Why IT Matters to Higher Education:

Open Education, Open Questions
Catherine Cronin

Higher Education, Digital Divides, and a Balkanized Internet
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Memory Machines and Collective Memory: How We Remember the History of the Future of Technological Change
Audrey Watters

A Joyful Series of Breakthroughs
Molly Broad

2017 Educause Awards
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EDUCAUSE Review

November/December 2017

Volume 52, Number 6

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“See You at EDUCAUSE!”

You may be reading this online in any of the 40-plus countries from which EDUCAUSE members hail, or you may have paused on this page while leafing through the EDUCAUSE Review print magazine shared on-site at the 2017 EDUCAUSE Annual Conference in Philadelphia. If you're at the conference in person, you're no doubt enjoying the powerful sense of community that makes EDUCAUSE so unique. If you couldn't attend the meeting this year, you'll see many of the conference's most important conversations and insights discussed in subsequent issues of EDUCAUSE Review and elsewhere on the EDUCAUSE website.

All kinds of magic happen when we bring together so many professionals to revel in what is, every year, the best thinking in higher education information technology. We're a vibrant, thriving community: we have common challenges and common opportunities, and we are committed to the common good. We speak a common language and share numerous perspectives. However, what I love most is not our single-mindedness but the sheer variety of these perspectives, challenges, opportunities, solutions, and institution types—and the strong voices from our community's exceptionally talented leaders. These voices are exemplified by the 2017 EDUCAUSE Award winners: Susan Metros (Leadership Award), Mark Bruhn (Community Leadership Award), and Liv Gjestvang (Rising Star Award). You can learn more about the winners in this issue of EDUCAUSE Review and through their presentations at the annual meeting.

To further expand and enhance diversity, earlier this year we sought and received a grant to advance our capacity to promote diversity, equity, and inclusion (DEI)—and to better position the association for providing effective resources to campuses engaged in the same crucial work. Last August, we convened an expert panel of leaders in our community to make recommendations about DEI and help us better understand what EDUCAUSE can do to make a difference. This particular era in history, when incivility and outrage appear to be spreading throughout the world, is an ideal time to focus on conveying a sense of inclusion. At this year's conference, I hope you will benefit from this intentional focus, whether you enjoy the different perspectives of our keynote speakers or attend some of the 25-plus sessions touching on DEI themes such as accessibility, data ethics, and unconscious bias.

Also this year, we have worked to broaden the circle of interest and influence for technology leaders. We believe that the future of the IT profession lies in IT leaders and staff having more conversations with non-IT colleagues. Technology leaders of today and tomorrow increasingly must connect in meaningful ways across divisions, units, and C-suite colleagues. To this end, at this year's conference we are welcoming 32 ACAO Digital Fellows: provosts and chief academic officers who have been selected by the Association of Chief Academic Officers to come to our conference, share their perspectives, and join our conversations. Including these exceptional academic leaders in our conference programing is an excellent capstone to a year-round exchange of ideas through the Leading Academic Transformation (LAT) community we began two years ago. In addition, attendees of the LAT community meeting will have the chance to identify areas of common interest and engage in deeper conversations around leading academic transformation.

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Beyond the conference, you'll see a similar emphasis at other EDUCAUSE events. For example, at our annual Enterprise IT Summit in March 2018, our partnership with the National Association of College and University Business Officers (NACUBO) will be expanded to a triple partnership among EDUCAUSE, NACUBO, and the Association for Institutional Research (AIR). In September 2017, Christine Keller, executive director and CEO of AIR, and I shared a keynote at the 2017 Achieving the Dream Data & Analytics Symposium, where we talked about building stronger collaboration between IT and IR professionals. I have also been part of the Association of Governing Board (AGB) newly convened Innovation Task Force to develop a comprehensive statement, for presidents and trustees, that will include technology-related innovations and transformation for colleges and universities. By connecting the dots and bringing more people into conversations about the role of information technology in the future of higher education, we are amplifying the impact of the IT profession.

Whenever I hear EDUCAUSE members ask each other “Are you going to EDUCAUSE this year?” or exclaim “See you at EDUCAUSE!” I experience a complicated reaction. Certainly, this event is our premier opportunity to share insights, discuss innovations, and lend our collective strength for the common good. But EDUCAUSE is not just a conference. EDUCAUSE is a vibrant and diverse community, with a wonderful depth and breadth and an unwavering commitment to the common good.
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The Role of Higher Education in the Changing World of Work

The changing world is a universal topic of interest, with particular resonance to higher education. Colleges and universities research change, teach about change, and often impact current and future change. To support students to live in this ever-changing world, those of us who work in higher education strive to provide solid, relevant preparation at the baccalaureate and graduate levels. We proactively and thoughtfully integrate and rely on educational technologies—in curriculum and instruction, labs, assignment design, libraries, support services, and more. But increasingly, employers tell us that our graduates are not adequately prepared for the changing world. Why? Because the “world of work” has also changed, and these changes are not always configured as one would expect.

For example, while it is true that manufacturing has been diminished by both technological advances and increased global competitiveness, this sector remains a significant component of the U.S. economy in many regions, including Southern California. Indeed, manufacturing itself has evolved to become what is now referred to as “advanced manufacturing,” which relies more on the smart use of technology (requiring graduates who are comfortable working with emerging technologies) and a focus on innovation, solution design, agility to respond quickly to changing markets and opportunities, global and national supply chains, and more. These changes have resulted in a transformed world of industry and manufacturing.

Similar fundamental changes in most fields and industry clusters have influenced what employers need and expect from the workforce, particularly those workers who hold a college/university degree. Colleges and universities must stay attuned to the evolving needs of regional employers in order to remain vital drivers of the U.S. economy.

As I explored further why employers now feel that college and university graduates are not ready to work, here is what I learned:

- Employers expect a graduate and new hiree to come into their public or private organizations and be able to add value immediately. They expect that the hiree will quickly learn how the organization works and be able to work well within that context to make a positive difference. They also expect the hiree to understand the dynamics of complex organizational structures and apply that knowledge with analytical skills and higher-order reasoning to build a solid, wide-ranging, and adaptive understanding of the organization.

- Employers expect a graduate and new hiree to have the refined and agile communication skills needed to work successfully in an organizational context with a wide range of stakeholders. They expect the hiree to be able to understand the perspectives of these various stakeholders and to shape communications accordingly to make them effective and purposeful for the organization’s advantage.

- Employers expect the graduate and new hiree to use technology easily and comprehensively in all aspects of work and to participate in a knowledge/data/information-based economy in order to purposefully and strategically advance the organization.

- Employers expect the graduate and new hiree to know how to work in diverse project teams (in-person or virtual), representing specific fields of expertise, levels and kinds of experience, gender and age, socioeconomic and ethnic background, learning and working styles, global context, and more. In these teams, they expect the hiree to foster innovation, develop viable solutions to challenges, and recognize and respond to emerging opportunities.

- Employers expect the graduate and new hiree to know how to think at an advanced level about challenges and opportunities from a variety of perspectives, questioning traditional organizational and industry assumptions and introducing and exploring new possibilities as both industries and markets change. The new hiree must also foster excellence in others and be a part of talent development within the organization.

- Employers expect the graduate and new hiree to have command of the discipline in which he/she earned a degree. Employers expect that the hiree will have the preparation, experience, professional values, and connections needed to stay current and engaged in the field and to link those forefront industry models and practices to the advancement of the organization.

- Employers expect the graduate and new hiree to know how to think at an advanced level about challenges and opportunities from a variety of perspectives, questioning traditional organizational and industry assumptions and introducing and exploring new possibilities as both industries and markets change. The new hiree must also foster excellence in others and be a part of talent development within the organization and contribute to the purposeful evolution of the organization by regularly adding value and capabilities.

Not that long ago, organizations might have expected these capabilities only from their more senior leadership hires. This is one of the more profound changes in the contemporary world of work: employers need leadership abilities, advanced conceptual skills, technology-enhanced learning, and high-value professional capabilities from all college/university-prepared hires and not just from a few.

In many ways, we in higher education know this, but we have
not been able to consistently craft an effective and more complete response to this new situation. Among the changes that higher education leaders may need to consider are some that we at California State University, Northridge (CSUN) have been making to better ensure that our graduates are indeed prepared to work:

- Link research to instructional strategies so that students work closely with faculty to develop research skills at the forefront in the field and learn to work in diverse teams to apply research to practice: solution design, innovation, and creation.
- Ensure that all students understand the importance of group, as well as individual, efforts and that all students have an opportunity to learn team dynamics, including how to form teams, how to manage them, and how to measure their success.
- Make assignment design a high priority so that students receive a better awareness of the current realities in their field, fostering students’ capacities to make positive contributions early in their careers. Increase opportunities for students to work in diverse in-person and virtual project teams, fields, and disciplines.
- Expand sustained conversations between university and college administrators, faculty, employers, regional economic and community development leaders, and national and global thought leaders about talent/workforce development for the region so that deans, department chairs, and faculty have an ongoing sense of the current work realities of their fields. This enables colleges and universities to make the curricular, assignment design, and instructional strategy changes needed to ensure an increasingly strong connection between the preparation they provide and what will be expected from graduates.
- Ensure that educational technology continues to be widely and thoughtfully used in all aspects of the college/university experience and that students have the opportunity to add to the institution’s technical capacities through their own innovative uses of technology in their coursework and projects.
- Expand meaningful access to college/university preparation for traditionally underserved populations—benefiting not only employers and their workforce needs, since these students represent a growing percentage of future wage earners, but also all students who learn cross-cultural competency in multifaceted learning environments. This enriches the educational experience and training for all students, who will bring this multicultural dexterity to employers.
- Refine liberal education content, structure, and strategies so that there are tighter links between breadth of knowledge, modes of reasoning, and depth of understanding across time, cultures, and the disciplines provided in the liberal learning components of the curriculum and study in the major.

As I have considered the challenges that higher education faces today in educating the talent and workforce needed by the United States and across the globe to ensure the viability of our economic future, I find myself thinking that we need to push ourselves even further. We need to look at the wider range of options and possibilities, paying particular attention to social justice, sustainability, and our shared global community. For example, we need to become very good at putting together diverse teams to innovate and design responsive solutions. We also need to increase our agility in ways that expand access to and use of the core strengths of our traditions: teaching, learning, scholarship, creative work, research, and the ability to transform lives. We need to prepare today’s students to assume leadership roles. We need to create a tighter and more engaged connection between graduates and the ongoing educational and research work of colleges and universities across the career span.

Technology will play a significant role in our ability to achieve these aspirational but increasingly vital goals. By harnessing the possibilities of technology and by implementing curricular and organizational enhancements, we can amplify the transformative power of higher education as we prepare our graduates for future success in the ever-evolving world of work.

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Whether we consider ourselves to be open education practitioners or researchers, advocates or critics, wonderers or agnostics, our motivating questions regarding openness are likely to be different, often very different. For example: How can we minimize the cost of textbooks? How can we help students to build, own, and manage their digital content? How might we support and empower learners in making informed choices about their digital identities and digital engagement? How might we build knowledge as a collective endeavor? And, how can we broaden access to education, particularly in ways that do not reinforce existing inequalities? Open educational practices can help us in achieving these aims. However, engaging with the complexity and contextuality of openness is vitally important if we wish to be keepers not only of openness but also of hope, equality, and justice.¹
Free resources are not unfettered, however. They can be accessed online by those with the requisite skills, device(s), and Internet connection.

the use of educational technologies, and the values underlying educational endeavours.

So how do we grasp openness? A first step is to be clear about our own aims and interpretations. I’ve often used a simple typology of interpretations of openness (see figure 2) to contextualize and compare others’ work and to communicate my own. The first interpretation of openness in education is open admission, where the qualifier “open” refers to open-door academic policies, such as those of The Open University in the United Kingdom and dozens of open universities globally. A second interpretation is open as free. Using this interpretation, a vast array of online resources and courses would be considered open: YouTube videos, podcasts, TED Talks, and MOOCs, for example. Free resources are not unfettered however. They can be accessed online by those with the requisite skills, device(s), and Internet connection. Users are often required to register in order to access free resources, providing personal information such as a name and e-mail address. In such cases, even though the resources are free, they have an opportunity cost to the user in the form of personal data and usage data. In addition, the use of free online resources is subject to copyright restrictions unless the creators provide explicit permission for reuse of the original works. Many open education advocates and researchers thus consider the “open as free” interpretation to be limited.

Two further interpretations of “open” are OER (Open Educational Resources) and OEP (Open Educational Practices). OER are resources whose creators have expressly enabled reuse through the use of open licenses. OER embody the notion of knowledge as a public good: take it, use it, remix it, and share as you wish. OEP move...
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Figure 2. Interpretations of “Open”
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We must be aware of the potential for openness to do the opposite of what we intend.

the focus beyond content. OEP are “practices which support the (re)use and production of OER through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning paths.” The most expansive definitions of OEP focus on OER, open pedagogy, and open learning, as well as power relations and inequality.

The deceptively simple term open hides a great deal of complexity, much of which depends on the particular context within which open practice is considered. Thus it is imperative to move beyond open-versus-closed dichotomies and even beyond unified conceptions of openness. Openness requires a critical approach.

We must be aware of the potential for openness to do the opposite of what we intend—and openness—which was overwhelmingly described as both an individual decision and an ongoing challenge. In the words of one academic: “You’re negotiating all the time.” Through this research, as well as ongoing work with faculty and students, I’ve found that individuals seek to balance privacy and openness in their use of social and participatory technologies at four levels (see figure 3): macro (global level), meso (community/network level), micro (individual level), and nano (interaction level).

Considering these different levels has proved helpful to me in understanding the personal and complex negotiations involved in open practice. At the macro level, individuals make decisions about...
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whether or not to engage in open networking and sharing, for example via Twitter or blogging. Some individuals opt out at this level. Those who engage further in open practice must consider questions at three additional levels. At the *meso* level, individuals consider whom they would like to share with (e.g., family, friends, faculty, students, interest groups, the wider public), as well as those with whom they do not want to share. At the *micro* level, individuals make decisions about their digital identities—that is, who they will share as. And at the *nano* level, individuals make decisions about individual open transactions: “Will I like, follow, friend, post, tweet, tag, or share this?” Think, for example, of those moments when you’ve hovered over your keyboard or phone before pressing “Send.” As one academic in my research study put it: “It’s a lot of work for one tweet.” Formal and informal professional development initiatives often focus at the top or macro level, describing the benefits of sharing and supporting staff in learning how to use various tools. But the complex and ongoing work of open practice happens beneath this level—at the meso, micro, and nano levels—where issues around context collapse and digital identity are negotiated.

In summary, openness does not involve a one-time decision, and it is not universally experienced. It is always complex, personal, contextual, and continually negotiated. Attention must be paid to the actual experiences and concerns of students and faculty. Critical approaches are essential. I believe we must support faculty and students by working broadly and collaboratively in three key areas: developing digital literacies and digital capabilities; specifically supporting individuals in navigating tensions between privacy and openness; and, most critically, reflecting on the role of higher education and the roles of and relationships between educators and students in an increasingly open and networked society.
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Higher Education, Digital Divides, and a Balkanized Internet

Bryan Alexander

Most of today’s educational technology depends on users having Internet access. Students, staff, and faculty must be online in order to participate in learning management systems, digital tests, student information systems, licensed databases, and the entire web. They not only must be reliably online but also need to do so through high-speed connectivity. The digitally networked world is increasingly predicated on users having broadband access.
Unfortunately, Internet access has remained deeply uneven and unequally distributed in the United States. This has serious implications for higher education. Inequitable digital connections can warp access to learning, which in turn can help drive and escalate social inequality. Indeed, the “new” digital divides—which create a Balkanized Internet—may constitute one of the most important issues confronting the U.S. higher education technology community.

A Short History of Digital Divides
Uneven Internet access is not a new problem. It has been an issue since the invention of the Internet in the late 1960s. With the inception of the U.S. Defense Department’s Advanced Research Projects Agency Network (ARPANET) in 1969, the number of computers, modems, connections, and nodes grew slowly through the 1970s and 1980s. Owning or otherwise having access to a networked computer was by no means ubiquitous. Although the burgeoning networked ecosystem gradually, then more rapidly, increased opportunities for access, those opportunities depended on who had access to the right combination of hardware, networking, and software. As connection speeds began to advance past dialup, they too were unevenly distributed, as per science fiction writer William Gibson’s famously cited observation that the future is already here—it’s just not evenly distributed yet.

By the 1990s, the importance and size of the Internet and its new face, the World Wide Web, became popularly recognized, as did inequalities of access. Accordingly, the United States took steps to identify and mitigate what many were referring to as the digital divide by kicking off a generation of research, activism, policy development, and practice. Under the Clinton administration, federal and state government initiatives joined with nonprofits and businesses to expand Internet access across multiple fronts. The E-Rate program of 1996, for example, compelled telecommunications companies to divert resources in order to link public schools to the burgeoning Internet.

Efforts to address the digital divide continued in the first two decades of the twenty-first century, with the advent of programs such as One Laptop per Child and state-driven broadband initiatives. Meanwhile, Internet technology continued to change. Mobile phone access came belatedly to the United States after connecting much of the rest of the world, since America had both excellent land-line phone service and more Internet-connected computers than most other nations. But once it came, the cell phone revolution offered an alternative to land lines, fiber, and cable boxes. Maximum Internet speeds grew, partly through competition between Internet service providers (ISPs) and also due to research and development, with Internet2 serving as an advanced outlier. Public libraries became community Internet anchors, as librarians not only provided computers, networks, and software but also offered the widest possible range of user training and support. More and more of education, work, and life migrated online, especially once social media took off in popularity and usage. Richer media that required more bandwidth became increasingly popular: animated images, sound files (music and podcasts), streaming video, videoconferencing and webinars, software updates and downloads, and gaming. And yet, broadband remained less than ubiquitous throughout the 21st century. By May 2013, to pick one data point, only 70 percent of households had high-speed broadband—and “high-speed” was defined at a lower speed than what we expect now, in 2017.

We can look back on these historical transformations and see that Internet access inequalities have altered in some ways while persisting in others.

The Current Digital Divides
Where does the Internet access gap stand now, at the end of 2017? We can look back on these historical transformations and see that Internet access inequalities have altered in some ways while persisting in others. The concept continues to deeply determine our Internet experience, dividing it into uneven strata of user access and capacity.

Most of the forces that drive uneven Internet access have been at work for decades. To begin with, wealth and education often positively correlate with higher broadband use, as the more affluent and/or educated a family is, the more likely it is to have broadband at home and work. This makes intuitive sense when we think of the costs of laptop and
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Higher Education, Digital Divides, and a Balkanized Internet

desktop computers and of the greater budgets of schools in wealthier districts. Poorer students have less access to computer science offerings, from classes to afterschool clubs. In addition, higher levels of educational attainment increase one’s likelihood of learning digital skills, as well as one’s chance of working in a field heavily dependent on the networked world.¹

Wealth can drive familiarity with computation even more strongly than generational differences, as media scholar Siva Vaidhyanathan argued nearly ten years ago. Living in a poor or working-class economic stratum can lead to reduced access in a variety of ways, from inferior equipment to filtering. Poverty can remove urban residents from the relatively plentiful broadband networks that cities host. And ISPs may already be discriminating in speed offerings based on poverty, according to recent complaints to the Federal Communications Commission (FCC).²

Racial inequalities also shape access. Blacks, Latinos, and Native Americans continue to lag whites and Asian-Americans in home broadband speeds and access. At least partially in compensation, the former are more likely to use cell phones for connectivity. This may constitute a digital version of the 20th-century real estate practice of redlining: restricting certain populations from access to desired locations. Race is also tied in to the earlier mentioned economic issues, as blacks and Latinos generally have lower incomes and lower savings than do whites.³ As D. Amari Jackson has observed:

The good news? Your daughter’s school has been designated an “Apple Distinguished School” and, as such, she and all of her peers will receive brand new iPads for their individual usage.

The bad news? Once your daughter leaves school, she can’t use it—at least not at home. For you live in a lower-income neighborhood without access to Internet or a fast-enough connection to take advantage of her shiny new toy.⁴

Though wealth is likely a stronger factor, age is another correlate with Internet access: the older an American is, the less likely he/she is to have a speedy connection and the more likely he/she is to use the Internet for less time. It is very easy to fall into traps and myths about digital natives and immigrants, but we can rely on years of Pew Research Center and other surveys showing that—in general—older Americans use less technology than younger Americans (although the gap is gradually closing). This tendency appears in terms of both Internet connection and related devices. As the Pew Research Center reported in May 2017:

Many seniors remain largely disconnected from the digital revolution. One-third of adults ages 65 and older say they never use the Internet, and roughly half (49%) say they do not have home broadband services. Meanwhile, even with their recent gains, the proportion of seniors who say they own smartphones is 42 percentage points lower than those ages 18 to 64.⁵

Yet the strong drivers of class and education can revise a simple age correlation:

Fully 87% of seniors living in households earning $75,000 or more a year say they have home broadband, compared with just 27% of seniors whose annual household income is below $30,000. Educational differences follow a similar pattern, with college graduates adopting technology at much higher rates than seniors with lower levels of formal education.⁶

Perhaps the steepest and most intractable force currently driving Internet speed and access differences is geography. People living in cities and suburbs tend to enjoy higher broadband speeds and a more competitive ISP environment, while the rural population is more likely to endure slower Internet velocity and a local ISP monopoly. Business reasons are largely behind this divide: cities offer denser, more customer-rich, and easier-to-wire populations; rural areas are relatively underpopulated with less revenue per square mile. Business incentives are vital at this stage of Internet history. Governments are no longer leading energetic expansion efforts as they did with broadband in the 1990s or electricity in the 1930s. An additional complication may stem from the fact that providers are adhering to out-of-date standards...
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for what constitutes broadband. In 2015 the FCC increased its broadband minimum from 4 Mbps to 25 (download) and from 1 to 3 Mbps (upload), which triggered protests that still rage today. Many businesses, sometimes citing other FCC recommendations, argue for a definition pegged to lower speeds, which allows providers to claim greater broadband deployment success than if they were held to speedier standards. The FCC’s current chair, Ajit Pai, has controversially argued that cell phone access could substitute for wired or other wireless connections—and also wants to define mobile network broadband speeds as low as 10 Mbps down and 1 up.\(^\text{12}\)

Technological limitations heighten the geographical divide. Urban areas were upgraded from copper lines more quickly than rural areas, which may not have been upgraded at all. Terrain details such as mountains, thick forests, or bodies of water can make deploying wired or wireless solutions more difficult. Many rural areas have cell phone access, but speeds are too low all too often. And satellite connections are just a step above dialup. The impact of this gap is clear. As Clare Malone recently noted, based on Pew surveys: “Those who live in rural areas were about twice as likely not to use the Internet as urban or suburban Americans.”\(^\text{13}\) Perhaps this becomes self-reinforcing. Having become inured to lesser services, those living in rural areas demand smaller improvements. That separation from urban and suburban broadband gives rural populations greater challenges in attempting to get online for work, entertainment, government interaction, health care information and records, personal communication, and education. They may also fall behind the rest of the nation economically.\(^\text{14}\)

To some extent, the rural-urban divide connects with the way wealth shapes Internet connection. As rural areas fall behind cities and suburbs in terms of total wealth and connectivity, residents experience a double whammy. Rural towns become relatively poorer and less well connected, which renders them less economically competitive, which can reduce their population, cramped or stripped down. Meanwhile, mobile phone Internet access can be severely limited by data plans—again a greater problem for the poorest than for the affluent.

Finally, a more recent development in driving unequal access is due to politics and culture. The abuse of women, people of color, those with marginalized gender and sexual identities, Muslims and other religious minorities, and the disabled has increased dramatically over the past several years. Internet users target these populations with hate speech, doxxing, and other threats. These incidents have grown into organized movements, like Gamergate and the organized harassment conducted by some in the alt-right current.\(^\text{15}\) Unlike technological divides, these political or cultural movements make using the Internet more dangerous for large numbers of people, restricting their access, causing emotional distress, and ruining reputations.

Various projects and efforts—such as the E-Rate program and One Laptop per Child, mentioned earlier—have attempted to address these digital divides, at least to some extent. Federal and state governments, nongovernmental organizations, foundations, and companies have also contributed resources to narrowing the divide. For example, OneCommunity, led by Lev Gonick, worked hard to expand broadband service in the Cleveland area. In Vermont, one telecommunications company announced lower prices for poorer residents.\(^\text{17}\) International projects...
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may have uses in the United States as well—projects such as Gunnar Stefansson’s offline Education in a Suitcase or Google’s airborne Wi-Fi Project Loon. Yet the divide persists, in part because, as consumer tech analyst Carolina Milanesi put it: “The pace of tech adoption will maintain the divide.”

Among all programs and players, few sources play a greater role in mitigating these divides than public libraries. Their service mission leads them to provide a mix of hardware, software, connectivity, and training. Consider the wide range of needs from library users (or patrons): some may request the use of 3D printers, while others struggle with understanding how to use a mouse. In a very real sense, public libraries have become not only leading advocates for digital literacy but also unheralded heroes helping people across the digital divides of wealth, education, race, age, geography, politics, and culture.

**Digital Divides in Education**

The current digital divides have many implications for higher education and technology. To begin with, learners lacking sufficient network access will have a harder time completing their Internet-dependent studies, whether taking LMS-based quizzes, engaging in videoconference conversations with classmates and outside experts, or exploring simulations. One analyst has dubbed this the “homework gap.” The NMC Horizon Report: 2017 Higher Education Edition succinctly observed: “Without high-speed internet access, successful scaling of emerging technologies in education is moot.” Both formal learning and informal learning suffer. To return to Jackson’s account of a child blocked from doing digital work at home: “Given that her scholastic success is intimately tied to this new technology, your daughter is now at a clear disadvantage to her peers in terms of homework, research, engagement and general knowledge. Not good at all.”

Back on campus, current levels of economic inequality drive divergent academic digital strategies. Research by Chris Gilliard and Hugh Culi has determined that wealthier and more prestigious campuses support a very different educational technology environment than do lesser-resourced institutions, especially those focused on poorer students: “The more research-based the institution, the more the policies emphasized IT as an environment with a variety of stakeholders. On the other hand, institutions that emphasized job training and certification saw IT as a tool for transmitting information as determined by the school. These deeply different approaches to digital technologies are a form of redlining that can both discourage and limit working class students from the open-ended inquiry supported at more elite institutions.”

Here economics and technology combine to yield very different, and clearly unequal, pedagogies and student experiences. We should also expect a related divide between those institutions capable of reliably supporting high-speed connections and those that cannot do so.

We’ve been speaking of higher education, but digital divides afflict primary and secondary schooling as well, of course. Given that public K-12 is funded largely at a very local level, divides based on class, race, and geography are already shaping different digital experiences for schools depending on their immediate social and economic environment. It is possible that those divides have deepened over the past generation and might deepen further based on feedback loops. Already this leads to major differences regarding which students graduate from high school and attend and graduate from college.

Will would-be postsecondary students arrive on campus with starkly different digital backgrounds? Will those differences include a gap in pedagogical expectations, along with unequal digital skills? If so, colleges and universities will have to take the digital divide into account when determining how to educate their students in everything from digital literacy to office productivity apps. To the extent that a given institution supports students who are poor or working class, black or Latino, or rural, the institution will have to direct more resources for their support. Given also that the majority of undergraduates are women, we must ask how higher education is ready to help them in the face of online abuse.

**Digital Divides and the Future**

Faced with such deeply laid and powerfully determined divisions, how should higher education respond? What is the role of educational technology in this unfolding situation?
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To some extent, higher education is already pursuing a demand-side strategy. Colleges and universities are serious broadband customers, from research to entertainment to civic engagement. They educate students to be thoughtful and thorough users of the digital world (although higher education can always do more). The cumulative impact of this technological buildup helps grow demand for services, which could elicit further market, governmental, or nonprofit responses.

Local solutions are available. For some areas, academic and public libraries offer viable routes for getting online with sufficient hardware, software, and speed. Perhaps interinstitutional partnerships could strengthen these connections. State governments, businesses, and nonprofits could expand their capacities, especially if they experiment with the unused TV white space spectrum. Along similar lines, higher education could urge or support local efforts to build out broadband, through initiatives such as co-ops or small businesses. This could be an opportunity for students to become business or social entrepreneurs, potentially incubated by their campuses. Students may be inspired by educational broadband projects like Wi-Fi-enabled school buses.

Perhaps technology-specific solutions are available. If campuses are serious about equity, could they reshape their digital offerings (content, services) for different access levels? That is, a mobile-first design approach might better suit students who primarily use cell phones when they lack access to laptops and desktops. Alternatively, a less-bandwidth-demanding media strategy, one centered on text rather than video or audio, might be more accessible to those who lack sufficient bandwidth. Higher education could urge or support local efforts to build out broadband, through initiatives such as co-ops or small businesses. This could be an opportunity for students to become business or social entrepreneurs, potentially incubated by their campuses. Students may be inspired by educational broadband projects like Wi-Fi-enabled school buses. A mobile-first design approach might better suit students who primarily use cell phones when they lack access to laptops and desktops. Alternatively, a less-bandwidth-demanding media strategy, one centered on text rather than video or audio, might be more accessible to those who lack sufficient bandwidth.
than video, would be more accessible to audiences with slower bandwidth. Higher education institutions might reconsider mobile strategies, keeping in mind the underappreciated likelihood that not every student has a fully featured smartphone. Or they could make curricular materials accessible offline, through local or portable storage, from USB drives to the Education in a Suitcase model noted above.\textsuperscript{26}

Beyond technology and local partnerships, it may be time to consider political options. The federal government has offered various forms of digital divide mitigation over the past generation but has suffered from congressional budget battles—including fights from before the current administration. Perhaps educators should lobby legislators for the preservation or extension of programs such as the FCC’s Connect America Fund (CAF) or Lifeline initiatives. IT leaders might urge the FCC, in particular, to not decide that cell phone access is as good as home broadband. Similarly, college and university leaders could urge state governments to more fully fund local efforts, such as New York’s current effort to connect upstate. They could also agitate for urban Wi-Fi clouds. Most ambitiously, higher education could collectively call for a broadband version of the New Deal’s rural electrification program.\textsuperscript{27}

Digital divides are a painful dimension of the U.S. higher education technology experience. This article may elicit action on the part of readers: undertaking further research, or holding new conversations, or taking programmatic steps. But readers need to bear in mind that this portrait is one based on recent history and the present. The future may
Higher Education, