion of consumer computing devices, many of which go unprotected, and the popularization of virtual currencies that facilitate anonymous transactions.

Also a factor, as the X-Force found: Users are more self-assured than they ought to be, which means they’re not as careful as the situation warrants. According to a report issued in December 2016, while three-quarters of consumers said they could protect data on their computers and two-thirds said the same for the data on their mobile or tablet devices, six in 10 hadn’t taken any action in the previous three months to protect their devices from hacking, such as avoiding suspicious attachments or links in e-mail, regularly changing passwords or staying off of public WiFi access points.

Among business people, the results were even more alarming. A SANS survey in the financial sector found that 32 percent of companies had lost anywhere from $100,000 to $500,000 due to ransomware.

Disrupting the Ransomware Business

An organization of law enforcement and IT security companies wants victims of ransomware to stop paying. The resource “No More Ransom!” offers free decryption tools that can be used to retrieve encrypted data “without having to pay the criminals,” as the site explains. By mid-January 2017, nearly 30 forms of threats had counter-measure tools in place with straightforward how-to instructions for using them.

Spreading on Campus

In a widely reported research project undertaken by security vendor SentinelOne, 63 percent of British universities
had “suffered from ransomware events.” Only one of the respondents had reported the attack to law enforcement. Bournemouth University (England), in particular, was called out for being the “most targeted,” with 21 attacks in a single year. What was less reported was the institution’s response: “It is not uncommon for universities to be the target of cybersecurity attacks; there are security processes in place at Bournemouth University to deal with these types of incident.” In other words, it was business as usual on campus, and this was just one more blip on the security radar.

Why the difference? The primary attack vector for ransomware is an individual who has clicked on something he or she shouldn’t have. Numerous institutions — among them, Georgia College, Fort Lewis College in Colorado, Red Deer College in Alberta and the University of Houston Clear Lake (TX) — have posted messages on their IT or information security websites broadcasting that members of the community had experienced ransomware incidents that had encrypted their devices and apprising others about how to minimize their risk and respond if it happens to them.

Those institutions that have been most successful in keeping ransomware problems from spreading are the ones where the user has immediately unplugged the device from the internet or turned off WiFi and communicated with IT as quickly as possible. It appears to be as simple as that.

The Cost-Benefit of Paying Up
You’d find few people willing to go on the record as supporting payouts to black hat hackers that have locked up a computer. Most agree that caving in just encourages more ransomware activities. And there’s no guarantee the victim will get back device access or data. Just to confuse the decision, some ransom schemes now come with a new variable: Hackers threaten to make the data publicly available if somebody refuses to pay.

During a cyber security summit held at Georgia Tech last
 SECURITY

Avoiding Ransomware

Beyond the timely patch updates and multi-layered defenses you presumably already have in place, consider these tweaks to your security approach:

- Do your users love those portable hard drives that back up files continually? Tell them to avoid a constant connection, said the experts. Unplug it regularly, confirm that the system is malware-free and do the backup in confidence.
- Remind users to store their important files on the network drives that will be automatically backed up by IT or to the cloud, which, while not entirely immune to malware, is more tightly defended.
- Test your users. Some schools have sent out phishing e-mails to students and staff and followed up directly with those who click to get them extra needed education.
- Rank data on its importance. Losing research data that has taken years to accumulate may call for a different decision than content that's nice to have but hardly irreplaceable.
- Maintain net flow logs back a minimum of 30 days, recommends Georgia Tech’s Institute for Information Security & Privacy. While this “may not prevent a ransomware attack,” the institute explained, “it will assist in any law enforcement investigation.”
- Communicate through whatever means you have about the specific e-mails, subject lines or other characteristics users should watch out for when it appears a particular type of malware is about to turn up in e-mail or on popular websites.
- Train users to notify IT. Encourage users to inform the help desk as quickly as possible when they discover they’ve made a mistake and clicked on the wrong link. Make sure your help desk people are ready to take those calls.
- Call in the law. The Justice Department recommends contacting the local office for the Federal Bureau of Investigation or the U.S. Secret Service when you’ve discovered a ransomware event. They may provide just the help you need.

fall, experts recommended just that: Avoid payment. However, acknowledged Evan Downing, a doctoral student in computer science, the “decision whether to or not all comes down to personal cost-benefit analysis.”

His suggestion was to examine “what you’re willing to pay for, literally and figuratively: What data can your business stand to lose? How quickly can your business recover from losing this data? How much money will an attack cost your company from the lack of the service your company provides? Is this all worth the risk of paying the ransom and possibly not getting your data back?”

Given that, an IT leader who needs to decide how to respond to a ransomware demand may approach the problem with more confidence: Been there, done that. As a 2017 report from Georgia Tech’s Institute for Information Security & Privacy emphasized, “It’s just malware, people.” By not announcing their presence, other kinds of malware are doing “far scarier things.”

Eventually, these security experts predict, ransomware will run its course. With “training, planning and partnering for effective intelligence sharing” in place, this form of IT headache will “hopefully wind down to become an outdated cybersecurity problem.”

Dian Schaffhauser is a senior contributing editor for Campus Technology.
24/7 Help for the Online Student

Two institutions share their experiences rolling out online tutoring services, from garnering faculty and student buy-in to analyzing usage data and measuring outcomes.

**TUTORING FOR ONLINE** learners is a tricky business. Even the best-staffed brick-and-mortar tutoring center would be hard-pressed to overcome the time zone challenges presented by students hailing from all over the world. CT spoke with two institutions — the [Ivy Tech Community College System](https://www.ivytech.edu) (IN) and [Pennsylvania State University World Campus](https://www.world.psu.edu) — that turned to a third-party, 24/7 online tutoring service to help bridge that gap.

The schools are both similar and different. In a presentation during the OLC Accelerate conference last year, Stacy Atkinson, a project manager for strategic initiatives at Ivy Tech, reported that her 31-campus community college system has 14,000 “exclusively online” students. They tend to be working students based primarily in-state; 70 percent of them attend college part-time and are of “traditional” college age. Penn State’s World Campus, which is entirely online, has a similar number of online degree students (15,000), but they come from 60 different countries and tend to be adult learners — mostly over 30 years old and attending part-time.

Both institutions offer multiple forms of student support, including tutoring services, through asynchronous formats as well as web-based software that connects an
“on-the-ground” adviser with the student in real time. And for both, adding a 24/7 online tutoring program to the mix was a new endeavor. During implementation, they found they had to knock down some commonly held myths: that students wouldn’t use online tutoring; that faculty wouldn’t want it; and that it wouldn’t really have an impact on student success. Here’s what each has learned about making sure online tutoring works.

