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Malcolm Brown

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Mark Valenti

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Looking Back, Facing Forward, Listening

There is little doubt that as a community, we can do much more together than we can alone.

There is a lot to be learned about an organization by how it sends off a departing leader, and I’m touched and heartened by the outpouring of support for Diana Oblinger. I’ve heard countless times how impossible it is to articulate all that she has done for EDUCAUSE, which speaks to the depth and breadth of her contribution. As we wish her well, this is the perfect moment for looking back and taking stock of all that the association has accomplished—while also facing forward with a view to plan for the years to come.

As we look back, the facts speak for themselves. EDUCAUSE has grown from 1,815 member colleges and universities in January 2008 to over 2,028 members today, and we have benefitted from a broader range of participation, including representation from 47 different countries, an increase of 13 percent in international memberships. EDUCAUSE has continued to develop and refine its premier programs, including the EDUCAUSE Learning Initiative (ELI), the EDUCAUSE Center for Analysis and Research (ECAR), the Core Data Service (CDS), and our cybersecurity initiative. Many of the signature services of EDUCAUSE in 2015 have evolved more than once over the years: for example, Net@EDU became the Advanced Core Technology Initiative working groups and eventually the ECAR working groups, whereas our regional conference strategy is now supported through the highly interactive EDUCAUSE Connect events. With the Bill & Melinda Gates Foundation and other partners, we launched the Next Generation Learning Challenges (NGLC) to support educational innovation through technology to improve college readiness and completion, and we expanded services in virtual curriculum and leadership development opportunities, including the Breakthrough Models Academy and Breakthrough Models Incubator programs. EDUCAUSE also developed and deepened relationships with other higher education associations and organizations. Again and again, EDUCAUSE innovations are driven by the community and emerge from the dynamic conversations, challenges, and opportunities that make up the information technology and higher education landscape.

From the vantage point of 2015, we can clearly see how the EDUCAUSE community dealt with the challenges of the past years. People came together, and EDUCAUSE evolved to what we know today. During a time when institutional independence was seen as an unquestioned value, influential IT leaders were urging colleges and universities to embrace more, not less, “intentional interdependence.” Whether the resulting collaborations are Internet2, the Kuali Foundation, HathiTrust, Unizin, the IMS Global Learning Consortium, or others, there is little doubt that as a community, we can do much more together than we can alone. Although the last decade has seen significant change, there is no sign of a slowdown. The most compelling adventure is the one facing us head-on, and the opportunities found at the intersection of higher education and information technology have never been more promising, dynamic, or urgent. Together, we are questioning the sustainability of models that have served us for generations, and we are contemplating new models that may take us into uncharted territory.

This sense of being on the brink of a period of dynamic growth emerges and re-emerges throughout the pages of this issue of EDUCAUSE Review. In “Six Trajectories for Digital Technology in Higher Education,” Malcolm Brown takes us on an engaging tour of the digital learning environment in higher education, focusing not on where we have been or even where we are—but on where we may be going. Brown observes that in the future, “technology is no longer in the foreground” and the focus is instead on “the learners and the learning experiences that the technology enables.” In “Beyond Active Learning: Transformation of the Learning Space,” Mark Valenti too looks ahead to the future: “The
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next generation of learning spaces will take all the characteristics of an active learning environment—flexibility, collaboration, team-based, project-based—and add the capability of creating and making. In short, the learning space will become a “creation space.” A key tool in this environment is the learning management system. Malcolm Brown, Joanne Dehoney, and Nancy Millichap discuss its future in “What’s Next for the LMS?” and advocate taking a “Lego approach” for the next generation digital learning environment (the NGDLE).

Part of the reason the path ahead seems so promising is that many higher education stakeholders have accepted that neither staying in one place nor going back to earlier times is a realistic option. The stakes are simply too high. Still, in ways nuanced and profound, higher education has been struggling with change, especially since the tipping point of the Great Recession. Meanwhile, members of the EDUCAUSE community have continued to come together at places like the EDUCAUSE annual conference to explore strategies for responding effectively to the changes happening across our campuses. We use the convening and research power of EDUCAUSE—participating in discussion lists, serving in working groups, attending conferences, sharing information and best practices, and writing articles. We come together and do more together than we ever could individually.

This is a remarkable moment to be joining EDUCAUSE as president and CEO. And just as EDUCAUSE members listen to each other and to those outside our community, in my first months as your new president, I will be strongly focused on listening in order to develop the understanding that makes effective action possible. For example, I met in June with EDUCAUSE staff in both Colorado and Washington, D.C. I came away from the meetings with the clear conviction that this is an extraordinary team making difficult work look far easier than it is—much as EDUCAUSE members do every day on campus. While in D.C., I also began meeting with key national associations to continue to deepen these important connections outside the technology domain. This is a high priority for me because I strongly believe that the ongoing evolution of EDUCAUSE will be the result not only of intensifying the conversations we have among IT professionals but also of furthering our rich conversations outside this circle.

I have also been closely listening to our members, our partner organizations, the foundations we work with, our corporate partners, and others to make sure that my initial impressions are grounded in conversations with our key constituents. In the months ahead, EDUCAUSE staff will launch internal conversations about how we listen to and connect with members on a regular basis to guarantee the organization is responding to and meeting members’ needs.

Listening can be a tricky thing. Sometimes you hear more than you want to hear. When my son was young, I asked him a question I had seen posted in a parenting blog: “Nathan, when do you know I’m really listening to you?” His answer, without missing a beat, was “when you put your phone down and look at me.” Since that unsettling moment I have devoted myself to listening the best I can and to doing whatever I can to understand not only the surface talk but also the tides and currents below.

As I begin my new role facing forward together with you, I welcome your ideas, insights, creativity, and constructive counsel. Please connect with me by e-mail at jobrien@educause.edu. Admittedly, I can already hear the e-mail floodgates creaking open under the weight, but I would much rather face a deluge of ideas than lead without taking advantage of every opportunity there is to listen to all of you in the EDUCAUSE community.

Note

John O’Brien (jobrien@educause.edu) is President and CEO of EDUCAUSE.

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Reshaping the Educational Environment for Tomorrow’s Workforce

Imagine a state-of-the-art facility, stretching 1.2 million square feet, that brings innovative STEM, continuing education, and other instruction, flexible training labs, business incubator space, public-private partnerships, and nonprofit resources under one roof, all to benefit students and the community. This is happening now at Austin Community College—in a somewhat surprising location. ACC is transforming one of the first shopping centers in the Austin, Texas, area into a regional hub for higher education.

ACC’s vision calls for refurbishing the Highland Mall property into a modern educational environment and a center for community and business partnerships. Over the long term, space not used by the college will be available for mixed-use development, with the goal of creating a premier destination for lifelong learning, living, shopping, and entertainment.

**Phase I**
The college’s first renovation at Highland Mall converted 200,000 square feet of space formerly occupied by J.C. Penney. After breaking ground in the spring of 2013, ACC opened phase I of Highland Campus in August 2014 with almost 4,000 students. The campus offers a variety of options:

- Transferable core curriculum classes
- Developmental education to achieve college readiness
- Continuing education to enhance job skills

The campus includes innovative classrooms, computer labs, study areas, a library and media center, student commons area, and ACCelerator—the nation’s largest learning lab providing more than 600 computer stations for individualized instruction through technology.

Data from the U.S. Bureau of Labor Statistics and other sources shows that STEM jobs will grow faster than other jobs over the next decade and will pay higher wages overall for qualified employees. Many of these jobs will require a bachelor’s degree or higher, but others will not. In fact, STEM jobs requiring an associate degree are one of the fastest-growing job categories in the U.S. economy. This is good news for students and presents a viable pathway to the middle class for many people, yet there is a significant barrier: almost all high-growth, high-wage STEM occupations require significant math skills. Unfortunately, about 40 percent of students entering community colleges are not prepared for college-level math and must enroll in pre-college-level developmental courses. Most students who begin their college experience in developmental math struggle through several years of non-credit-bearing courses and eventually drop out. This is a serious problem for students and the economy, leaving large numbers of STEM jobs unfilled.

ACC is using the Highland Campus ACCelerator to revolutionize developmental education and help more students earn the credentials needed to succeed in the workforce. ACCelerator offers a new course, MATD 0421 (Developmental Math), that gives students the opportunity to complete more than one course, and possibly the entire developmental mathematics curriculum, in a single semester. If students need more time, they do not begin a new semester by studying skills they have already mastered. Instead, they begin wherever they stopped in the last semester.

The course uses adaptive learning software, called ALEKS, to customize coursework for each student. ALEKS is an artificially intelligent adaptive learning program that assesses students’ skills to determine current abilities and create a personalized learning plan. Students also receive individual attention from faculty, tutors, and academic coaches during class and open lab time. This model allows each student to more efficiently and effectively address his or her specific knowledge deficiencies, providing an accelerated route to the higher-level courses required in STEM pathways.

Initial results from the inaugural semester are promising. The course withdrawal rate is 7.5 percent, compared with 20 percent in traditional developmental courses. Of the 706 students enrolled in week 14 of the 16-week semester, 97 percent had completed the one-semester basic arithmetic course, with 64 percent continuing into the elementary algebra course. Students have provided extremely positive qualitative feedback, praising the personalized instruction and the high-touch, high-tech approach of the course. These results support the idea that students are more likely to persist to their goals through the effective integration of technology with active and collaborative learning and personalized interactions with faculty.
Phase II
The college’s academic master plan calls for a variety of programming for phase II of Highland, for both credit and continuing education students:

- Digital and creative media cluster
- Expanded IT programs (traditional and competency-based instruction)
- Culinary and hospitality center
- Professional incubator space
- Advanced manufacturing center
- Regional workforce innovation center
- Regional health sciences center with STEM simulator lab

With the approval of a bond package in November 2014, this work is in progress. The conversion will be transformative, with the site offering a host of advanced, contemporary spaces for instruction, research, and collaboration. A key aspect of ACC’s Highland planning involves making the facilities flexible—able to adapt to different training programs as the economy evolves and as new industries come to the forefront.

In addition, recognizing that ACC will not need the entire Highland space for some time, the college sought a partner to lease a four-story, 194,000-square-foot space once occupied by Dillard’s. Looking for an organization that aligns with the community college mission, ACC is currently developing a partnership with Rackspace Hosting, a global technology company that provides managed cloud hosting services to many Fortune 100 companies. The partnership creates new opportunities for students in a high-demand field, enhances the college’s technology training, and ultimately helps ensure a pipeline of skilled workers for the region. In turn, Rackspace, one of the region’s top employers, will set up its offices at ACC Highland and benefit from proximity to the college.

This public-private partnership is a key aspect of what makes ACC Highland a new model for higher education. By bringing the college’s industry partners onsite, ACC Highland can immerse students in their field of choice from the start, enabling real-world experiences to enhance what happens in the classroom. This venture expands the traditional concept of the internship to encompass the entire academic and career-training process. Benefits to the college and its students include Rackspace-funded scholarships, internships, guest lecturers and adjunct instructors, continuing education for ACC faculty, and on-campus job fairs.

Collaborations of this nature are essential in STEM fields, with the rapidly evolving technology. Through this agreement, ACC’s curriculum and offerings will remain on the leading edge of developments in the IT sector and will ensure that a new generation of tech workers has the skills and training that are in demand by today’s employers. This kind of partnership is critical to reversing the nation’s STEM skills gap.

Moving Forward
ACC is using a variety of funding mechanisms to bring ACC Highland to fruition. The college funded phase I through student tuition and fees. District taxpayers approved bond funding for phase II. The renovation of the property for the Rackspace partnership will be privately funded by the partner developer.

In addition, RedLeaf Properties, which has partnered with ACC for the transformation of the Highland site, is developing plans for the mixed-use component of the project. Along with the 1.2 million square feet of classroom space, the site is eventually expected to include 800,000 square feet of office space, 150,000 square feet of retail space, 1,200 residential units, and 200 hotel rooms to accommodate 20,000 students, 6,800 employees, and 1,800 residents.

ACC is re-envisioning the future of higher education and the educational environment. A collaboration among business and education partners, neighborhood groups, and community leaders, ACC Highland is revitalizing an Austin landmark while expanding access to higher education, improving student success, and training an elite workforce for Central Texas and beyond.

Richard M. Rhodes (rrhodes@austincc.edu) is President and CEO, Austin Community College District.

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This article is derived from several conversations with John O’Brien, including a telephone interview, in the spring of 2015. Excerpts from the interview are italicized, with some editing for clarity and flow.
On first impression, John O’Brien comes across as a scholar with a genuine love for teaching and learning. Although that is true, there is much more to the next president and CEO of EDUCAUSE. John is routinely described by friends and colleagues not only as warm, passionate, curious, and self-effacing but also as a keen-eyed observer and incisive questioner.

He arrives at EDUCAUSE from his most recent position as senior vice chancellor for academic and student affairs for the Minnesota State Colleges and Universities (MnSCU) system. In that role, John served as the senior academic officer for this system of 31 colleges and universities and over 400,000 students, the fifth largest system in the United States.

During his career, John has been a professor of English, a faculty president, and an academic and technology leader. Following service at the system level as associate vice chancellor of instructional technology, he was president (interim and ongoing) of two colleges.

With his depth and breadth of professional accomplishment, John could be on anyone’s short list of academic leaders destined for a major college, university, or system presidency. So, why choose EDUCAUSE? And why now? John points to his multiple, in-depth discussions with the EDUCAUSE search committee, executive staff, and board members during the recruitment and selection process. Through these interactions, he came to see the EDUCAUSE presidency as an opportunity of a lifetime—and a chance to return to his roots:

I became progressively more enthusiastic because of the quality of the conversations we were having. They reminded me of when I worked with technology as a professor and as a technology leader. That work inspired me. It captured my imagination, and I’m both grateful and eager to be returning to that original inspiration. In so many ways, I feel as though I’m returning home.

As the recruitment process progressed, John says he came to see the opportunity as more expansive and dynamic than he first imagined:

In an early interview, I asked everybody to volunteer, in one or two words, the characteristics that they were most interested in for the next president and CEO of EDUCAUSE. One person said courage, and others said creativity and agility and all these additional wonderful qualities. The next day I realized that nobody had said anything about technology, reminding me that the contribution EDUCAUSE makes is exceedingly broad, much bigger than just the tools and solutions we deploy.
Clearly, the next leader of the association needs to understand the technology, yes, but needs to understand that broader landscape even better. I also realized that the CEO must be able to make meaningful connections with presidents, provosts, faculty, business officers, and other senior campus leaders—which is something that I love to do and have a successful track record of doing. EDUCAUSE is critical to convening conversations and sharing best practices and ideas among these groups and also among association and corporate leaders. In other words, I saw that the influence of EDUCAUSE extends beyond the IT community and even beyond the campus. That’s when I realized this was both a unique opportunity and a great fit for me.

The need to listen carefully to one another—and to the EDUCAUSE community—is one of John’s signature themes:

A healthy organization is one that is always trying to improve. Former president and CEO Diana Oblinger has made the point that “just because EDUCAUSE is doing well, doesn’t mean we can’t do better.” I expect to continue that mantra, and I think the best way to improve is always to be listening carefully to the community we serve.

For example, I’ve been following the EDUCAUSE CIO Constituent Group discussions, and I see the topics the members bring up and the information they exchange. It’s very dynamic and energizing; clearly there is no shortage of strategic advice, opinions, and terrific ideas.

I will spend a considerable amount of time carefully listening, to find out what people love about EDUCAUSE and to find out what people want to reimagine—and then work with EDUCAUSE members and staff to take us in some exciting directions.

John describes his time as a technology leader for the MnSCU system as among the most important roles of his career:

When I first served as associate vice chancellor for instructional technology in the MnSCU system, one of the key responsibilities I took on was bringing academics into the broader technology conversation. I saw it as my job to remind IT staff and academics that they were on the same team. In an effort to amplify that connection, I attended both the senior IT management meetings and the senior academic management meetings, allowing me to serve as a conduit and liaison to those two crucial communities.

From the very beginning, when I worked directly with system CIOs, I understood that the quality of the conversation changes in important ways when we bring the academic and the technical teams together. Most CIOs agree that they can do their best work when they play a key role in shaping the strategic direction of their institutions. Broadening the IT conversation is essential if we are to increase the impact of information technology on campus and beyond. I believe no organization does a better job facilitating and encouraging technology conversations among everyone on campus than EDUCAUSE.

What’s encouraging is that so many CIOs are already reaching outside the IT organization and are already effectively leading change. These technology leaders have moved beyond having a seat at their institution’s leadership table. They are making collaboration across divisions second-nature, honoring the past work of our community members with wider conversations about the strategic importance of information technology in support of the mission of higher education.

Though John moved rapidly into leadership roles, he did not begin his faculty career with administrative leadership in mind. His passion still burns bright when he talks about his love of teaching and scholarship. And John expects that this foundational passion will always be part of the energy he will bring to his work for EDUCAUSE:

I never ever wanted to do anything other than teach. That was all I wanted to do: teaching and research. Nothing made me happier than walking through the famous 18th-century library at Trinity College, Dublin, when I was doing research for my MPhil degree, strolling by those marble busts and beautiful books from centuries ago. That experience powerfully grounds me in everything I do.

With my roots in teaching and research, I can see quite clearly the strategic opportunities for information technology. What is inspiring to me is that we are forging a path to use information technology to change the way students learn and the way faculty teach and the way they conduct research. At the same time, we are addressing current challenges in higher education by helping to manage costs and increase college completion and student success.

With the emergence of the Internet, John found new ways to channel his passion:

What I found was that the exact time when I started my academic career was the exact time when the Internet started to deeply affect teaching and learning, open doors, and inspire people with the ways that technology could significantly enhance teaching and learning by making it more interactive. I got so absorbed in that adventure as a faculty member—and it took me in so many new directions—that half a dozen years later I was a little surprised to find myself an associate vice chancellor and deputy CIO working on the administrative side of things.

I believe the twists and turns in my career give me a unique understanding of the perspectives of many EDUCAUSE stakeholders, and I trust it will serve us well in the years ahead.

At a time when the value of the liberal arts is questioned by some politicians, employers, parents, and most discouragingly, students, John is squarely in the camp of those who argue that a grounding in the liberal arts is essential, no matter what career objective a student may have:

I think my having been an English professor, and someone who still loves words, matters to me now more than ever. In a sense, everything is words, especially in our distributed world. So much of the way we communicate with one another is through writing (tweets, texts, e-mails, blogs). I love the challenge of finding the best way to say something in writing, and I think this will serve me well as I express myself across our distributed community.
John is looking forward to being part of the national and international effort to inspire the next generation of IT leaders. His self-appraisal about the drive and creative energy he will bring to the table gives us a strong indication of his priorities:

*I'm unrelentingly curious, whether I'm discovering a new book to read or a new concept or model to test or a new musical instrument to take up (and play badly). This opportunity with EDUCAUSE finds me at the perfect time in my professional life. It allows me to feed my curiosity, along with my desire to learn and to make a bigger difference on the national and international scene. I'll be part of some extraordinarily creative and strategic conversations about technology, and to me, that's tremendously exciting. I welcome any opportunity to tell the story of technology and the future of higher education.

When we allow ourselves to tell our genuine stories about the difference technology is already making and can make in the future, our enthusiasm can be infectious. If we can bring a little bit of evangelical zeal to the conversation, people might even stop talking: they might turn around and listen. Then the real work of reinvention and rediscovery can begin. After all, this is what EDUCAUSE and its predecessor organizations have been doing for decades: building community around powerful ideas and leading the way forward.

Notes
1. Prior to his position as senior vice chancellor, John O’Brien was associate vice chancellor of instructional technology for MnSCU. He was responsible for providing system-wide leadership for instructional technology initiatives for colleges and universities across the MnSCU system.
2. See “About Us” on the MnSCU website: http://www.mnscu.edu/system/about.html.
3. John and his spouse, Kathryn, have three children and live in Minneapolis, Minnesota. He is active in his community, and for nearly eight years he was a member of the selective Kantorei Chamber Choir: http://www.kantorei.net/about/ (he is pictured on the front row, far right). For performances, see https://www.youtube.com/watch?v=icGP5Yz7Mx8 and https://www.youtube.com/watch?v=VUPsLhaANp4.

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When we consider the future roles of digital technology in higher education, it is often helpful to think in terms of *trajectories* rather than predictions. Predictions are remarkably fragile things. Any unforeseen factor will render the prediction false or off-target, and as those variables increase, so too does the likelihood that the prediction will fail. Predictions also tend to be projections of the current and the known, ornamented with something that provides a futuristic hue. In the case of digital technology, given the acceleration of change—enabled by the very things whose course we are trying to predict—the conundrum of predictions may be at its most acute.

“We look at the present through a rear-view mirror. We march backwards into the future.”
—Marshall McLuhan

By Malcolm Brown
It is thus more practical to work with trajectories. With a trajectory, we know where something is headed, but we cannot say—or we refrain from guessing—where it will end. Working with trajectories is an admission that we cannot foresee the unanticipated factors and developments that might influence the trajectory, accelerating it or perhaps instead derail it entirely. In this sense, working with trajectories is a more humble and realistic way of facing the future. A trajectory is also far less fatalistic than a prediction. The latter asserts that this is where we will end up, whereas a trajectory shows where we might end up.

In terms of teaching and learning, I would like to suggest three characteristics that provide context for the following discussion of six digital technology trajectories. The first characteristic is **personalization:** the growing capabilities and willingness to use digital resources to create custom pathways for learning and degree success. One of the clearest illustrations of developments in this area may be MIT’s exploration of breaking its courses down into modules and enabling students and instructors to “reassemble” the modules to construct personalized educational pathways—a process likened to constructing a playlist in iTunes. Developments such as these lend credence to the suggestion that we have entered the “post-course era” in higher education: the course is no longer the curricular atom or fundamental building block.

The second characteristic is the **adoption of hybrid learning models:** The footprint of the online dimension is expanding across all venues of higher education, including institutions that have traditionally valued intimate, face-to-face learning. Higher education’s “affair” with the MOOC, though now waning, has had one lasting impact. It has greatly accelerated the migration of higher education into online education. In addition, this characteristic is intertwined with the first as instructors, instructional designers, and students are starting to invent and modify learning models and pathways as needed to achieve more personalized learning goals.

The third characteristic is the **analysis of ever-increasing amounts of data and the increasing influence those analyses have in the conduct of higher education.** This use of “big data” affords much more nuanced and timely insights into all kinds of learning processes. It enables the creation of custom reports tailored to specific learning contexts, ranging from institutional dashboards to personalized assistance for learners. It provides the basis for measuring progress toward institutional strategic goals. Equally important, analytics enables interventions in nearly real time. It provides the basis for measuring progress toward institutional strategic goals. Equally important, analytics enables interventions in nearly real time. It enables the creation of custom reports tailored to specific learning contexts, ranging from institutional dashboards to personalized assistance for learners. It provides the basis for measuring progress toward institutional strategic goals. Equally important, analytics enables interventions in nearly real time. It enables the creation of custom reports tailored to specific learning contexts, ranging from institutional dashboards to personalized assistance for learners. It provides the basis for measuring progress toward institutional strategic goals. Equally important, analytics enables interventions in nearly real time.

Clearly, digital technology is the fabric of nearly everything associated with teaching and learning. We can think of this fact as an overarching trajectory: digital technology is the core strategic enabler of learning in higher education. But there’s a twist. Our thinking about digital technology in higher education is shifting away from seeing it as IT infrastructure and instead toward conceiving it as a digital learning environment. For those of us who have worked in higher education information technology, this is a significant shift in our thinking. It means that the technology is no longer in the foreground; instead, our attention is focused on the learners and the learning experiences that the technology enables.

It sets for all campus players the ambitious goal of a learning ecosystem that is responsive and can be personalized. Enabling that ambitious goal are six individual trajectories of digital technology: device ownership and mobile-first; the textbook and open educational resources (OER); adaptive learning technology; learning spaces; the next generation learning management system (LMS); and learning analytics and integrated planning and advising services (IPAS).

### Device Ownership and Mobile-First

In the past, there was much discussion of the digital divide: the situation in which some students were able to afford digital equipment whereas others could not. Although the problem has not been fully resolved, the picture has shifted. The combination of lower costs for hardware and the mobile computing revolution of the past decade has altered the landscape. Mobile computing is a key technology in teaching and learning, and the trajectory is that it will continue to be so.

One way to appreciate this trajectory is by taking a look at results of the annual student study conducted by the EDUCAUSE Center for Analysis and Research (ECAR). In 2004, the study revealed that student technology ownership was divided between desktop and laptop computers. Most students owned only a single device. The ownership of “personal digital assistants” was just under 12 percent. If we jump to the most recent studies, we see how thoroughly this landscape has changed. According to the results of the 2013 study, 30 percent of the respondents owned 4 or more Internet-capable devices. In 2013, ownership of smartphones and tablets had increased by 14 percent and 15 percent, respectively, over the previous year. According to the 2014 study, ownership of smartphones jumped to 86 percent and is projected to be 90 percent in 2015. Tablet ownership in 2014 jumped to 47 percent, and its 2015 trajectory is 58 percent ownership.
Data has the power to transform the way you deliver education and drive better business decisions. But knowing how to tap into that power—and overcome skepticism about the value of analytics—often presents a major challenge. Download our free guide, “4 Ways to Justify an Analytics Investment in Higher Education,” and learn:

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http://bbbb.blackboard.com/justifyinganalytics
Significantly, the percentage of students using these devices directly for academics is increasing: moving from roughly 50 percent (2013) to 70 percent (2014) for smartphones and from 12 percent to close to 50 percent for tablets.

Such ubiquity enables institutions to leverage the mobile environment. Many are moving to a mobile-first approach. One of the first schools to move to mobile-first was Abilene Christian University, which has integrated mobile technology into its courses. Lynn University is moving its LMS functionality off the traditional LMS application and onto a component-based approach, one informed by this mobile-first approach. Tennessee Technical University’s Mobile Learning Environment and Systems Infrastructure (MoLE-SI), first introduced in the College of Engineering, is now poised to be introduced more broadly throughout the curriculum.

Mobile technology affords students and instructors an unprecedented degree of independence from the campus IT organization. Certainly they need campus networking, but even here, their cell phone connectivity can provide Internet access. It is helpful if the campus has an agreement in place for Google Docs, but if it doesn’t, they can use Google Docs anyway. The use of apps, such as VoiceThread for audio annotations or Diigo for collaborative tagging, requires neither permission from nor enablement by the campus IT organization, again apart from networking. To access resources from iTunes U or to participate in a MOOC requires only the campus network; instructors’ and students’ devices do the rest. Hence mobile technology permits students and instructors to personalize their environment, which puts their relationship with the campus IT organization on a slightly different footing.

The Textbook and Open Educational Resources (OER)

This trajectory is surprising. The textbook is undergoing a remarkable bit of evolution: it’s vanishing, as least in its traditional form as a book whose text is furnished by a third-party company and is sold at the campus bookstore. As paradoxical as it sounds, this is due largely to the companies that have in the past provided textbooks for higher education, companies such as McGraw-Hill, Cengage Learning, and Pearson. These companies are coming to see that profits lie in adding value to the core text and not in providing the texts themselves. According to Michael Feldstein, these companies “just want to be out of the textbook business. They want to sell software and services that are related to educational content, like homework platforms or course redesign consulting services.” Jonathan Band similarly noted that the textbook publishers “are well aware of the expanded competition presented by the Internet, and have begun to adjust their business models accordingly. Pearson, for example, is shifting from the supply of educational materials to the provision of educational services. Such services include testing, assessment, student information systems, and course management platforms.”

One dimension of this trajectory is the decline in the purchase of commercial textbooks, driven largely by their increasing costs. According to information from the U.S. Census Bureau, the price of textbooks rose 812 percent between 1978 and 2012. By contrast, over the same period, the cost of medical services rose 575 percent, new home prices 325 percent, and the consumer price index 250 percent. This has motivated students and instructors alike to seek alternatives. According to the ECAR 2013 student study, 71 percent of students used OER in 2013 (up from 25 percent in 2010) and 54 percent said that open resources are extremely important. The ever-growing abundance of ancillary content relevant to education (e.g., iTunes U, MOOCs, and repositories such as OpenStax CNX) enables students to skip the purchase of core textbooks altogether and instead seek basic explanations of content from these open resources. The course textbook is no longer a requirement but, rather, an option.

There are also initiatives entirely devoted to enabling students to create their own custom course content, largely from OER. The company Boundless (https://www.boundless.com) will mimic the table of contents of a commercial textbook and supply OER alternatives for each chapter of the book. A Pearson project (http://www.pearsonhighered.com/collections/) uses a specially designed search engine, called Gooru, to enable anyone to find appropriate OER. As an indication of how rapidly untraditional all of this is becoming, this is a Pearson project, but at the same time, Pearson is one of the major companies suing Boundless.

This trajectory seems to counsel us to expect that the classic higher education textbook will vanish, replaced by a variety of resources, the most important of which is OER. We may also expect that the traditional commercial companies will continue to invest in services such as adaptive learning technology (see the following section).

Adaptive Learning Technology

Situated “next door” to OER is adaptive learning technology. This appears to be the core service that publishers are betting on. Adaptive learning technology is in its start-up phase, much as where learning analytics technology was two years ago. Although its trajectory is not fully established, adaptive learning technology
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Adaptive learning technology takes a “non-linear approach to instruction and remediation, adjusting to a learner’s interactions and demonstrated performance level and subsequently anticipating what types of content and resources learners need at a specific point in time to make progress.” It is, then, a kind of automated tutor. What is fascinating is how quickly the major textbook publishers have cast an anchor into this technology:

- Pearson has teamed with Knewton, enabling Pearson to offer its MyLab and Mastering adaptive learning tools for a broad range of subjects, mostly in the sciences.
- McGraw-Hill has introduced ALEKS and Smartbooks, the latter based on its LearnSmart adaptive technology.
- Macmillan’s New Ventures division has a partnership with Knewton and has access to PreP’U’s technology.
- Wiley has announced a partnership with Snapwiz to produce a new product offering called WileyPlus.

There are other companies and even universities in the mix here as well:

- The companies include Smart Sparrow, CCKF, and ScootPad.
- Brightspace by D2L acquired the startup Knowillage and its adaptive learning technology called LeaP.
- In Europe, roughly a dozen institutions have formed INTUITEL, with the objective “to enhance e-learning content and Learning Management Systems (LMS) with features that so far have been provided only by human tutors.”
- The University of Phoenix has invested considerably in its adaptive learning technology Academic Activity Stream.
- Professors at Ohio University created an adaptive learning module (called MOOCulus) that they grafted onto the Coursera platform for their MOOC on calculus.

Adaptive technology has established a beachhead in higher education practice. Notable early projects include Arizona State University’s use of Pearson’s MyLab and Essex Community College’s use of ALEKS. Reports from these projects are mixed, as is to be expected with a young technology that is just getting going, but the blend of considerable interest and investments promises to make this a key technology for the foreseeable future.

**Learning Spaces**

Learning spaces is an umbrella term referring to the physical spaces specifically designed to accommodate learning activities, including (but not limited to) formal classrooms, the learning commons, labs, and makerspaces. The trajectory here, as explored more fully by Mark Valenti in his article in this issue of *EDUCAUSE Review*, “Beyond Active Learning: Transformation of the Learning Space,” is that these spaces are evolving away from being places of presentation and toward being places of discovery, invention, and knowledge construction.

The makerspace is perhaps the clearest example. Currently makerspace rooms are places for invention using physical objects. Often these rooms house a variety of equipment, available to students individually or in teams. As always, technology provides a very wide range of possibilities. 3D scanning and printing technologies are common to almost all makerspaces, enabling students to capture and reproduce objects in three dimensions. Programmable circuit boards, such as Arduino and Raspberry Pi, enable a variety of projects. Some schools, seeking to enable as wide a range of projects as possible, provide equipment such as sewing machines, miter saws, computerized routers, 3D microscopes, large sheet printers, oscilloscopes, and soldering irons. The idea is to provide raw materials and tools to foster discovery and invention.

This trend toward discovery, content sharing, and knowledge creation is not limited to makerspaces but also informs formal and informal learning space design, and once again digital technology is the enabling agent.

Technology further enables team-based classroom design, also called scale-up or active learning classrooms (see, e.g., http://scaleup.ncsu.edu/). Traditional classroom design provides seats arranged in rows, with a podium for the instructor at the front. This design is informed by the idea that the primary purpose of the room is to enable presentations by the instructor. By contrast, team-based classrooms provide seating at circular tables, with six to ten seats per table. Most often the room has no “front” in the traditional sense. The team-based room is designed to make collaborative student work the focus of face-to-face class sessions. The instructor functions more as a guide or mentor and less as a presenter. Students, in teams, learn by actively working in collaborations and partnerships. These designs are enabled by extensive wireless
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The learning space trajectory clearly embodies the “new” priorities of learner-centeredness, the social/collaborative dimensions of learning, and the importance of active learning engagements.19 The built environment is particularly conspicuous, both because of its cost and because it physically affords certain kinds of usage while discouraging others. Classrooms are “architectural embodiments of educational philosophies.”20 The new classroom designs offer clear evidence that the trajectory is indeed moving away from presentation and toward knowledge construction by all course participants.

The Next Generation Learning Management System (LMS)

Much like an institution’s student information and fiscal administration applications, the LMS is now a fixture of the higher education technology landscape. Since its inception in 1997, the LMS has matured to the point that nearly every higher education institution runs at least one LMS. A 2014 ECAR study revealed that the current model of the LMS has been very effective—both in its design and in the way faculty use it—for the administration of learning, especially in the conduct of a course. According to the study, 99 percent of institutions have an LMS in place, and on average, 85 percent of faculty use it, whereas 56 percent of students report using the LMS in most if not all of their courses. For postsecondary teaching and learning, this level of adoption is unprecedented. But in contrast to these high numbers, the percentages of students and faculty who use the more advanced LMS features are low. According to the ECAR study: “Faculty and students value the LMS as an enhancement to their teaching and learning experiences, but relatively few use these systems to their full capacity.”21

In spite of these high adoption percentages, there is widespread impatience with what we might call the “LMS 1.0” trajectory here is the collective anticipation of, and investigation into, an entirely new model for this function—one that is, from the ground up, learner-centered, unlike the LMS 1.0’s orientation around the instructor and the course. The community is clearly seeking to replace the current LMS with a robust and comprehensive digital learning environment. As the ECAR study reports, 15 percent of institutions intend to replace their LMS in the next three years.22 Compared with the turnover rate of administrative enterprise applications, this is a significantly large percentage, suggesting a fair degree of restlessness.

What would an “LMS 2.0” look like? EDUCAUSE, in partnership with the Bill & Melinda Gates Foundation, has been conducting research into this very question, as outlined further in an article in this issue of EDUCAUSE Review: “What’s Next for the LMS?”23 To achieve this next version of the LMS, however, higher education will need a new paradigm. In the past, the instinct of the IT community, when confronted with a challenge like this, would have been to build a new and “large” enterprise application to meet the new requirements. But it is no longer clear that this traditional approach will work. The construction of a single application assumes that one design can meet the needs of the majority of schools, instructors, and students—an idea that seems dubious, especially in a post-course era in which personalized, custom education pathways are emerging as the priority.

The construction of a single application assumes that one design can meet the needs of the majority of schools, instructors, and students—an idea that seems dubious, especially in a post-course era in which personalized, custom education pathways are emerging as the priority.

Learning Analytics and Integrated Planning and Advising Services (IPAS)

All analytics for teaching and learning is intended to increase student success. A key ingredient is sustaining student “momentum.”24 Research indicates that students who experience early success in a learning endeavor tend to complete courses and degree programs at higher rates. By contrast, students who do not have early success are much more likely not to complete their courses and degrees. It is also now becoming clear that students
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who are metacognitively participatory in their learning achieve higher success rates than students who are not. Analytics for teaching and learning seeks to promote learner success by providing near real-time information to instructors and advisors, helping them build and sustain positive learner momentum. Student-facing analytics also seeks to address the metacognitive dimension by providing data to the learner so that he/she has a more objective basis for learning decisions. I will focus here on two types of analytics for student success: (1) learning analytics, which enables instructors and students to monitor engagement and progress at the course level; and (2) integrated planning and advising services (IPAS), an enterprise-level technology that blends data from a variety of campus systems.

Learning Analytics
The adoption of learning analytics has been accelerated by the integration of these capabilities into the major LMSs. This enables a campus to license a learning analytics module, flip the “on” switch, and quickly provide this service. For example, Blackboard, D2L, and Canvas have released learning analytics modules for their LMS applications (all called “Analytics,” as in “Blackboard Analytics” and “Canvas Analytics”). All of these modules provide similar capabilities: identifying at-risk students, measuring student engagement and participation, and offering ways to see which curricular activities seem to be producing the best results.

Although integration with the core LMS makes the task of providing learning analytics services relatively straightforward, questions remain. One question is what use students, instructors, and advisors will make of the information. In the past, most instructors have confined their use of the LMS to its more basic functions. Another question is how much support will be provided to conduct the interventions needed when a student is flagged as being at risk. A final question concerns the sophistication of learning analytics. Some object that the current set of mainstream learning analytics functions, such as counts of how often a student logs into a course website, is at best only a proxy for how much they are learning. In spite of these questions—or perhaps because of them—learning analytics will see increasing adoption over the coming years.

Integrated Planning and Advising Services (IPAS)
Learning analytics can be seen as a part of the larger IPAS suite of student success services. According to the 2014 ECAR IPAS benchmarking study, these services seek to realize a comprehensive vision of a technology-enabled and integrated digital environment that provides students, advisors, and faculty with the following capabilities:

- Education planning (identifying the degree and the best path to its achievement)
- Progress tracking (asking whether the learner is on course toward degree completion)
- Advising and counseling (offering services such as mentoring and tutoring)
- Early-alert systems (initiating proactive intervention with at-risk students)

At the technology level, IPAS requires a fluid exchange of data between major applications such as the student information system (SIS) and the LMS. At the level of institutional culture, IPAS requires a viable cross-institutional partnership between the IT organization and other campus offices. The key stakeholder groups are faculty (who often have workload concerns) and, of course, students.

The IPAS trajectory shows growing adoption. In light of this momentum, it is likely to be a key and increasingly ubiquitous academic technology in the future. As noted in the ECAR study: “IPAS is coming to a student success effort near you. Our study-group institutions overwhelmingly said it is important to their efforts and that they plan aggressive adoption and investment.”

Conclusion: Swirl

“We shape our tools and afterwards our tools shape us.”

—Marshall McLuhan

In higher education, student swirl refers to the practice of students formulating a custom, multi-institutional pathway to a degree. This is not a recent term: it appears to have been coined in 1990 by administrators at Maricopa Community College. But the practice is gaining momentum.

Student swirl is essentially a disaggregation/reaggregation cycle. Traditionally, the learning process and the degree conferral were aggregated into a single institution. The hop from a two-year institution to a four-year institution was the nearest thing to student swirl. Today, however, the aggregation of the learning process and the degree conferral has broken apart. Students now have more options. In short, the path to the degree is no longer linear or uniform in the traditional sense, nor does it need to be. In addition, the tempo of progress toward academic goals can accelerate or decelerate, depending on the requirements of the learner. Indeed, there are already indications that shifts in pacing have
“arrived”: the NYU School of Medicine, for example, now offers an accelerated track to the MD degree. Schools are also exploring badging and micro-credentialing as ways to mark progress toward an academic goal, especially in the domain of competency-based education. Obviously, we need to have discussions and debates about the quality of these new, swirled academic pathways, but the options have emerged and are being explored.

Digital technology in postsecondary education is undergoing swirl as well. Consider some of the key trends:

- The evolution or morphing of the campus IT organization, in its role as the provider of the IT environment and also with respect to its role in teaching and learning
- The increased independence of instructors and students, using their own tools to form their connections, resulting in custom pathways to achieve learning goals
- The trend away from large central applications, run on campus servers, in favor of confederations of apps, many of which run in the cloud
- The growing importance of interoperability and interface standards
- The increase in multiple mobile device ownership
- The capacity of data analytics to profile custom portraits of learners and to make predictions and suggestions based on those portraits

In each case, there is a similar pattern: an individualization or fragmentation, together with a reassembly of the micro-units into new, custom configurations. This swirl in postsecondary educational technology is perhaps the most important trajectory of all. We have entered into a period of both dislocation, when the known and familiar begin to disappear, and relocation, when we invent new methods, techniques, and configurations. But perhaps what characterizes our current situation best is the rapid tempo of these swirl processes—a tempo that shows no sign of abating.

It is a time that is both stressful and energizing, with both loss and new opportunity. Our task as educators is to carefully sift through these new options, being wary not only of clinging to the past but also of embracing digital snake oil. The fundamental challenges to us are to not look into the future “through a rear-view mirror” and to not have our “tools shape us.” Change in higher education is inexorable, as evidenced by these six trajectories for digital technology. The only way forward to a digital learning environment is through thoughtful participation in the swirl.
Six Trajectories for Digital Technology in Higher Education

Notes
This article is excerpted and adapted from the paper "Six Trajectories for Digital Technology in Higher Education," developed with support from the Josiah Macy Jr. Foundation. Concepts discussed herein were presented at the Macy Foundation Conference "Enhancing Health Professions Education through Technology" in Arlington, Virginia, April 9–12, 2015.


3. This is sometimes called blended learning, but the term hybrid better suggests the evolution and experimentation of this characteristic.


12. This technology is also called intelligent tutoring systems. For an introduction, see the ELI publications “7 Things You Should Know About Intelligent Tutoring Systems,” July 9, 2013, http://www .educease.edu/library/resources/7-things-you-should-know-about-intelligent-tutoring-systems-and-7-things-you-should-read-about-intelligent-tutoring.


14. For a contextualized look at adaptive learning, see the case study concerning Essex Community College’s use of this technology in its mathematics curriculum: http://e-literate.tv/series/personalized-learning/.


18. Two useful examples of makerspaces include the makerspace at the North Carolina State University Hunt Library (http://www .lib .ncsu .edu/spaces/hunt-library-makerspace) and Case Western Reserve University’s Thinkbox (http://engineering.case.edu/thinkbox/home).

19. The Learning Space Rating System (http://www .educease .edu/eli/initiatives/learning-space-rating-system), an ELI initiative, provides a set of measurable criteria to assess how well the design of classrooms is supporting and enabling active learning activities.


25. Ibid., 10, 7.

26. Ibid., 42.

27. Alfredo de los Santos Jr. and Irene Wright, “Marpuria’s Swirling Students: Earning One-Third of Arizona State’s Bachelor’s Degrees,” Community, Technical, and Junior College Journal 60, no. 6 (June/July 1990); National Student Clearinghouse Research Center, “Transfer and Mobility: A National View of Pre-Degree Student Movement in Postsecondary Institutions,” February 2012, https://pas.indiana.edu/pdf/transfers%20%26%20mobility.pdf (at the time the report was published, 24 percent of students had changed schools more than once).


29. A prominent example is College for America (http://collegeforamerica.org/) at Southern New Hampshire University (SNHU).

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Beyond Active Learning

ILLUSTRATION BY DUNG HUANG
The past decade has seen exciting developments in learning space design. All across the United States and around the world, across seemingly every discipline, there is interest in creating new, active, project-based learning spaces. Technology-rich and student-centric, the new learning spaces are often flexible in size and arrangement and are a significant departure from the lecture hall of yesterday. These developments are not the result of any one factor but are occurring as the result of changes in student demographics, technology advances, and economic pressures on higher education and as the result of increasing demands from employers. The nature of work today is inherently team-based and collaborative, often virtual, and geographically distant. Companies are seeking creative, collaborative employees who have an exploratory mindset. Employers seek graduates who can be more immediately productive in today’s fast-paced economy. Colleges and universities around the country are responding by creating flexible, multimodal, and authentic learning experiences. It’s a complex ecosystem of education—and it’s evolving right before our eyes. What an amazing time to be in education and to be a part of the transformation of the learning space!
Pedagogical Transformation

To begin to understand the evolution of the learning space—the classroom—it is useful to revisit the seminal work of Jack Wilson, who developed the Studio Physics classroom at Rensselaer Polytechnic Institute (RPI) in the mid-1990s. His team-based concept paired two students with a computer to teach undergraduate physics. The concept was taken considerably further by Robert Beichner at North Carolina State University with the Student-Centered Active Learning Environment for Undergraduate Programs (SCALE-UP) Project (http://www.ncsu.edu/per/scaleup.html). SCALE-UP transformed the teaching of undergraduate science from a lecture/lab-based model to an active, project-based learning approach. SCALE-UP typically teams three students with a computer and seats nine students at a round table. The concept eventually emerged into the public eye in the bellwether classroom design at MIT in 2004: the Technology Enabled Active Learning (TEAL) classroom (http://icampus.mit.edu/projects/teal/). Also used to teach undergraduate physics, the TEAL classroom was part of MIT’s iCampus initiative and garnered much attention for its innovative use of audiovisual technology to support the collaborative team concept.

Though it seemed expensive at the time, the design actually reflected the falling cost of digital projectors and made innovative use of off-the-shelf video-cameras to capture content on team whiteboards distributed throughout the space. Many other institutions could be mentioned here as the studio teaching concept spread throughout STEM programs across the United States, promulgated by Project Kaleidoscope (https://www.aacu.org/pkal) and others.

Concurrent with the development of the active learning space came a change in student demographics as the Millennial Generation arrived on campus. Often referred to as digital natives, millennials grew up with the Internet and hundreds of television channels; as a result, their expectations are completely different from those of previous generations of students. Millennials

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have influenced, and will continue to influence, higher education in a number of ways. As students, digital natives have forced higher education leaders to communicate and educate in new ways that meet millennials’ needs. For many decades, institutions offered education in a space of their choosing, on a schedule of their choosing, and in a style of their choosing. Millennials no longer accepted that model, demanding that education be offered in a space of their choosing, on a schedule of their choosing, and in a style of their choosing. Those spaces, schedules, and styles are often radically different from the offerings of traditional higher education. And at the same time, millennials bring a new generational personality—one of optimism, structure, team orientation, and a confidence bordering on entitlement that also impacts teaching and learning. As a result, educators are working to figure out how to manage the amount of personalization, involvement, and feedback these students demand of their educational experience.

Technology as an Enabler
There’s a technology thread to this story too, of course. In the mid-1990s the “smart classroom” emerged as a new paradigm for education. Done right, the new classroom technology model coupled personal computers and Internet access with audiovisual equipment to bring the world’s information resources to the classroom. Early implementations were fraught with problems, including network (un)reliability, complex system architectures, and challenging user interfaces for teachers and students alike. It was not unusual for a typical classroom system to use technology from ten or even twenty different manufacturers. Nevertheless, there was more success than failure, and within a few short years, the technology-enabled classroom became the norm and not the exception.

Still, for all practical purposes, the educational paradigm hadn’t shifted. Instructors translated transparencies into PowerPoint files, and the LMS (learning management system) emerged to organize and store digital course materials and student work, but the learning space was still teacher-centric and focused on the front of the room. Lecture-based instruction was “the way.” The technologies that really caused that model to start to break down were the laptop computer, LCD projectors, and wireless networking.

Today, high-performance computing in laptops, tablets, phablets, and smartphones is commonplace. Wireless networking has become sufficiently ubiquitous as to have receded into the fabric of everyday life. Indeed, we are on the cusp of a bandwidth revolution as projects like Google Fiber and US Ignite develop reliable, high-speed infrastructures in communities across the United States. Many think we will soon have essentially unlimited bandwidth at costs so low as to be practically free. There is no question that human behaviors and expectations are changing as a result. We have become a “rich media” society, with skills and expectations to match. Students are “prosumers,” producing and consuming content at equally voracious rates. New content developers are emerging from the Internet as Netflix, Google/YouTube, and Yahoo create original programming. The traditional underlyings financial models of entertainment content delivery, such as advertising that supports the production of a television series, are experiencing seismic shocks.

There’s yet another trend that has emerged from the ubiquity of the Internet, and that is society’s willingness to buy “virtual” instead of real goods. The music industry was the first to feel the effects of this trend, but it was certainly not the only one as the phenomenon spread throughout the entertainment industry. Consumers regularly buy virtual books, music, movies, and games that they store in “the cloud” and consume on their personal devices anywhere and all the time. In the education market, Apple’s iBooks 2 is one example of a digital textbook provider capitalizing on the virtual trend—and there are plenty of others.

The emergence of the MOOC (massively open online course) is yet another aspect of the willingness to buy “virtual.” Although the jury is still out on MOOCs and their future financial and educational success, there is no question that the viability of online learning is very real and that blended learning (a combination of online and in-class delivery) is becoming a mainstream approach used by institutions of all sizes. In a blended learning delivery model, the classroom becomes a different kind of asset. The Khan Academy has popularized the notion of the “flipped classroom,” wherein what was once class time (listen to the lecture) is now homework and what was once homework (solve the problem) is now class time. Active learning, an instructional model that focuses the responsibility of learning on learners, fits the flipped classroom perfectly. Students work in teams to solve problems that are often multidisciplinary in nature, using techniques
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Beyond Active Learning: Transformation of the Learning Space

that are technology-rich. Active learning classrooms are generally characterized by furniture and technology settings that foster small-group collaboration, a rich-media working environment, and the ability to easily reconfigure within the class period.

Interestingly enough, these new active learning classrooms are enabling students to acquire exactly the kinds of skills that employers are demanding of today’s graduates. Just as education is changing and adapting to the digital economy, the workplace is changing as well. In the past, it wasn’t unusual for an employer to hire a fresh graduate while assuming that a couple years of training and experience would be necessary before that new employee would become productive. Today’s fast-paced business environment demands nearly instant productivity from every hire. Educational institutions are being asked to fill in the gap by graduating students with “instantly productive” skills and abilities.

The T-Shaped Student
Employers and educators are increasingly placing importance on boundary-crossing competencies such as teamwork, communication, perspective, networks, and critical thinking across many disciplines. This model includes many systems and disciplines and requires thorough understanding and communication. Individuals with the abilities to bridge the traditional boundaries between disciplines have been referred to as “T-shaped professionals” (see figure 1). A greater focus on competency-based skills in this model has the potential to close the gap between traditional rote education and the needs of the workplace.

First coined by IDEO (http://www.ideo.com/), a respected international design firm, a T-shaped employee is one who has not only deep contextual understanding/knowledge in his/her discipline (the base of the “T”) but also a competency-based skill set needed in the workforce. A person who delves into other disciplines and understands how they can all work together to solve real problems is what employers look for in a new recruit. Any vision for undergraduate education must focus on preparing students with these fundamental competencies. Today’s employers want multidisciplinary workers who are capable of responding creatively to unexpected situations.

Michigan State University is taking the T-shaped student approach seriously. To determine how industry and higher education can better work together to produce professionals who use new technologies, business models, and societal innovation, MSU and IBM are leading the discussion among corporate, professional, government, and higher education leaders from across the nation. Doug Estry, associate provost for undergraduate education and dean of undergraduate studies, notes:

MSU is working more closely than ever with employers. While learning by doing has long been part of the MSU student experience, we are approaching development of T-shaped talent with greater intention by more fully integrating curricular and co-curricular experiences into the college experience. Increased emphasis is being placed upon internships and opportunities that feature real-world problem solving, often in collaboration with employers. Via avenues such as undergraduate research, study abroad, entrepreneurship, interdisciplinary learning, and service-learning opportunities, we hope to create a generation of students known for the depth and breadth of their individual abilities and for the power of their collective intelligence, including the ability to apply comprehensive knowledge of a discipline, understand the complex nature of systems, use advanced technologies in innovative ways, and apply professional qualities necessary to navigate among and lead members of multifunctional teams as they address complex global challenges.

MSU’s commitment has some interesting implications for the future of learning space. Consider a scenario where maybe

FIGURE 1. The T-Shaped Professional

Credit: Developed by IBM (Jim Spohrer, IBM Labs) and Michigan State University and modified on March 16, 2015. Reprinted with permission.
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The next generation of learning spaces will take all the characteristics of an active learning environment—flexibility, collaboration, team-based, project-based—and add the capability of creating and making.

**Learning Space as Creation Space**

The next generation of learning spaces will take all the characteristics of an active learning environment—flexibility, collaboration, team-based, and project-based—and add the capability of creating and making. Project teams will be both interdisciplinary and transdisciplinary and will likely need access to a broad array of technologies. High-speed networks, video-based collaboration, high-resolution visualization, and 3-D printing are but a few of the digital tools that will find their way into the learning space.

The ability to rearrange furniture and technology quickly and easily will be highly desirable. Some project activities will need nothing more than comfortable furniture, food, and caffeine. Others will require sophisticated computational analysis and the ability to do rapid prototyping.

Acoustics will be a concern and will need to accommodate a wide range of activities. It seems likely that such space will support more than one team or activity simultaneously. That will be a highly desirable trait, fostering serendipitous discovery and innovation.

The ability to quickly and easily capture the group’s activities and progress will also be desirable. An emerging class of powerful and effective collaboration tools enables project teams to save and store project elements, resources, concepts, plans, designs, models, and renderings—in short, all the “stuff” that a team might find or make.

The notion of learning space as creation space is certainly not new, but the advent of low-cost, high-performance technology is transforming the nature of environments. Right now, that rethinking is manifesting itself as an active learning, collaboration kind of space. But as employers seek creative, collaborative, and productive employees, the student of the future is going to graduate with a different skill set. What might their learning space look like? It’s going to be technology-rich, multimodal, and very flexible, enabling authentic learning experiences. The paradigm is shifting. Transformation of the learning space has begun.
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The learning management system (LMS) is a remarkable phenomenon in higher education. On the one hand, the LMS has seen unprecedented adoption rates. Estimates of colleges and universities running an LMS are almost always near 99 percent. Of faculty, 85 percent use an LMS, with 56 percent using it on a daily basis, and 74 percent say it is a useful tool to enhance teaching. Among students, 83 percent use an LMS, and 56 percent say they use it in most or all courses.1 In an enterprise as highly individualistic as teaching and learning, these are remarkable numbers. No other academic application comes close to such adoption rates.
What's for the LMS?
On the other hand, restlessness with the LMS is conspicuous. One measure of this is the finding that 15 percent of higher education institutions intend to replace their LMS in the next three years, which is far higher than typical for enterprise-class applications. Blog posts abound with expressions such as “LMS 3.0,” “LMS 5.0,” and “the LMS in a post-LMS world.” Despite the high percentages of LMS adoption, relatively few instructors use its more advanced features: just 41 percent of surveyed faculty report using the LMS to promote interaction outside the classroom.

What is clear is that the LMS has been highly successful in enabling the administration of learning but less so in enabling learning itself. Tools such as the grade book and mechanisms for distributing materials (e.g., the syllabus) are invaluable for the management of a course, but these resources contribute only indirectly, at best, to learning success. Initial LMS designs have been both course- and instructor-centric, which is consonant with the way higher education viewed teaching and learning through the 1990s. Higher education is moving away from its traditional emphasis on the instructor, however, replacing this emphasis with a focus on learning and the learner. Higher education is also moving away from a standard form factor for the course, experimenting with a variety of course models. These developments pose a dilemma for any LMS with a design that is still informed by instructor-centric, one-size-fits-all assumptions about teaching and learning. They also account for the love/hate relationship that many in higher education have with the LMS. The LMS is both “it” and “not it”—useful in some ways but falling short in others.

If current LMS designs are tied to a teaching and learning model that is being replaced with new approaches, then what should come next? Because the successor to the LMS needs to support a very different model of learning, it seems unlikely that we can get there by updating the current LMS with incremental improvements. Nor is the matter as simple as setting the current LMS entirely aside and developing another from scratch. Indeed, the instinct to “build from scratch” in the tradition of an enterprise application may be approaching obsolescence. Over time, the LMS needs to be supplemented with (and perhaps later replaced by) a new digital architecture and new learning components that contribute to and enable the transitions that higher education is currently experiencing. The challenge is to build on the value of the LMS as an administrative tool by retaining what works but not be bound to an outgoing model of teaching and learning. Another challenge is to make targeted investments that will bring about the environment of the next generation more quickly and coherently.

The Next Generation Digital Learning Environment

We have adopted the term next generation digital learning environment (NGDLE) for what should come next—after the LMS. The term pulls together several key themes. What comes next must be informed by the new learning-centered model that increasingly characterizes higher education practice (hence next generation). It must be digital, given that digital technology has become a component of virtually all teaching and learning practice. Another challenge is to make targeted investments that will bring about the environment of the next generation more quickly and coherently.
another sense as well. In traditional IT practice, when you have a problem to be solved, you write code to develop an application that will address the issue. But code, like the built environment, imposes a point of view. Classrooms, as one scholar puts it, are instances of “built pedagogy” and the LMS, in a similar way, imposes a pedagogical model.3 But any approach that posits a single chunk of new code is out of sync with the wide variety of postsecondary teaching and learning. This is particularly true today as higher education is transitioning from the transmission model of education to one built on concepts such as active learning, personalization, hybrid course designs, and new directions for measuring degree progress.

New Architectures

Although the NGDLE might include a traditional LMS as a component, it will not itself be a single application like the current LMS or other enterprise applications.4 Rather, the NGDLE will be an ecosystem of sorts, characterized by the following:

- At the built layer, it will be a confederation of IT systems, including content repositories, analytics engines, and a wide variety of applications and digital services.
- One key to making such a confederation work will be full adherence to standards for interoperability, as well as for data and content exchange.
- Instead of uniformity and centrality, it will need to support personalization as an option at all levels of the institution. The NGDLE will not be exactly the same for any two learners, instructors, or institutions.
- For users, it will be a cloud-like space to aggregate and connect content and functionality, similar to a smartphone, where users fashion their environments directly with self-selected apps.
- If the paradigm for the NGDLE is a digital confederation of components, the model for the NGDLE architecture may be the mash-up. A mash-up is a web page or application that “uses content from more than one source to create a single new service displayed in a single graphical interface.”5 Hence it uses a heterogeneity of components to produce a homogeneity of function. The confederation-based NGDLE will be mashed up at both the individual and the institutional levels, as opposed to consortia forming to create open enterprise applications.

The challenge for the NGDLE is supporting this diversity while retaining the necessary technological coherence. But in this challenge also lies the opportunity. Clearly we need to invent new architectures that support a digital confederation. We need to invent a model for technological coherence for the NGDLE, consisting of standards and core services. Other components will also be necessary, such as new standards, tools, and user experience designs. Examples of how this might play out include the following:

- An institution may decide to forgo the current LMS altogether and instead set up a confederation of components that provide similar functionality.6
- An institution could retain the LMS as a core component, preserving its value as an administrative tool and a linchpin for learning data. But learning pioneers would be able to experiment and innovate by hooking apps and other functions onto the LMS. Contact with the LMS would be more indirect than direct for most users.
- Clusters of institutions could form consortia (such as Unizin or C-BEN)7 to set up co-ops to provide a buffet of apps and other tools, either purchased or donated. In this case, each institution’s learning environment would be a unique blend of these components.

Five Functional Domains

As amorphous as the NGDLE may be from a traditional perspective,
its realization will entail five critical domains of core functionality:

1. Interoperability and Integration
2. Personalization
3. Analytics, Advising, and Learning Assessment
4. Collaboration
5. Accessibility and Universal Design

Progress toward the full realization of the NGDLE is possible only if the whole set of five functional domains is addressed.

1. Interoperability and Integration

**Finding:** Interoperability is the linchpin of the NGDLE. The ability to integrate tools and to exchange content and learning data enables everything else.

Interoperability in the context of the NGDLE has four primary dimensions. The first concerns content: all components must be able to accept and exchange curricular content in common formats. This ensures that content can be exchanged, transferred, and utilized. Second, on the tool side, integration must be easy enough for end users to quickly and easily add tools to the environment, without help from the central IT organization. Third, the learning environment will continue to be the key source of learning data. The unimpeded exchange of data is imperative to be able to aggregate, integrate, and analyze learning data. Fourth, the NGDLE must enable the creation of new interoperability standards in ways that are compatible with its other standards so that overall coherence is maintained.

For example, an NGDLE might tie together an e-book application with a course syllabus and a separate quizzing tool, all of which could smoothly exchange data. The syllabus could link students to e-book resources, which could communicate with the quizzing tool to provide appropriate review questions based on the pages read, creating opportunities for adaptive learning. Data about responses could then be sent to a gradebook, providing a complete picture to students and instructors about progress and areas of weakness. Higher education has not always taken full advantage of available standards, and the NGDLE will be an opportunity to encourage full implementation of technical and quality standards that enable such interoperability.

2. Personalization

**Finding:** Personalization is the most important user-facing functional domain of the NGDLE.

Personalization is highly dependent on interoperability. Whereas the mechanisms of interoperability (such as data standards) are largely invisible to the user, personalization is highly tangible and is the most important factor shaping the user experience. A learning ecosystem that enables learners and instructors to act as the architects of their environments is a powerful tool.

Personalization encompasses two aspects. The first is the outfitting and configuration of the learning environment, which is then used to construct pathways to accomplish learning tasks and attain learning goals. Typically we think of this as happening at the individual level, that of the learner and the instructor. But a configuration of this kind also needs to happen at the departmental, divisional, institutional, and consortium levels.

The second aspect is adaptive learning, in which an automated system provides learners with coaching and suggestions specific to each learner’s needs. There has lately been considerable momentum around adaptive learning, much of it from textbook publishing companies, and it must be a feature of the NGDLE landscape. As with other NGDLE functional domains, integration of adaptive learning tools will be key, as well as the ability of the tools to contribute learner data to support analytics.

At the 2014 EDUCAUSE Annual Conference, 50 thought leaders from the higher education community came together to brainstorm NGDLE functionality. This group identified and prioritized 56 desirable NGDLE functions. Three of the top 10 functions pertain to personalization:

- Integration for discipline-specific apps (#1)
- Easy to configure or adapt to teaching styles and disciplines (#2)
- Clear, customized, self-paced learning/degree pathways (#9)

Note that the term discipline appears in two of these functions. Academic disciplines are defined in part by scholarly practices and pedagogical methods and so have their own “personalization” requirements. This illustrates that personalization needs to be supported at the collective level and not just the individual level.

The integration of tools and content is one of the more important NGDLE challenges/opportunities. Currently a great deal of third-party content (both open and proprietary) is available to learners and instructors, and the same is true to some extent of learning apps and tools. But it is far from easy for end users to integrate content and tools directly into the current LMS. By contrast, the NGDLE will need to empower all users of the environment to add, alter, and customize the components to directly support their individual needs.
3. Analytics, Advising, and Learning Assessment

Finding: The analysis of all forms of learning data—resulting in actionable information—is a vital component of the NGDLE and must include support for new learning assessment approaches, especially in the area of competency-based education.

In the context of the NGDLE, there are two primary dimensions to analytics:

- **Learning analytics**, defined as “the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimising learning and the environments in which it occurs.”

- **Integrated planning and advising systems (IPAS)**, defined as “an institutional capability to create shared ownership for educational progress by providing students, faculty, and staff with holistic information and services that contribute to the completion of a degree or other credential.”

These dimensions are much like the two sides of a coin. Both rely on the aggregation and analysis of learner data to produce actionable reports and information. Learning analytics tends to be focused at the course level, whereas the IPAS suite of analytics typically targets overall student success, especially degree completion. The thought leaders we consulted were unequivocal about the importance of these kinds of analytics for NGDLE. At the EDUCAUSE 2014 convening, 30 percent of the desirable NGDLE functions had to do with one or both of these kinds of analytics. The question, then, is not whether they should be included but how.

Today most major LMS platforms have proprietary learning analytics capabilities that use data from the LMS and the student information system. These modules can be considered first-generation attempts. Future analytics modules could sit outside the LMS, while their dashboards could be viewable within the LMS or other applications using the Learning Tools Interoperability (LTI) specification. In the transition to the NGDLE, several points are key:

- **Widening the scope of the data.** There are three kinds of learner data: dispositional (e.g., incoming GPA, biographic and demographic data), course activity and engagement, (e.g., keystrokes, selections, time on task), and learner artifacts (e.g., essays, blog posts, media products). All of these need to be incorporated into the NGDLE’s approach to learning analytics.

- **Integrating the platform, tools, and data.** Standards are again key to this kind of integration.

- **Enabling learning analytics for all stakeholders.** As one thought leader told us, the next generation of learning analytics must address at least three levels: student empowerment, continuous instructional improvement, and institutional oversight. It must also furnish the basis for deeper, long-term research into the conditions that promote effective learning.

An ever-widening scope of data and integration is highly relevant for IPAS as well. IPAS applications are still an emerging technology, so a great deal of exploration lies ahead. Data standards will be of special importance. For example, one particular challenge is the need for a standard way to describe degree pathways for IPAS environments. Degree pathways are often complex and contain a host of exceptions, alternatives, and idiosyncrasies.

Like the other domains, analytics will require personalization in its features. Faculty, students, and administrators will want to configure reporting
Another important dimension is the assessment of learning. Assessment is foundational to learning and is therefore of central importance to any learning environment. The key aspects of NGDLE learning assessment include the weaving together of standard formative assessments, adaptive learning technology, and learning analytics, as well as the continued development and integration of portfolios. Competency has emerged as a particularly important way of assessing learning and mastery, calling attention to another disconnect in that the conventional LMS is organized around the course, whereas competency-based programs typically focus on smaller units of learning. Competency-based education (CBE) has already developed considerable momentum. For example, several LMS platforms have introduced support for competency-based approaches with tools such as a mastery-based gradebook, using the acquisition of skills as the way of measuring progress toward learning goals. Some institutions have now established CBE-based programs (e.g., Northern Arizona University, the University of Texas, and the University of Wisconsin). Key for the NGDLE is to integrate various ways to assess learning, moving away from tools that support only a single approach.

4. Collaboration
Finding: The NGDLE must support collaboration at multiple levels and make it easy to move between private and public digital spaces.

Collaboration is fundamental to many forms of learning. Even the relationship between the reader of a textbook and its author can be viewed as a kind of collaboration. Digital technology provides learners and instructors new opportunities to collaboratively construct unique pathways to accomplish learning goals. The tsunami of social networking in particular has enabled learners and instructors to organize learning collaborations at all levels, purposes, and group sizes. Learners are no longer restricted to forming collaborations with just their peers in a course. They can organize interinstitutional collaborations, discover content, and participate in MOOCs and other learning communities to augment their learning for a particular course. The breadth and depth of resources at the disposal of the higher education learner are unprecedented. The NGDLE must provide the resources to support learning collaborations of all kinds.

The support for collaboration must be a lead design goal, not an afterthought. The current LMS is often designed on the transmission model of education—a mechanism to transmit syllabi, content, and assessments. This process is important for the management of the course, but equal time must be given to collaboration, a true learning dimension. The NGDLE must provide learners with individual spaces that persist across entire academic careers (and possibly into professional lives), serving as a base for all learning operations. Tools such as portfolios and tools for content creation must also be fully integrated into the environment.

One issue that the NGDLE must address is the “walled garden” problem. Most of the current LMS systems were designed under the assumption that what happens in the course must stay in the course. As a result, within the LMS, the course is a private community—a walled garden. There are good reasons for this approach. It gives instructors use of content that might otherwise be unavailable to the course because of copyright laws. If trial and error is a core rhythm of learning, then a private setting makes it easier for learners to embrace a path of improvement, part of which is inevitably making mistakes and learning from them. But recent experience has shown that coursework in social settings, authentically situated, can have great value in the learning process. It has also shown the value of learning that is organized in units other than the course. So the issue is not that the walled-garden approach is entirely wrongheaded. The issue is that it is all too often viewed
as a binary choice—a course is either public or private. A requirement for the NGDLE is to move past this either/or view and instead enable a learning community to make choices about what parts are public and what parts are private.

5. Accessibility and Universal Design

Finding: Efforts to realize the NGDLE should include working toward ensuring that all learners and instructors are able to participate, with access to content and the ability to create accessible learning artifacts. We should strive to address issues of accessibility from the start, based on a universal design approach.

The shift away from the LMS to the NGDLE is one of considerable magnitude. Instead of just altering a room or two in our digital learning environment “house,” we are reimagining the whole house, including its foundation. A change of such scope brings with it many opportunities. We suggest that the NGDLE represents such an opportunity: to assist higher education in supporting the needs of people with disabilities by adopting a universal design approach in the context of a digital learning environment. A holistic, ground-up approach, addressing accessibility within the larger framework of universal design, has the potential to provide the most accessible digital learning environment possible.

The architect Ron Mace formulated a useful definition of the concept of universal design: “Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.”

In the context of the NGDLE, universal design means, most simply, having the goal of a learning environment that works for all learners and instructors. A universal design approach means that accessibility is addressed in the initial design of all NGDLE components, as opposed to being integrated—often imperfectly and at considerable cost—after the fact. This changes accessibility from an exercise involving users and technology to one focused on people and experiences, with the goal of enabling everyone to be successful in the digital learning environment.

Addressing accessibility via universal design enables us to think about the dual role of any learner: both a receiver and a creator of content. Learning entails both reception and expression. NGDLE components need to address both aspects from a universal design framework. The opportunities are many. Consider the student producing a video in conjunction with a course assignment—the NGDLE toolset should enable and encourage that student to produce a version of the video that is broadly accessible. Universal design thus becomes integrated into core digital literacy skills that all students develop when interacting with the NGDLE. Starting from a universal design perspective, improvements in discussion boards and assessment instruments would focus on designs that support learners in independent, successful task completion, while reducing user interface clutter that may create severe usability challenges for people with certain impairments.

The confederated approach we propose for the NGDLE is the key to progress in accessibility and universal design. This approach would encourage the development of specialty tools that could potentially address the more difficult obstacles to accessibility. Embracing interoperability standards would enable faster, more effective integration of these tools into the larger learning environment, and including accessibility standards as part of interoperability will help produce components that support people with disabilities. Similarly, including
accessibility in the support of personalization and adaptive learning helps balance the need for universal design of the learning environment with the opportunity to provide individually tailored experiences that are sensitive to accessibility requirements. Making progress in this functional domain is not just a matter of interoperability standards, since it is first and foremost a question of design. Incorporating universal design into the NGDLE framework will allow it to effectively address a wide range of accessibility needs and concerns, as well as encourage designers of NGDLE componentry to integrate accessibility as a core part of the design from the beginning.

Moving Forward: Lego Sets

If we look over the functional domains just discussed, and think too about the immense variety that higher education teaching and learning comprises, we might ask, “How could any application address all of that and do it well?” The answer, of course, is that no single application can, which harkens back to our earlier suggestion that no single chunk of code will constitute the NGDLE. This fact frees us to seek new, more effective approaches.

If the creation of an über application is not the path to the NGDLE, then we will need to take what might be called a “Lego approach.” Indeed, if the mash-up is the way that individuals and institutions will assemble their own NGDLE, then one way to enable that model is to populate the landscape with a set of tools and resources that are NGDLE conformant. This would result in a toolbox of applications, content, and platforms that could be assembled in custom ways. The key is defining what is meant by “NGDLE conformance.” Lego pieces work because of a design specification that ensures they will interlock, while enabling a wide variety of component parts. For the NGDLE to succeed as we describe here, we must define a similar set of specifications and services that constitute the conformance needed to make the Lego approach workable.

The Lego approach has two key advantages. One is that it enables communities to focus on realizing specific aspects of NGDLE functionality. If these components adhere to the necessary standards, they should be able to be interconnected into a single structure. Second, the approach addresses the key needs for personalization by enabling it at a variety of levels, from the individual to the institutional.

One could argue that some of this is happening today. We see work being done in a variety of NGDLE functional areas. Some of the more conspicuous efforts that are taking shape include the following:

- **Incorporation of mastery-based models.** LoudCloud has released a CBE platform called FASTRAK and is partnering with the University of Florida’s Lastinger Center. Instructure, which offers the Canvas LMS, announced its mastery gradebook a year ago.
- **Content tools.** EdCast seeks to create a network of institutions so that students can efficiently find course content. Acatar offers a learning platform that incorporates findings from learning science.
- **An app store.** Instructure’s EduAppCenter has a set of open, LTI-compliant apps that should be usable with any LMS that also supports the LTI standard.
- **Recommender systems.** For course content, Brightspace LeaP can recommend supplementary course materials in an automated fashion. D2L Degree Compass, originally developed at Austin Peay State University and now owned by Brightspace, makes course recommendations based on predictive analytics.
- **Interoperability standards and APIs.** IMS Global has many standards that potentially apply to the NGDLE, including Common Cartridge, LTI, EDUPUB, Access for All, QTI (Question and Test Interoperability), Learning Information Services, and Caliper Analytics. The Experience API is an example of an API that “makes it possible to collect data about the wide range of experiences a person has (online and offline).”
- **Accessibility standards.** Relevant accessibility standards include Web Content Accessibility Guidelines (WCAG) 2.0 and the Authoring Tool Accessibility Guidelines (ATAG) 2.0.
- **Adaptive technology.** Leading efforts include McGraw-Hill’s ALEKS, Smart Sparrow, Carnegie Mellon University’s Open Learning Initiative, and Cerego.
- **Additional initiatives.** Blackboard is developing a new LMS UX, currently called Ultra. Google (Google Classroom and Google Apps for Education) and Mobiliya Edvelop (based on Microsoft’s Office 365) have stepped into the LMS arena.

These projects and activities are useful initiatives, but they are disparate. Some are open, whereas others are proprietary. Their allegiance to standards is variable. These factors work against the coherence needed to create the NGDLE “Lego set.” This suggests an opportunity to expedite the development of NGDLE componentry. If the equivalent of the Lego specification could be articulated for the NGDLE, it would serve as the basis for the confederation we propose. We are suggesting an NGDLE-conformant standard or specification, which would be based on adherence to a coordinated set of component standards. Once such a standard is in place, future investments and development efforts could be designed around the NGDLE specifications.

Whereas an NGDLE Lego specification will need to include the appropriate technical standards to achieve
If the mash-up is the way that individuals and institutions will assemble their own NGDLE, then one way to enable that model is to populate the landscape with a set of tools and resources that are NGDLE conformant—using a “Lego approach.”

interoperability, it will also need to address the other functional domains identified above. It must include specifications that address accessibility and universal design. It must also feature specifications that speak to collaborations and work with peers. The articulation of the NGDLE specifications will need input from community members with a range of expertise.

Having this as a common frame of reference, we can imagine a host of additional areas for the development of new NGDLE components. Here are some examples:

- **Learning environment architectures:** A set of exemplary NGDLE architecture designs, which could serve as models for the community
- **Smart tools:** A set of learning-tool designs that explicitly incorporate learning science and universal design and are fully NGDLE compliant
- **Learning measurement rubrics:** A set of designs to effectively integrate new rubrics for learning measurement and degree progress (e.g., competency) into the NGDLE
- **Success promotion:** A set of apps and components that directly address the important opportunities and challenges associated with the realization of the NGDLE, using priorities identified by the higher education community
- **Collaboration:** A set of NGDLE resources to enable collaboration and peer work among learners
- **IPAS design challenge:** A set of designs that effectively use the NGDLE framework to leverage IPAS development
- **Portfolio 3.0:** A set of applications and platforms that provide learners with an integrated set of portfolio tools
- **Everybody all at once:** A set of NGDLE designs, based on universal design precepts, that can be used and built on by the community
- **Dual enrollment:** A set of communities that use exemplary practices to bridge high school and higher education, using a single platform and supporting dual enrollments and a seamless transition
- **Mobile-first:** A fresh exploration of mobile-first designs, specifically addressing the NGDLE
- **Authoring tools:** A set of tools that are NGDLE compliant and relevant to the workflows and typical tasks that students and instructors undertake

There is perhaps one last “functional domain” for the NGDLE—one that has nothing to do with the technology. The culture of higher education teaching and learning must evolve to encourage and even demand the realization of the
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NGDLE. We need to adopt “NGDLE thinking,” whereby the five functional domains described above feel like a natural fit for any learning environment. We must, as a community, encourage one another to move culturally and socially into the NGDLE mind-set. Allowing evolution in our thinking about the nature, purpose, and conduct of higher education teaching and learning is one of the best ways to ensure the arrival of the NGDLE.

Notes
This article is drawn from the EDUCAUSE Learning Initiative (ELI) white paper The Next Generation Digital Learning Environment: A Report on Research (April 2015), produced in partnership with the Bill & Melinda Gates Foundation. Background on the research and the full paper can be found here: http://www.educause.edu/library/resources/next-generation-digital-learning-environment-report-research.
2. Ibid., 3, 10.
7. Unizin (http://unizin.org/) is a consortium with seven founding member institutions, created “to exert greater control and influence over the digital learning landscape.” The Competency-Based Education Network, or C-BEN (https://www.cbenetwork.org/), is a consortium of colleges and universities collaborating “to address shared challenges to designing, developing, and scaling competency-based degree programs.”
10. See the Center for Universal Design, NC State University, http://www.ncsu.edu/ncsu/design/cud/about_ud/about_ud.htm.

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As a professor, I felt that this conference was worth my time. Very happy with booth traffic, Exhibit Hall events, and attendee demographics. This event is always very informative.

Smooth operations; meaningful content.

I loved the pre-conference sessions and am happy to show off the badges I received for reflection. I picked up some helpful ideas from others and was able to find out about and join a group of professionals who are in a role similar to my own.

The sessions I attended had great information and the presenters were open for questions and interactions.

The content of the conference was great!

The conference was well organized and had many very interesting breakout sessions.

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Strange Bedfellows: How to Think about Innovation in a World of Regulation

Disruptive innovation has become one of the most overused phrases in the discourse of change and upheaval in higher education. Taken from Harvard Professor Clayton M. Christensen's hugely influential 1997 book, The Innovator’s Dilemma: When New Technologies Cause Great Firms to Fail (disclosure #1: Christensen is an old friend of mine and a former trustee of Southern New Hampshire University), the phrase describes innovation that takes place on the margins of an industry and that eventually comes to reinvent the industry, displacing longtime and ostensibly unassailable incumbents. Think about what happened to the world of books with the appearance of Amazon and what happened to Kodak now that we have cameras in phones.

Disruptive innovation is an appealing notion for those frustrated by higher education’s glacial pace of change, high price, resistance to new technology, frequent solipsism, and poor customer service (the fact that the last phrase can’t be used on most campuses is itself telling). Add a growing conviction that traditional, incumbent higher education (IHE) does not do its job well, and this seems an industry ripe for disruption. The flood of venture money into the ed-tech sector is perhaps the best indicator of that conviction.

However, even though there is ample money to be made (disclosure #2: my university has launched its own for-profit subsidiary to create a next generation learning management system), traditional higher education is not going off the cliff any time soon. The most successful ed-tech companies will help traditional higher education do its work better; they’ll become a “sustaining innovation”—to use the correct phrase from the Christensen research—but they will not soon displace the incumbent players. In that, the higher education industry resembles health care more than retail, photography, music, or journalism.

Like health care, higher education is a highly regulated industry with billions of dollars of federal aid (and a shrinking flow of state support). Higher education has the “tried” of state regulation, accreditation, and the federal government determining the rules of the game—or at least many of them. Indeed, I’ve been told that higher education is the only industry touched by every major federal agency. At the time of this writing, I am working for one of those agencies. I have taken a three-month leave (through the end of May 2015) from SNHU to work as Senior Policy Advisor to Under Secretary Ted Mitchell at the U.S. Department of Education, focusing on innovation and competency-based education (CBE) and finding new accreditation pathways for non-IHE players in the higher education ecosystem. In this role, I’ve had the opportunity to look at the innovation challenge from the inside of the regulatory world. I offer here three observations for innovators, using my own work on CBE initiatives to illustrate each.

1. Be sure that all the right people are at the table from the outset. Some of the most exciting initiatives come from smart, creative people who have a great idea, get institutional support from the top, and run with it. The regulatory world in which that idea must eventually be operationalized is the least interesting of the questions that they must sort through on the way to success. So the financial aid experts, the compliance staff, and the IT system pros are often brought in late or after an eleventh-hour discovery that the thing they want to do cannot be done because of a pesky but non-negotiable Title I or Title IV rule or a limitation of their student information system (disclosure #3: we made this mistake at SNHU when creating our CBE program).

With the CBE experimental sites currently under way at the Department of Education, some of the proposed programs are trying to lower the price and increase the quality through the use of amazing new student-support technologies and approaches such as adaptive learning, robust advising that is super-charged with powerful CRM tools, and game-inspired immersive learning environments. They often “unbundle” traditional faculty roles and sometimes have little that resembles a traditional instructional interaction between student and faculty member.

2. Make sure there’s a good understanding of federal regulation. When translating the educational model to the financial aid realities, some institutions run into trouble. For example, written into law in Title I is the “regular and substantive interaction” rule: however inventive and effective the new approaches, students must have access to a qualified faculty member (interpreted as one who has the right level of academic credentials for the subject matter in question) on a periodic basis. Two possible questions to ask:

- How can students who are struggling with the subject matter—after exhausting the adaptive learning system, talking to their coaches, and getting stuck in the immersive learning environment—have direct interaction with the qualified faculty member?
- Does the qualified faculty member initiate contact on a periodic basis? (Hint: “Yes” would be the right answer.)

The Office of the Inspector General has stepped into the CBE world to raise the issue of “regular and substantive interaction,” taking to task regional accreditors for not paying enough
attention to this requirement. Unless the law changes, CBE innovators need to know, during program design, that this demand must be accounted for. They are more likely to know this if the institutional compliance person is consulted or is part of the team from the start.

Similarly, the complexities around the dispersal of federal financial aid are head-spinning and don’t lend themselves to non-credit-hour-based CBE programs, the so-called direct assessment programs (a poor name, considering that all CBE is ostensibly direct assessment). Although Title IV allows the direct assessment of student learning as an alternative to the credit hour, all of the rules for the associated disbursement of federal financial aid use time-based rules such as term length, definition of an academic year, and satisfactory academic progress. Since it is hard to reconcile some of the exciting new CBE delivery models with these rules, the current experimental sites allow waivers of many of them. Yet most student information and financial aid systems are not able to support the waivers, and any program designers hoping to sort through that challenge will need their financial aid and IT staffs heavily involved. Too many realize that fact very late in the effort.

3. Don’t race to the bottom. Disruptive innovations almost always serve populations that are not well served by the incumbent industry, and these innovations are never as good at the start as they will be later. Fifteen years ago, those in online education asked: “How can we deliver courses that are better than traditionally delivered courses?” For quite a while, they couldn’t. Now the question is being reversed, and the best-designed online courses are arguably better than most traditionally delivered courses. Likewise, CBE programs are not as good today as they will be five to ten years from now, but that should simply impel program designers to try to outperform the existing offerings, rather than shrug and settle for meeting minimum standards.

Alas, some proposals take a minimalist, if not cynical, view of what is needed for students to demonstrate competence. In some CBE proposals, “success” is a 60 percent or better on an assessment. Do you want your nurse to be 60 percent competent? Some proposals use “CBE veneering,” in which a grid of competencies is simply overlaid on existing courses to allow for acceleration and to use the term “CBE” in marketing. In contrast, high-quality CBE programs require so much more in terms of how competencies are created and assessed, how students progress, and what students can actually do with the knowledge and skills they acquire.

As all of us in higher education look at new accreditation pathways and think about allowing non-IHE providers into the higher education ecosystem, we must focus on demonstrated outcomes, clear claims for learning, transparency of data, and performance-based assessments. Traditional, incumbent higher education generally does none of these well, and CBE should show the way. An outcomes-based pathway to approval says: “We’ll give you a lot of room to innovate in program design, but we will not compromise on how you serve students, and we’ll expect a higher minimum for student achievement.” If cost is the only reason to innovate and if outcomes remain poor, or worse than outcomes in incumbent offerings, let’s spend our time on something more meaningful.

The uncomfortable and not-much-discussed reality is that if we are to make learning measurable and non-negotiable (while time becomes variable), we may see completion rates go down, even as quality of learning goes up. Our challenge will be to harness new technologies, learning science, data analytics, unbundling, and the best use of our people to get more students across the finish line without compromise. Then the real innovators will emerge—not those who simply offer lower costs.

Higher education badly needs genuine innovation and breakthrough models, but if innovators want to gain access to Title IV funds and to be accepted into a larger higher education ecosystem, they need to consider the constraints of the regulatory system from the start, innovate around those constraints where they can (some significant opportunity lies there), and push the design of delivery in all sorts of new ways while reaching for outcomes better than those in the incumbent system.
Social Reading and Technology Design

We are only beginning to discover how much the humanities have to contribute to the kind of world-building in which computer science, with its push to develop new tools and platforms, is now engaged. To begin with, the cultural record that humanists study abounds with forms of theoretical and phenomenological knowledge on which computational methods have, thus far, little purchase. Perhaps more importantly, humanists have the benefit of a millennia-long disciplinary bias toward human-centered design. An example of this advantage is the current work surrounding the design of digital tools to support the activity of reading.

In recent years, the development of tools to support digital annotation has been the subject of extensive research and development. Some research groups are building heavily annotated digital versions of maps, manuscripts, and specimens; others are focusing on developing tools that enable users to annotate new media formats, such as audio files or videos of class lectures. For example, the University of Maryland has teamed with Alexander Street Press to tailor a video-annotation toolkit for scholars. Johns Hopkins University is working with the French National Library on a complete digital library of existing manuscripts of the Roman de la Rose, annotated with the kind of scholarly commentary that normally could not appear in a facsimile. At Harvard University, the Domeo project aims to reinvent scientific note-taking for the age of big data, assembling a “knowledge base” of claims about a given subject (e.g., the pathology of Alzheimer’s disease) from across the scientific literature. Another Harvard project, Filtered Push, aims to create an authoritative digital collection of zoological specimens. Both of these projects are curated through crowdsourced annotation by a user base of scientists. MIT’s Annotation Studio, a web-based application that enables users to create, save, and share annotations to digital texts, recently received renewed funding from the NEH. The application was designed to help train readers in the techniques of close reading, textual analysis, and locating and marking evidence in texts, with the aim of supporting instructors and students in the humanities.

What these researchers have discovered anew is the value of humanistic perspectives to digital development and design. R&D among the app-building class has often focused on the tastes of the builders or the raw capabilities of various technologies. Yet a historian’s look back would suggest that devices intended to support the work of reading most often take shape from the features of the readers themselves. For example, during the Middle Ages, when bookmaking was expensive and books were sometimes literally chained to desks, annotation often served as a tool to support memorization. A common sign that a reader of the period had carefully attended to a text is a tidy string of summaries along the margins; thick annotations often signal a book that readers judged worthy of study and commitment to memory. After the rise of universities starting in the twelfth century, the largest customer base for booksellers changed from religious houses to students, who, unlike monks, had just a few years to master their texts. For the first time, the world of books saw the regular use of special devices for guiding the reader through a wilderness of pages: subject indexes, concordances, modern library catalogues, and starting systematically in the thirteenth century, the division of texts into books and chapters. “By the fifteenth century,” says Malcolm Parkes, “the reader had come to expect some of these features, and if they had not been supplied by scribe or rubricator, the reader himself supplied the ones he wanted on the pages of his working copy.”

New patterns of annotation arose in the early decades after the rise of print. In a study of the marginalia in English books during the 15th through the 18th centuries, William Sherman found an extraordinary range in the kinds of information that their owners jotted in the pages, often having no relation to the printed contents: “The blank spaces of Renaissance books were used not just to record comments on the text but penmanship exercises, prayers, recipes, popular poetry, drafts of letters, mathematical calculations, shopping lists, and other glimpses of the world in which they circulated.” This practice reflects not the new technology but, rather, a new class of reader for whom paper was expensive. Markings also record the intimate social world of readers: the playful tradition of writing a “curse” on the title page as a ward against negligent borrowers; the inscriptions in books received as gifts; or the family records stored in books of prayer. The eighteenth century, an era in which the expansion of the public sphere furnished new models for the partisan theater of public life.
The leisure reading that rose to ascendency starting around the same time has left predictably little marginalia. Historians describe this as “extensive reading”—that is, reading widely, lightly, and for news or pleasure—in contrast to the previous era of “intensive reading,” which involved the careful study of a smaller corpus of texts and which naturally produced more marginal notes. Even so, through the twentieth and now the twenty-first century, annotation has remained a conventional form of interaction with texts, especially during a reader’s college years.

The history I have outlined here is neither formal nor exhaustive, but it does suggest that technological change has had, by itself, remarkably little effect on major shifts in annotation—that is, in the models and devices that readers use to organize the information in texts. Instead, these shifts correlate with changes in the configuration of reading communities such as the rise of college/university readers and the rise in the number of readers following the spread of print. Likewise, since about 2007, industry and academia have witnessed an explosion of interest in developing digital annotation tools. But since the web has been around since 1993, the driving factor behind this interest cannot have been the digital turn by itself. Rob Sanderson, the co-chair of W3C’s Open Annotation Community Group, a networking group for researchers working on digital annotation projects, has suggested some technological factors that may have played a role in this little renaissance—for instance, improvements in bandwidth and scanning technology have made it possible to digitize materials worth annotating. However, he claims that the most salient change is the rise of Web 2.0, a major reconfiguration of our reading community. In response to readers’ demand for a read-write web, tool developers created a new class of technologies that transformed the web from a largely read-only platform to a read-write platform, allowing readers to comment, share, repost, and remix content. Changes in reading culture drive changes in the devices we use to support reading.

Tool designers who want to intervene in the new world of letters should look first to the social history, and to the social future, of reading. The web has made newly visible the diversity of interest groups among the general population of readers; it has also made the members of those groups more visible to each other, enabling them to define themselves and their needs in ways that perhaps change their behavior. The new and changed audiences that have emerged in the digital domain include data miners, professional readers who read scientific papers for industry, scientists on the semantic web, wiki contributors who treat their activity as leisure, and high school and college/university teachers who want to use digital tools to engage students or experiment with flipped-classroom pedagogy. Thus far, we know less about those audiences than we should, and as a result, we lack information about the material practices that users may want to bring to (and take from) new media. If we are to build a digital future for traditional humanistic activity, we should equip ourselves to bring humanistic knowledge into the tool-development process.

Notes
1. Ethan Zuckerman, communication with the author, March 16, 2015.
6. Interview with Rob Sanderson, September 2013.

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As the New Horizon department editor for EDUCAUSE Review, I've had numerous companies contact me about their products and services. While I appreciate the endless supply of innovative ideas and solutions, I have noticed that there is no clear consensus about what the future of higher education will look like. So I asked representatives from four diverse companies to share their assumptions about the future—the assumptions on which they build their companies or products.

Sean Corcorran, General Manager, Steelcase Education
This is a difficult time in higher education. Students, parents, and policymakers are all questioning the cost/benefit of a college degree. They want to see better access, more relevant teaching models, and the support to ensure completion in a reasonable timeframe. New technologies like MOOCs and online distance learning were developed in an effort to revitalize a centuries-old educational model, to provide access and flexibility. Although it's clear that many improvements are needed, some existing educational models remain relevant.

The integration of technologies such as MOOCs, lecture-capture systems, and video telepresence has broadened students' access and choice and made education more “location agnostic.” But there's still a major challenge in creating high-quality, engaging, and seamless experiences for online and distance learning students and educators. Most institutions are not there yet, which means that traditional face-to-face learning models in higher education will continue. Digital learning materials such as e-books have worked to reduce costs and provide a more personalized learning experience, yet studies show that millennials prefer reading from print books for both deep reading and enjoyment. For this reason, I don't see traditional books going away anytime soon.

Yes, technology's role in education will continue to grow, but so will the significance of face-to-face learning. Teaching is less dependent on one teacher delivering content in broadcast mode to students sitting in rows of chairs while quietly listening and taking notes. Teaching today needs to provide students with the opportunity to acquire skills in critical thinking, problem solving, analysis, and creativity, as well as the soft skills employers require in the workplace: interpersonal, collaborative, and presentation skills. Effectively teaching these higher-level cognitive and soft skills is difficult to do remotely; thus, the need for physical learning spaces will continue to be crucial. With the more active integration of technology, the educator's role will continue to expand outside of content delivery, allowing more time for interacting with and mentoring students.

For this style of learning to take place, educators need active learning environments that support the new activities and behaviors driven by new pedagogical methods. Most of today's classrooms are static and lack the flexibility needed for the diverse teaching methods emerging today. When the space, furniture, and technology can readily adapt to students' learning preferences and the new pedagogies being used, the classroom can more effectively support how students learn best. College campuses must be equipped with the more active, learner-centered environments needed to prepare students for the future workplaces they will enter. This means learning environments should offer a range of spaces, including group work, lecture, and quiet spaces.

To succeed in this changing environment, higher education institutions must change as well. The majority of colleges and universities cannot rely on historical brand equity alone but will have to create more effective differentiation and employ more robust business models to stand out and survive in today's competitive environment. This is true in any competitive market—higher education is no different.

Pano Anthos, Founder and CEO, GatherEducation
Synchronous learning online will gain favor as schools and students understand the power of engagement. Online offers a number of improvements over strictly physical classrooms, but online asynchronous has severe limits in maintaining student engagement and accredited learning in a vast number of topic areas.

Abstracted virtual reality learning will hit mainstream for two key reasons: (1) we can create or re-create visual environments that reinforce the learning; and (2) abstraction from physical appearance using avatars allows for personalization without being too connected to the person. The social impact is similar to that of schools requiring everyone to wear a uniform: it's an attempt to remove social stigma from the learning process. Similarly, avatars allow students to take on personas for one of two reasons: (1) they can protect themselves from social peer measurement; and (2) they can try on different personas.

Abstracted virtual learning will also enable accelerated instruction models. A seventh-grader taking twelfth-grade calculus, for example, would not fare well in a physical class due to the social challenges. But online and abstracted, the students will not be distinguishable.

Mobile will be the footprint of the future as online access frees students to take courses from wherever they are instead of being tethered to a desktop computer.
Global student bodies in synchronous settings will be possible with technologies that provide interaction without relying on video—aka gaming tech. Video will not scale in synchronous situations in over 50 percent of the world due to bandwidth challenges, even though wi-fi penetration will grow. Delivering online, synchronous classrooms on 3G networks will open up the rest of world to learning opportunities.

True virtual reality and augmented reality technologies will be slower to go mainstream, since the effort to put on glasses of any type means costs and changes in user behavior. When such technologies become seamless and unobtrusive accessories, they will move toward mainstream.

Joe Belsterling, Founder and CEO, MajorClarity

Many people, believing that higher education is on the brink of substantial transformation, are trying to predict what the next ten to twenty-five years will bring. Although I do not think there is any way to know for sure, I do have some thoughts. First, I do not think the shift will be as tangible as many others believe. For instance, although innovation like the Minerva Project is undeniably disruptive and aspirational and will certainly have its market, I am skeptical that it will scale enough to take over higher education. I believe the in-person community is, and will continue to be, a fundamental piece of college.

The two segments of higher education that I believe will change most significantly in the coming years are the recruiting process and the curriculum. Institutions spend nearly $3.5 billion per year on recruiting (calculated by multiplying cost per student and total enrollment), most of which is used on inefficient, increasingly outdated means—especially since 62 percent of students prefer web-based engagement from colleges and universities, and that percent is only growing.

Innovation in the curriculum, or what institutions focus on teaching, is occurring faster than ever, which is driving dramatic change in the job market. I think it is a given that institutions will put more emphasis on technology and computer programming. But in addition, the job market will continue to evolve more quickly than educational institutions can preemptively keep up with, and for that reason, I believe that rather than preparing students with specific knowledge or a specific skill set, institutions will transition into providing a widely adaptable skill set to students. Yes, this is the basic concept of the liberal arts degree, but what I’m referring to will be “Liberal Arts 2.0.” Think “liberal arts” meets “technology.” I cannot say exactly what this will look like, but I am confident it is on the way.

Anthony Showalter, Co-Founder and President, Pear Deck

Many technology innovations in higher education over the past two decades have been about organizing information and systems in a logical, asynchronous way. There are now hundreds of adaptive and personalized technologies that are focused on delivering, in an automatic and isolated way, the right content at the right time for a specific learner.

I believe that one of the largest greenfields for innovation is the real-time classroom. How can technology transform the actions that take place within the walls of a lecture hall? How can technology have an awareness not only of individual learners but also of the social context around them? The current state of hardware/software clickers, for example, is just scratching the surface of what will be possible. The real-time classroom will also include things like contextual help, smart grouping for discussions and peer review, better and more engaging formative assessments, and powerful real-time analytics.

I’m sure EDUCAUSE Review readers have assumptions about the future as well. Please share them in the comments section online or in social media with the hashtag #HiEdFuture.

Jonathan Blake Huer (jbhuer@bsu.edu), Director of Emerging Technologies and Media Development at Ball State University, is the 2015 New Horizons department editor for EDUCAUSE Review.

Notes

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Meditations of a CIO Yogi

My first CIO role, at the University of San Francisco, was unexpected both for me and, I think, for everyone around me. Brought about by very sad circumstances that I won’t describe here, my new position was trial by fire, sink or swim, or whatever metaphor of that nature one might choose. So to get help, I took the very first opportunity that came my way: a new/prospective CIO pre-conference seminar at the EDUCAUSE annual conference that year.

Along with ideas about focusing on outcomes, triaging urgent issues, and communicating effectively, one message stuck with me most clearly about the CIO role: if you want to maintain your integrity and do what is best for the institution, have your resume ready and don’t expect to stay long, at least not in any one place. Granted, what I heard may not have been exactly what was said; I was feeling pretty insecure at the time. But this message was compounded by press reports noting that the tenure for a CIO in industry was three years on average, as well as by my own observation that five years was a good solid tenure in the ranks of higher education leadership, and ten was exemplary.

So I wondered, how long would I last? Would I make it through three years? Five? I found it hard to think beyond that. I worked intensely—I don’t think I slept for the first two years—to both put out fires and stay afloat. My motivation was threefold: commitment to my institution’s mission; excitement to learn. Even after practicing yoga for thirty years, you won’t know what it takes to be in this position? How has the role changed since I began twelve years ago, and have I kept up? Am I running out of steam?

Around that same time, I took up yoga. Hot yoga, to be specific—I guess I just prefer to make things as difficult as possible. In my second class, the instructor commented that she had been doing yoga for ten years when, one day, she tried the triangle pose in a new way (keeping her outside hip pulled in). This variation opened up the pose for her in a way that changed her practice. She emphasized that new things can be learned at any point if you just stay in that hot room, looking for an opening, with calm determination and focused breathing. Even after practicing yoga for thirty years, you won’t know it all. There will always be a challenge, always something new to learn.

Hearing this, I had a very geeky thought: maybe IT leadership can be like yoga. IT leadership is not a sprint, but it’s also not a marathon. It’s a process of continuous change, exploration, and discovery made possible only through discipline, commitment, and boundless energy. Some days the best you can do is show up and stay in the room. Other days, if you are looking for it, you may find a new opening and break through.

This is not an either/or argument, however. I am not saying that my first IT leadership training was wrong, because it wasn’t. What I am working on learning now is how to sustain the integrity that comes with a fresh perspective, even as my perspective becomes more mature. Sustaining the newness is just as important as gaining the insight that comes from experience.

This year, I have been asking myself a question posed years ago, by a seasoned CIO, on the EDUCAUSE CIO mailing list: “What would the new CIO do?” Having been at his institution for a while, he challenged himself with that question, and he recommended the experience to others. Asking myself this question has helped me to step back and take another look, and has even changed my approach at times. In some cases, the reasons why I should not do what the new CIO might do are abundantly clear; in other cases, the path in a new direction is equally clear, if challenging.

While we speculate about the evolving role of the CIO in higher education—whether CIOs should or will become chief
digital officers, managers of utility services analogous to facilities operations, or (most likely) some complex combination of both—we need to consider how we can sustain ourselves and grow as leaders. How do we cultivate patient, statesmanlike good judgment while remaining willing to make dramatic change? How do we lead from a sense of possibility rather than from a fear of failure? How do we stay in the hot room—and it does get hot!—with calm determination, and focused breathing, long enough to find the opening in ourselves and our organizations?

Perhaps by giving some time to these questions, we can also gain new insights into the kinds of support that our IT team members need to sustain their energy, commitment, and calm amid the calls for change coming from many directions. They need us to lead not only with our words, but also with our example.

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Online in July/August

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