Faculty Buy-in Is Essential
Yes, all stakeholders — administration, learning designers, IT and advisers — provide important input on a project like this, but faculty are even more vital. “We don’t want [faculty] to believe that this is going to replace their instruction in the classroom or that this is more meaningful to students and that students should spend more time on tutoring online than they should engaging with their instructor,” suggested Atkinson. “We want it to be a partnership of some sort and we want them to support it.” Faculty are the ones, after all, who know the students best and will encourage some of them to seek out tutoring.

Amanda Mulfinger, Penn State’s director of program planning and management, added that World Campus instructors and lead faculty participated in the request-for-proposal process to choose an online tutoring service and approved which courses would receive it once it was in place.

It helped, Mulfinger noted, that the company the university contracted with, Tutor.com, has a “pretty specific, sound, robust pedagogy that they work through with their tutors to not give out answers, but to help the student learn the concept behind the problem.” That’s truly important, she said. “When you’re a large institution like Penn State that comes with the amount of academic rigor and preserves its brand very carefully, we want to make sure students are getting appropriate tutoring.”

Student Response Can Turn the Tide
Ivy Tech and Penn State both use Tutor.com to deliver their online tutoring. When students finish a tutoring session, they’re given the option of filling out a five-question survey asking whether or not they’re glad the organization offers the service, whether they’d recommend it to a friend and whether it’s helping them complete their homework, improve grades and be more confident in their schoolwork. Response rates are high: At Ivy Tech it’s 34 percent; and at Penn State it’s 48 percent. And in both cases, affirmative responses across the board rate higher than 90 percent.

Sharing that data along with personal testimonials from students with advisers, faculty and administrators has opened their eyes to the need. “Each of our 14 regions has a tutoring or learning resource center of some sort on campus,” said Atkinson. “Online tutoring has by no means touched upon replacing that. That wasn’t our intention. It’s just a supplement that the students really used and really wanted.” As she explained, there was no desire to shut tutoring centers down. The system wanted to be able to provide help “on a Saturday night at 10:30 or when [the student] lives in Sellersburg and they’re taking a biology course in Central, Indiana, three-and-a-half hours away. We have to figure out a way to meet them where they’re at.”

“When you’re a large institution like Penn State that comes with the amount of academic rigor and preserves its brand very carefully, we want to make sure students are getting appropriate tutoring.” — Amanda Mulfinger, Penn State University
Use Data to Figure Out Where Students Want Help

Besides student satisfaction information, the analytics generated by Tutor.com report on time of day, day of week, and week of semester where tutoring activity is heaviest. Heatmaps show that the most intense simultaneous usage for both institutions starts up around 7:00 p.m. or 8:00 p.m. on Sundays, Mondays and Tuesdays and runs until about 10:00 p.m. each night. However, as Mulfinger observed, “Every hour of every day has at least a little bit of tutoring going on.”

Even more important, faculty and staff are given reporting tools that allow them to see information about which topics students are requesting help in as well as which courses dominate the tutoring sessions, which varies by institution.

By far, the most popular Tutor.com feature at either school is a “drop-off essay review,” which allows students to upload papers for feedback. Within 24 hours they receive guidance about how to improve their papers, but without actual mark-up.

Both institutions have also taken advantage of Learning Tools Interoperability (LTI) middleware to integrate Tutor.com with other student systems. For example, in the case of students who show “low prerequisite knowledge” during a tutoring session, Ivy Tech allows the tutors to send early alerts through its Hobsons Starfish implementation to college staff members, who then reach out to instructors, suggesting they consider opening up a dialog with the student.

Seek Equity in the Tutoring You Offer

World Campus delivers courses in four world languages: French, German, Italian and Spanish. However, when Tutor.com came on board, the service didn’t have any Italian tutors. So the company went out and hired some and then “credentialed” them to fill the gap.

Likewise, during its RFP process Penn State considered what days the tutoring companies were open during the year. Tutor.com only closes on four days — all American holidays.

“For me that’s a baseline message,” said Mulfinger. “For online adult learners who may have already taken a language, but they’re taking a different one, we need to meet the needs of all of our students. One way you can do that is by offering a good group of courses and having extreme flexibility in the hours of tutoring.”

Students Still Need to Come Prepared

At both institutions, students are limited in the number of hours they can access online tutoring. A tally of time is maintained on their sign-in screen so that they know how much more tutoring time they’re allotted, encouraging them to come prepared for the tutoring session.

That means making sure they have their textbook in front of them, they’re not driving while talking on a Bluetooth speaker in their car, that they have access to video software enabling them to see the Tutor.com whiteboard that the student and tutor share during the session, and similar best practices, said Atkinson. “Just because it’s a virtual appointment, it still has to be quality, and part of that is their partnership in engaging in a quality conversation and discussion,” she noted.

As Mulfinger pointed out, the same need for preparation is true with on-campus advising and tutoring services too. “Like, ‘Please don’t come with nothing written. I expect you to have at least a rough draft and outline and know what you want your main points to be in your conclusion.’”
**Beware Too Much of a Good Thing**

If there were one thing Atkinson wishes Ivy Tech could do over again with its implementation of online tutoring, it would be to put parameters on the amount of time every student could use the service from day one. After all, the monthly fee charged by Tutor.com is dependent on usage. The more it’s used, the higher the fee. Early on, as the institution ran pilots, there were no limitations. Due to overuse by a small number of “power” users, “we really got into a budgetary crisis very quickly,” she recalled. “We went over our budget by 75 percent, and we had to go back and ask for forgiveness. And that’s really hard when at the same time you’re trying to get buy-in from every institution [in the system].”

Once a limit of 15 hours per student per semester was imposed, however, the college system was better able to manage its budget.

Although it didn’t face quite the avalanche that Ivy Tech did, Penn State also imposes a restriction of 10 hours per student semester based on usage patterns calculated from its multi-semester pilot. “There’s a cost to everything,” noted Mulfinger. “Our budget folks are really happy that we set a limit.”

Although neither publicizes this fact, each also has a process in place for circumstances in which students need additional tutoring hours, such as when a student is an English language learner or is receiving accommodations tied to a disability. What it’s not intended for, both emphasized, is when a student wakes up weeks into the course and realizes he or she is way behind and needs to cram to catch up.

**Plot Out Ways to Measure Outcomes**

Last year, an institutional researcher at Ivy Tech examined data from fall 2015 on a large pool of students with 25 like characteristics, such as how many courses they were taking, their employment status, which region they lived in and what their GPAs were. Everybody in the pool attended at least one course that offered Tutor.com. Then he divided the students into two groups: those who used the online tutoring service and those who didn’t.

When the researcher compared outcomes between the two groups, said Atkinson, he found that those who had availed themselves of the online tutoring were seven percentage points more likely to persist to the spring 2016 semester or graduate: 78 percent vs. 71 percent. Atkinson anticipates that the college will try to duplicate the study in a future semester.

At Penn State, understanding the impact of providing online tutoring will have to wait awhile, said Mulfinger. World Campus courses that use the online tutoring service have varied too much from the start. “We need to wait that out and have several semesters of data from courses that are just starting to receive the tutoring,” she explained. In the future, she added, the analysis will also examine the timing of when a student decided to partake in the service and the impact of it on student success in subsequent courses.

Both institutions view online tutoring as another way to nudge student success upward overall. “We’re really trying to help students with those foundational courses that would typically be taken the first two years,” asserted Mulfinger. That’s the same model, she added, “as the learning center on campus — which can’t really cover tutoring for all of our subjects 24 hours a day for every student in every class.”

**Dian Schaffhauser** is a senior contributing editor for Campus Technology.

---

**4 Other Tutoring Services**

Besides Tutor.com, the following organizations also contract with universities and colleges to provide online tutoring services.

- **brainfuse**: Used by the University of Nevada, Las Vegas
- **eTutoring.org**: In use by the Connecticut Distance Learning Consortium
- **Link-Systems International NetTutor**: Used by Oregon State University and the University of Missouri
- **Pearson Smarthinking**: Used by Utica College and Pasadena City College
How to Build a Production Studio for Online Courses

At the University of Illinois College of Business, video operations don’t come in one size. Here’s how the institution is handling studio setup for MOOCs, online courses, guest speakers and more.

WHEN THE University of Illinois Urbana-Champaign began running massive open online courses through Coursera, the institution quickly realized that the real power of those free courses was to introduce a world of prospective students to its campus programs — including the iMBA, its new online master’s degree in business. The Digital Media team within the College of Business has played an important role in helping the college’s production capabilities grow in quality and quantity. Now that team faces what may be its biggest challenge ever: accommodating up to 3,000 students in any particular online course.

Building up to that point has been an iterative process, said Digital Media Manager John Tubbs. The earliest video setup used for live sessions consisted of a webcam sitting on top of a 40-inch television monitor. “It was pretty crude,” he recalled.
From there, Tubbs’ operation grew into a fixed studio that could accommodate multiple camera views and presenters, green screen operations and teleprompting. He has found that well suited for specific kinds of productions, but not all. So the next iteration wasn’t so much a studio as a mobile video outfit that could be set up to bring remote students to campus locations in innovative, broadcast-caliber ways.

The college is in the process of finishing up two new studios to accommodate the latest production requirements, and their specs reflect all that Tubbs and his team have learned on the job, with a built-in assumption regarding explosive college growth.

The Primary Studio: 20x20 With Built-in Flexibility

The primary studio for the business school currently resides in a 400-square-foot space. The room incorporates a full-width green screen and a video monitor at stage right that allows instructors to see themselves interacting with words, charts, graphs or whatever else they’re superimposed against.

Frequently, faculty like to work from a tablet, so the space also offers a podium that can be “rolled in for that situation,” explained Tubbs. “They can have their digital stylus in hand, and we take a feed directly off that tablet and that goes into the recording as well.” At the same time, a different camera angle is used for the tablet work to visually emphasize the shift from lecture to demonstration.

For Charlie Rose-like panel discussions or interviews, the same room can handle up to four people sitting and talking at a table. This setting is also used frequently for webinars geared toward recruitment.
Camera two — the center one — includes a monitor used as a teleprompter. Tubbs said that some faculty like to work from “full written-out word-for-word scripting” for their lectures. Others prefer bullet points, so they use the teleprompter screen for their presentation slides. The stage-right monitor can mirror that same content to allow presenters to see themselves “immersed.”

The video team relies on Blackmagic hardware: 4K Studio Cameras connected via an ATEM 1/ME switcher to HyperDeck Studio disk recorders, which capture everything coming into the program — camera feeds, content feeds and audio. The studio director for the session works from a broadcast panel, which provides a tactile interface for switching between camera and other feeds.

During live sessions, teaching assistants help the instructors by acting as “Ed McMahons,” as Tubbs calls them. “They’re actually on camera, on mic, participating, but they are not the lead person. They’re the sidekick, saying, ‘Ah, professor, we have a question coming in from Mumbai....’”

A Three-Story Studio for a Different Kind of Experience
Sometimes, the studio experience isn’t the right fit for the kinds of videos Tubbs needs to produce. In those cases the team uses a mobile setup with three cameras that can be rolled onto the set, wherever that might be. The mobile outfit mirrors the equipment of the fixed studio. That way the location work uses the same Blackmagic gear and same technical skill set as the studio.

A prime backdrop is the business school building, a LEED platinum-certified facility that stands three stories tall with a panoramic view out onto a courtyard. “Our opportunities for location shots all over that building are bountiful,” said Tubbs. The setting is optimal for a number of video types: First, there are the welcome videos for MOOCs, in which the instructors are presented explaining to potential students what they can expect in the course. Those might include “dramatic shots, like the faculty member walking down the grand staircase in that room and coming to the camera,” he said.

The building’s atrium serves as a setting for iMBA Week, a business-focused spin-off of Sunday morning political television programs, used to generate interest in UIUC’s MOOC and iMBA credit-bearing courses. According to Tubbs, each show includes a panel of faculty experts discussing timely stories of interest to iMBA students, such as funding for higher ed and Volkswagen’s “dieselgate.” For the latter story, for instance, a professor of economics came on to talk about the effects of the scandal on the company’s fortunes; another faculty member who teaches leadership courses in business administration discussed what the CEO of VW faced as he tried to pull the company through the debacle. The whole program was moderated by Raj Echambadi, the senior associate dean of MBA Programs & Strategic Innovation and a professor of finance.

Rather than recording those sessions in a studio, which, as Tubbs explained, can be a “little stifling, especially for a show where you want to have more fun and be wide open,” they were captured directly in the atrium. “Middle of the day at

Watching the Eyes
Because the business school’s primary studio is fairly small, noted Tubbs, “we have to be very, very careful of our eye line” — the direction to which the instructor is reading and talking — “so they can keep their eyes going into the lens and they’re not glancing over to a monitor that may be off to the side.” In the case of the monitor’s positioning on the stage-right wall used for a “weather person effect,” Tubbs said, the eye line works because their body positioning is facing that monitor, which makes it “look correct to the student viewer.”
For the Record
Recorded lectures are posted almost immediately using the Kaltura video platform. As a class is delivered, it’s recorded in Zoom and shuttled through a connector to Kaltura, which immediately tags it with course metadata, compresses the file and automatically publishes it as a low-resolution recording. A Digital Media team member or TA then logs into Kaltura and eliminates the “junk” at the beginning and end of the recording, generated before the class session officially began and after it ended. In a second phase the video editor produces a high-resolution version of the recording to replace the low-res version, usually by the next day.

A third use for the atrium setting is to record “eminent speakers,” successful alumni who answer questions about their experiences and work. A recent speaker was Keith Bruce, marketing graduate and producer of Super Bowl 50, who was interviewed by Echambad. “Rather than putting them into a really highly controlled studio environment, where do we record them? Overlooking our beautiful atrium, from the second floor balcony. We took advantage of the building,” declared Tubbs.

New Studios: Designed for Student Presence
The college is now operating in its newest studio, which has been designed for program growth — but also for feeling.

“For me, the MOOC lectures have to be absolutely perfect,” explained Tubbs. “But when we bring [students] from that on-demand world into our high-engagement, high-touch, credit-bearing iMBA world, we need to bring relevance — what’s relevant on the outside with current events and also what’s relevant to those students at that particular time in their coursework. That’s why our new studios will feature up to 100 student heads simultaneously displayed in front of the instructor. The instructor needs to be able to feel the students in front of him or her.”

Achieving that goal is where additional technology and experienced staff come into play. Alongside a trio of Blackmagic Micro Studio cameras and a control board, the college has also added two 70-inch touchscreens and four 32-inch monitors.

One of the large displays enables faculty members to “walk up to a 70-inch whiteboard and show their slides, pull out a digital stylus and ink right on that screen,” said Tubbs. “They can be standing and doing that. They can also be seated and presenting with the slide over their shoulder on a second 70-inch screen. So it’s a much more movement-driven, interactive environment for the instruction. We want to make these fun for the instructor.”

The smaller displays have multiple uses. One or two will be hooked to computers running Zoom online meeting software to enable instructors to view and interact with their students. One will always display the active speaker from the Zoom session. Another monitor shows two lunch hour, buzzing all over the place in the background, just like when you watch the Today Show on NBC in the morning and you can see all the people in Rockefeller Center waving their hands. We don’t care that there’s a little murmur in the background. We don’t care that students are walking behind the stage.”

“Because they’re like case studies,” added Tubbs, “we can use them over and over again. But when they’re first shown, it’s all about being current [and connected] to what students are seeing in the news at the time they’re taking classes from these instructors.”

One of the large displays enables faculty members to “walk up to a 70-inch whiteboard and show their slides, pull out a digital stylus and ink right on that screen,” said Tubbs. “They can be standing and doing that. They can also be seated and presenting with the slide over their shoulder on a second 70-inch screen. So it’s a much more movement-driven, interactive environment for the instruction. We want to make these fun for the instructor.”

The smaller displays have multiple uses. One or two will be hooked to computers running Zoom online meeting software to enable instructors to view and interact with their students. One will always display the active speaker from the Zoom session. Another monitor shows two
shared Google docs, one with selected student questions from the Zoom chat and the other a “private” message screen for instructor/TA communication. Tubbs said the remaining monitors can display applications such as “Excel, browsers, slides that are pushed into the Zoom video feed, a second Zoom student display with the ‘Brady Bunch’ grid view, a duplicate view of any other monitor or, optionally, a feed from one of the other studios. Our goal is to be able display any source — any of the three cameras and any of the five computers — on any display for the instructor.”

To make sure the courses run smoothly, a studio director is on hand to control the cameras (set on articulated arms), pull a given image into the feed, turn screen sharing on and off and juggle the given permutations of video inputs going to Zoom. An additional corps of three or four TAs sits in on the Zoom session outside the studio to triage questions, muting student mics and answering queries that don’t need to be asked in front of the class. A studio TA continues acting as a sidekick. And the instructor can simply focus on the lecture and interaction with students.

So far, said Tubbs, feedback from the faculty is positive. He recalls one veteran professor coming to him after the first couple of sessions and saying, “I love having all

A Sanctioned Back Channel
In order to keep Zoom sessions focused on the class discussion at hand, the college encourages students to take other discussions to a separate back channel. To this end, the college has adopted Slack, a messaging app for teams, which is integrated with each student’s Zoom meeting ID for video conversations outside of class.

Students frequently use Zoom to meet in study groups or project teams. “They like the flexibility,” noted Tubbs. “They like the open door policy we’re making toward our conferencing system. They can do whatever they want whenever they want, which I think is a great plus.”
those faces in front of me. I feel like they’re there. I can see — without them even talking — if they’re understanding what I’m saying.”

Program Growth

So where does the multi-thousand-student count come in? That was the planning challenge given by the dean to Tubbs more than a year ago, as he began designing the new studios. “He told me, ‘John, you need to plan for a student body in any particular course of 3,000,’” Tubbs explained.

The initial cohort of the iMBA was about 120 students, brought online in January 2016. A second cohort was added in August, doubling the student count. As of January 2017, three cohorts are in play. The university has built a second studio, with adjustments made based on its experience from the first studio.

To accommodate a global class of students living in multiple time zones, each live session is presented twice a week (say, on a Friday night and a Saturday morning or Saturday night and Sunday morning). While the content for those classes is required, attendance isn’t, which means some students won’t show up. That makes the live-session recordings crucial and time sensitive, said Tubbs.

At some point, though, Zoom’s magical number of 500 simultaneous attendees will be breached and the college will convert from the vendor’s online meeting mode to webinar mode. Up to 3,000 people can attend in that mode, but only 25 can be invited as “panelists” for onscreen presence. The others will participate in view-only mode, which means they can listen and watch and text chat. Tubbs anticipates groups of students being moved into and out of the panel during a large group class session. The team is in the early stages of development of middleware for user management that will automate students going from the virtual lecture hall to the smaller classroom and back.

While the expansion will work from a technology standpoint, Tubbs is concerned about maintaining a “high-touch environment.” To enable that, he said, the college may need to start adding “specialized faculty” (non-tenured adjuncts) with professional experience “to satisfy that human side of our scaling process.” The primary faculty will then be in a position to teach the “broad, large-lecture courses” and the other faculty will teach to smaller groups. Both they and the TAs will act as conduits to the professor for the course-wide questions that come in.

Through the evolution, however, the production team is keeping one goal in mind: to make the new studios “feel as natural as possible” for all concerned. When it comes to instruction, faculty behavior is going to be “significantly different” in an online course than in a MOOC, said Tubbs.

“We want that experience to transfer over to the students so they feel like now that they’re accepted as credit-taking students in the program, they’re getting more value.”

Dian Schaffhauser is a senior contributing editor for Campus Technology.
WHAT WILL THE next-generation learning management system look like? Will it just be the next iteration of Blackboard, Canvas or Moodle? Malcolm Brown, executive director of the Educause Learning Initiative (ELI), said his group started researching the topic and decided that was the wrong question.

“We soon realized the thinking that prompted that question was old and in a box,” said Brown. He recalled talking to Randy Bass, vice provost for education at Georgetown University (DC), who said, “If you are talking about a single application, I don’t want to talk any further about that.”

Speaking during a lively Future Trends Forum video chat hosted by Bryan Alexander, Brown said that his conversation with Bass got him thinking about the huge diversity of needs in higher education. There is an increasingly diverse student population in today’s colleges and universities, and a wide variety of modalities and course models. “Try to imagine a single application like an LMS that could possibly do justice to the wide range of needs,” Brown said, adding that ELI also was influenced by how high a priority personalization and customization of the digital learning environment is in higher education. “Again, that takes you away from the idea of a single application being able to fit the bill for all comers,” he said. “We decided an ‘uber application’ is not going to work.”

As it tried to envision the next-gen digital learning environment, ELI started using metaphors such as Legos to describe a component-based architecture, in which individual applications, including an LMS, could all be “swimming around in this space connected through open standards and able to exchange data. That would be the platform,” Brown said.

Alexander asked if there was any precedent in educational technology for this approach of multiple applications in a distributed architecture. Brown responded that we are starting to see the basis for connections between applications with open standards such as IMS Global Learning Consortium’s Learning Tools Interoperability (LTI) specification and Caliper Analytics, a framework that enables the collection, storage and transport of data about learning.

“That is the Esperanto of learning data that now can go from point to point and create a ‘learning records store’ for the campus,” Brown said. “Once it is aggregated, you have a rich source of data you can run analytics on and get a much more focused idea of what your learners are doing.”

This approach also allows you to bring in the customization and personalization that institutions have needed for years,
he said. At its 2014 annual conference, Educause brought together 50 thought leaders and asked them to imagine what a new learning environment such as this would allow them to do, and they voted on their highest priorities. The No. 1 vote-getter was being able to add discipline-specific applications. “For chemistry or philosophy, they say ‘I need to fine-tune my learning environment, and that includes the tools that I make available to my students that work for them and work for me as the instructor.’ That was really eye-opening,” Brown said.

Alexander asked if major vendors in the educational technology space were on board with the concept. Brown responded that the idea has been well received and is working its way toward realization. Universities in the Netherlands and Spain are working on versions of platforms that are component-based.

He noted that the Unizin collaboration is seeking to innovate precisely in this manner. “You can have a confederation, a looser association of various components,” he said. That gives its members the freedom to plug things in and pull them out again, and allow their environment to evolve with open standards.

Brown admitted that there are lots of practical challenges to be worked through. “It is easy to say let’s all hold hands and obey the open standards and everything good will be ours. But people have different interpretations about implementing the standards, and sometimes they can be partially implemented. We have been having conversations and everyone seems enthusiastic about it, so the question is how do we get it to move forward.”

The LMS would still have a role to play, Brown insisted. “You could still have the LMS as the sun of your environment around which all the planets orbit,” he said. “You could have it partially obscured, so the user interface is largely through the LMS, but augmented by side applications.” Or the other applications could form the basis of the user experience, and those applications could hook into the LMS as a hub for them.

Lynn University in Florida has done away with the LMS entirely, he added. “The nice thing about this idea is that it is not prescriptive. It says if we can get our applications to talk to each other, then we become the architects, and we are not reliant on someone else to provide architecture for us.”

A video chat participant chimed in to illustrate Brown’s point. Michael Slade, a faculty member at California State University Monterey Bay, helps CalStateTEACH, a statewide teacher preparation program, with technology implementation. He said the program is starting to put content for a course into a multi-touch book, which has direct links to Canvas. Assignments are submitted through Canvas. “We are using Canvas for collecting material from the students, and the faculty are using its SpeedGrader app,” he explained. “We are using Canvas as a thin layer and laying apps on top of it. For instance, we needed a better way to record video, so we developed an app to record video on an iPhone or iPad. Once you upload it, it automatically gets bounced into your Canvas account. We are using Canvas as the core glue to hold together a bunch of other things.”

Brown said that sounded like a nice example of the basic idea of the next-generation learning environment. “It sounds like Canvas has become thin, which is one metaphor for it. Or we can think of it as receding into the background. But it sounds like the students’ primary learning experience is not through Canvas, but through this application you have built. That is where the reading, thinking, posting of notes takes place, but Canvas still has a role and remains a hub. But the learning experience is invested elsewhere.”

When asked how this new paradigm might impact the role of the CIO and the IT department, Brown said, “I don’t see that role changing. IT is still going to be in charge of the infrastructure, but also, given their technical expertise, they are the most informed about what is plausible to connect and what is not, and to encourage open standards,” he said. Procurement is another important factor, he added, because an institution can say, “We are looking to buy x, but one of the requirements for x is that it needs to adopt open standards.” Brown said no one understands the strategic importance of technology better than the IT folks. “Their role is not diminished in this, because there is a lot we need to figure out.”

David Raths is a freelance writer based in Philadelphia.
HERE’S A WORD you don’t hear much anymore: obsolescence. But it’s a word that’s making a comeback in 2017 in a new and distressing way. Popularly used in a business context (e.g., the planned obsolescence of consumer devices that are designed to fall apart in a few years, like cars and laptops), the term is now being used to describe the human mind. It’s no longer the technology that’s becoming obsolete too quickly; it’s the knowledge of technology that’s rapidly falling behind tech advances or changes. And that obsolescence, according to the New Media Consortium’s Horizon Report: 2017 Higher Education Edition, is just one of the six major challenges facing technology in higher ed in the coming years.

BY DAVID NAGEL

Even as technology proliferates in education at unprecedented rates, new barriers — including the “obsolescence” of human technological knowledge — are throwing themselves in the way of effective implementation.
The Horizon Report is NMC’s annual research project that, with a panel of higher education experts, attempts to identify significant and not necessarily obvious technology trends that will impact education in the future. Among those trends are those accelerating adoption of technology, those impeding technology and those that are simply educationally significant technology-based developments.

Roadblocks Ahead: Wicked Challenges
This year’s report identified six major roadblocks to education technology, either in its adoption or in its implementation. The report divided the roadblocks into three categories: those that pose challenges but are solvable in the near term; those that are more difficult to solve but are still understandable; and those that are “wicked difficult” — nigh impossible to define, let alone solve.

Falling into the wicked difficult category in this year’s report are two issues that did not make last year’s list: managing the obsolescence of human knowledge and, perhaps even more difficult, grappling with the changing role of the educator.

On the human obsolescence front, the report explained: “Staying organized and current presents a challenge to academics in a world where educational needs, software, and devices advance at a strenuous rate. New developments in technology hold great potential for improving the qual-
ity of learning and operations. However, just as faculty and staff are able to master one technology, it seems a new version launches. Institutions must grapple with the longevity of technologies and devise back-up plans before making large investments. There is added pressure to ensure that any tools selected are in service of deepening learning outcomes in ways that are measurable."

Professional development can only go so far in alleviating this problem, though the report did note a few exemplars. One of those is the Houston Community College (TX) system, which provides both technical and pedagogical assistance to adjuncts. As the report described: “Eight Curriculum Innovation Centers work with instructors to integrate the latest technologies into their courses and facilitate engaging learning experiences. Adjuncts receive training on special projects, such as digital storytelling and designing online courses, as well as basic assistance with LMS and grade entry software. The centers are accessible during set hours or by appointment, providing flexibility for adjuncts to visit the location nearest their home, place of employment, or teaching campus.”

Another exemplar noted in the report was Penn State University, which “employs a three-pronged approach for managing knowledge obsolescence among faculty and staff: providing them with emerging technologies for free-form experimentation, bringing together instructional de-

6 SIGNIFICANT TECHNOLOGICAL DEVELOPMENTS

The NMC Horizon Report: 2017 Higher Education Edition also identified the six technologies expected to have the greatest impact on education in the next decade.

**Adoption in one year or less:**
- Adaptive Learning Technologies
- Mobile Learning

**Adoption in two to three years:**
- The Internet of Things: IoT is broadly viewed as a major factor that will impact multiple sectors. But how will its impact be felt in higher ed? Samantha Becker, co-principal investigator for the Horizon Project, noted: “I think the earliest and most basic applications of IoT at institutions are those that enhance safety and efficiency. Alert systems that send notifications through mobile devices are one way to help protect people on campus … and University of New South Wales [Australia] is already using sensors to lower energy consumption and improve connectivity. In future incarnations, always-connected devices, enabled by IoT, also have the capacity to detect patterns in behavior and performance to target students in need of greater support.”

**Next-Generation LMS:** The much-maligned current-generation learning management system can be described as limited “in capacity, too narrowly focused on the administration of learning rather than the learning itself.” By contrast, according to the report, “Next-generation LMS, also called next-generation digital learning environments (NGDLE), refers to the development of more flexible spaces that support personalization, meet universal design standards and play a larger role in formative learning assessment.” Rather than existing as single applications, they are a “confederation of IT systems and application components that adhere to common standards … that would enable diversity while fostering coherence.”

**Adoption in five or more years:**
- Artificial Intelligence: Broadly, AI can be a powerful educational tool. According to the report: “As the underlying technologies continue to develop, AI has the potential to enhance online learning, adaptive learning software and research processes in ways that more intuitively respond to and engage with students.”

**Natural User Interfaces:** “There is a rising level of interactive fidelity in systems that understand gestures, facial expressions and their nuances, as well as the convergence of gesture-sensing technology with voice recognition. While there are many applications of gesture and voice recognition already, developments in haptic technology, tactile sensations that convey information to the user, are creating new areas of scientific inquiry and application in education,” according to the researchers.
signers and programmers to reimagine how technology can transform classroom activities, and establishing long-term bonds between leadership and faculty to engage in creative problem-solving."

According to Samantha Becker, co-principal investigator for the Horizon Project and NMC's senior director of communications, this particular challenge "converges with integrating formal and informal learning. Not only is keeping up with new educational trends and technologies an important part of formal PD, but educators and staff must (somehow) find the time in the limited free time they have to pursue external learning pathways. I've heard educators, for example, refer to their social media as personal learning networks."

She said it's crucial for institutions to recognize, reward and scale good pedagogy and that these practices need to be a part of an institution's fabric. "When institutions reward research over teaching, it sends a message that devalues teaching," she said. "Establishing programs that identity effective teaching and then allowing those educators to teach other educators is one route. Peer-to-peer learning can be an important part of PD — and of scaling innovative practices."

She added that "cultures that promote experimentation are essential. Institutions are doing a better job of integrating this idea into learning experiences and assignments for students, but what about faculty? Good example: At Columbia University [NY], Teachers College's Gottesman Library is building the 'Learning Theater,' an open-plan educational lab that deploys proven techniques from the visual arts to enable staff to experiment with unconventional collaboration and instructional approaches, constructing mock-spaces in the same manner a set designer does a play."

Intimately related to these issues of pedagogy and experimentation is the second "wicked difficult" challenge in this year's Horizon Report: re-thinking the roles of educators. This has been a major issue in K-12 education for decades, one that has proved contentious for educators in many cases and somewhat difficult to implement given the wide policy swings at the federal, state and local levels — coupled with reform efforts that have been at times at cross-purposes with one another (for example, the push to let students drive their own learning coupled with a push to tie teachers' bonuses, salaries and even employment to the performance of their students on standardized tests)."

Higher education has traditionally had much more flexibility in the ways in which it's been able to deliver education, yet the oft-maligned large lecture remains a prominent fixture.

NMC's Becker explained: "It's all about the transition from sage-on-stage to educators as coaches, guides and mentors. That is not to say there is not a place and time for lectures, but the move toward more active, immersive and hands-on learning calls for a different kind of instruction. These are changes to learning approaches as well as pedagogy, so traditional forms of teaching may not be effective in implementing them."

It's crucial for institutions to recognize, reward and scale good pedagogy and these practices need to be part of an institution's fabric. Cultures that promote experimentation are essential.

So why do less effective practices remain? The report noted a significant gap between the values espoused by leaders in academia with their practices: "Compounding this wicked challenge is the contradiction between what higher education institutions value and how they prioritize those values. A Gallup survey of college and university presidents found that 64 percent of presidents place teaching first in importance in faculty roles, and only 1 percent believe that publishing and research are their most important responsibilities. Yet, pundits note that a growing number of faculty appointments
are part-time or non-tenure track positions with lower faculty engagement, higher turnover and declining instructional quality, and those with tenure are assessed primarily on their scholarly output rather than their ability to engage students."

The Merely (Yet Extremely) Difficult Challenges

One pip down on the difficulty scale come two new challenges that could easily have qualified as "wicked": They, too, can be difficult to come to grips with and are certainly going to be a challenge to solve — if they are able to be solved at all.

The first is digital equity. In this nation alone, some 30 million people are without high-speed internet. That is compounded with the fact that there’s an enormous qualitative gap when it comes to access to technologies, whether that be the high cost of specialized software tools or the high cost of quality computing devices.

Globally, the problem is even grimmer: Only 41 percent of the population in developing countries is online. And, as the report noted, there’s a significant gender issue involved as well: “200 million fewer women than men are accessing the internet around the world.”

The second difficult challenge in this year’s report is closely related: the achievement gap. As the report explained: “While emerging technological developments such as digital courseware and open educational resources (OER) have made it easier to engage with learning resources, significant issues of access and equity persist among students from low-income, minority, single-parent families, and other disadvantaged groups. The one-size-fits-all approach of traditional higher education paradigms, coupled with overwhelming tuition costs, is in stark contrast with an increasingly diverse global student population; more flexible degree plans are needed.”

The ‘Solvable’ Challenges

On the low end of the scale are the two solvable challenges, both of which carry over from the 2016 report: digital literacy and integrating formal and informal learning.

Lifelong learning — much of it informal, delivered through workplace experience or participation in online courses or webinars — has become essential to workers across sectors, and, according to the report, it’s become imperative for higher education institutions to recognize informal learning in order to remain relevant. But what exactly constitutes “credible informal learning?”

Coming to a consensus on that is a fairly substantial barrier, yet informal learning is making inroads in a number of ways. For example, the report noted, “The European Commission is setting an influential policy precedent by recognizing that informal learning validation increases visibility of learning outcomes and appropriate value of these experiences. Their recently published ‘European Guidelines forValidating Non-formal and Informal Learning’ is aimed at stakeholders, policymakers and practitioners involved in developing and implementing education validation arrangements. The European Centre for the Development of Vocational Training has, in tandem, developed a database that provides an overview of how each country is meeting the challenge of validating informal learning. In the U.S., the Department of Education launched Education Quality through Innovative Partnerships,
which allows students to leverage financial aid toward several non-traditional offerings, including management in industries like hospitality and manufacturing or mobile and web development; they are also piloting new assessment mechanisms to support and track the outcomes of these new programs."

The final challenge on the 2017 report, digital literacy, which has been a repeat player for several years, focused this year less on proficiency with technology and more on digital citizenship — though proficiency remains an issue. The report noted: “The productive and innovative use of technology encompasses 21st century practices that are vital for success in the workplace and beyond. Digital literacy transcends gaining isolated technological skills to generating a deeper understanding of the digital environment, enabling intuitive adaptation to new contexts and co-creation of content with others. Institutions are charged with developing students’ digital citizenship, ensuring mastery of responsible and appropriate technology use, including online communication etiquette and digital rights and responsibilities in blended and online learning settings and beyond.”

When asked whether it was the role of higher education institutions to instruct their (adult) students in digital citizenship or whether this might be a more appropriate pursuit for K–12 schools, NMC’s Becker responded, “I think the concept of digital citizenship transcends learning sectors. It’s true that I’ve seen some digital citizenship frameworks designed by K–12-focused organizations, but remember: Great trends and practices can come from K–12 and greatly impact higher ed, such as the flipped classroom. Here’s a digital citizenship example for higher ed: Students, faculty and researchers are being expected to disseminate their work and share their knowledge/questions via social media. How does one understand the difference between an intellectually provocative tweet and a downright inflammatory one?”

The complete Horizon Report: 2017 Higher Education Edition is freely available (along with reports from prior years) at nmc.org/nmc-horizon or horizon.wiki.nmc.org.
In the face of instant communication, continuous connectivity and data analytics, the key research question at the University of Texas at Arlington’s LINK Research Lab is “What does it mean to be human in a digital age?” Here, LINK Lab Executive Director George Siemens brings our attention to key issues about our connectedness.

Campus Technology: Like every other sector, education is growing more connected all the time. How is this connectedness changing us? Or is that question too broad?

George Siemens: Actually, the questions we are looking at today are fairly broad, but I don’t think that’s unusual in times of substantial change.

At the LINK Lab, as a research space, our defining question is broad: What does it mean to be human in a digital age?

We’re looking at that question from a number of perspectives. One thing that comes to mind immediately is the new technology and different knowledge practices that you and I experience all the time. And going deeper, there are also some psycho-physiological impacts — we’re feeling more stress than ever, as we may become a bit overwhelmed by the newly emerging tools we see on a daily basis.

CT: What’s an example of these psycho-physiological impacts?

Siemens: Think about the recent election in the U.S. There are toolsets now where everyone has a voice — things are much different than in the past, because there are new ways we engage with one another technologically. We don’t have regulatory guidelines for these new systems similar to what we were used to in the past. This is a very different experience of the election process.

From a learning perspective, this particular aspect of new technology and toolsets creates winners and losers, meaning that there is a large percentage of learners who are not able to be effective in this type of knowledge climate, and they are in effect being excluded from the education system.

CT: So are you looking at student success at the LINK Lab?

Siemens: Yes, in addition to looking at new knowledge processes, we are also quite focused on success for all students: How do we bring all students along? An important part of that work now relies on learning analytics, artificial intelligence and other models that help us improve practice.
CT: What are some of the challenges or benefits of connecting students to these models — with their real data?

Siemens: There was a period a few years ago when we thought that it will be great if we bring new, more “connected” toolsets into education practice. We wanted students to have the ability to use technology that they could connect with and control. We were very actively engaged in promoting what we called “Web 2.0” technologies. That was a big mission in education for some time.

But as we look back now, with 10-plus years experience working with these toolsets, we are finding that the same toolsets that enable democracy and empower anyone to participate also generate an unprecedented amount of error in the public space, in terms of misinformation.

That became amply clear, as I mentioned, during the recent election, throughout the political spectrum.

There is a growing concern now that the toolsets we thought would provide democracy have in some ways provided something like the opposite. By raising all voices, some of the important voices can get “drowned out.”

Now, this doesn’t mean I’d like to exclude anyone, but I think we certainly need to start looking at this question: How does an open, equitable digital space function when there are groups who are intentionally disrupting the space? We’ve seen some groups whose mandate is not to be equal participants but to achieve their intended outcomes through some fairly dubious means. They fly in the face of the humanist model that underpins most of Western democratic society.

This question has really come to the forefront. In the digital world, in some sense we are what we connect to — what we read, and the people that we engage with in an ongoing basis, for example, in the echo chambers that we are a part of on Twitter and Facebook.

I’ve found that in this post-election timeframe, many people are re-examining who
they are “following” — and whether that represents diverse, challenging voices or simply comfortable conversation spaces.

We can easily create false realities for ourselves with some of these toolsets and technologies. If we disagree with someone, we can basically ignore them. This can in some cases be a benefit, but there are still some implications to be understood: Misinformation — or incomplete views — can start to drive the behavior of people in different places along the spectrum. What happens if they are steeped in unbalanced information? We may be able to find corollaries when we look back to the print age, but in our digital age, what we have is a much more complex picture and not an easy challenge to address.

So, those are a few of the questions we are looking at in terms of the impact of technology on the equity of information.

CT: If there is a technology problem, is there a technology fix?

Siemens: What a lot of systems are starting to do now is switch to data-intensive models, whether under the umbrella of learning analytics, artificial intelligence or machine learning approaches.

Now that’s assuming that if we can get better fidelity or higher quality information into the hands of people, then they will make better choices, personally, politically and otherwise. But if you look, you can still find bias reflected in virtually all of the toolsets we use that have a data-centric model.

CT: What’s an example of that type of bias?

Siemens: You may remember about eight months ago, Microsoft released an AI bot to the internet — a sort of Twitter bot — to learn and engage with people. It did learn, but it happened to become a rather racist bot because it started to acquire the language that was used by people in that space. It’s a very practical example of becoming what you connect to.

There are social justice components in conversations we are having now about our growing data-centric worldview and how that’s starting to shape how decisions are made — for example, in law enforcement and judicial outcomes; or in an education system for student success and completion.

CT: Where are we now in all of this? What happens next?

Siemens: We have the beginnings of a new space now that’s open and equitable, where everyone has a voice. And we’ve had growing attempts to create structure to that space through the use of data-centric models.

We are focusing on how we can improve the accuracy of information that emerges in this space. But even as we try to do this, we see many examples of how we are capturing in our algorithms almost mirror-like reflections of biases and prejudices that we may not have been aware of.

Where does this take us, and how do we remedy this? Among the things we’ve pursued at the LINK Lab, are — for want of better words — the traditional contemplative practices. For example, we are developing a yoga MOOC that will be run as part of a MicroMasters on edX, that looks at the practice of yoga as a way of centering one’s self in a fairly complex world. It emphasizes mindfulness practices that enable attention and focus.

There is a huge distractionary element to the common toolsets people use — constant pings on our mobile, alerts on our desktop. Distractions are competing with our ability to work. A 30-second e-mail that offers instant gratification may get more attention than a comprehensive, 80-page report. What do such choices mean for us?

We are recognizing that in a digital age, there needs to be a growing attention to the most fundamental human attributes and...
how we nurture those while we relinquish selected parts of our work to technology — technology that can, in many ways, help us do certain things better than ever before.

**CT:** Does the LINK Lab push out practical solutions within UTA and elsewhere?

**Siemens:** We concern ourselves with both research and practice. This is the intent of our dLRN initiative, the Digital Learning Research Network, which focuses on the idea that research should have a practical application and real impact — and conversely, that practice space needs to feed into research.

dLRN started as a $1.6 million grant from the Bill & Melinda Gates Foundation. We brought research institutions like Carnegie Mellon [PA], Stanford [CA] and the University of Pennsylvania together with state systems including Arkansas, Georgia and California — from these we created teams that were both research- and practice-represented.

We very much believe that practice in the digital learning space needs to have a basic science or research focus, together with an application focus. Research needs to have impact at a classroom level.

We don’t see a sharp distinction in digital learning between what is research and what is practice. Part of the reason is that many of the practices we are engaged in haven’t been researched — basic questions about learning activity, student motivation and student agency haven’t been addressed in some environments where software has been deployed to literally thousands of students. We want to understand what’s happening in those spaces and how that impacts and changes the act of teaching, the student’s sense of well-being … and the list goes on.

Just because something is possible technologically does not mean that it is going to be effective when deployed in an organizational setting. So, the research component and the human experience component become very important to us. At the LINK Lab, we try to emphasize projects that can have immediate impacts but at the same time have a true learning sciences orientation. **CT**
ADVISORY BOARD

Link Alander
Vice Chancellor and CIO, Lone Star College System (TX)

Jill Albin-Hill
CIO, Dominican University (IL)

Keith Bailey
Director, Office of Online Learning, University of Georgia

Edward Chapel
Senior Vice President, NJEDge; former VP for IT, Montclair State University (NJ)

Maya Georgieva
Associate Director, Center for Innovation in Teaching and Learning, NYU Stern School of Business

Thomas Hoover
Associate Vice Chancellor and CIO, University of Tennessee at Chattanooga

Kim Cliett Long
Director, The Center for Excellence in Distance Learning, Wiley College (TX)

Alexandra M. Pickett
Associate Director, SUNY Learning Network, State University of New York

Sasanka Prabhala
Executive Director for Strategic Information and Business Intelligence, Wright State University (OH)

Upcoming Events

April 5–7
Online Learning Consortium
OLC Innovate 2017
New Orleans

April 7–14
The SANS Institute
SANS 2017
Orlando

April 22–25
American Association of Community Colleges
AACC 97th Annual Convention
New Orleans

April 23–26
Internet2
2017 Internet2 Global Summit
Washington, DC

April 30–May 3
United States Distance Learning Association
USDLA 2017 National Conference
Indianapolis

May 7–12
The Data Warehousing Institute
TDWI Chicago Conference
Chicago

May 16–19
IMS Global Learning Consortium
Learning Impact Leadership Institute
Denver

To submit your event, e-mail rkelly@1105media.com.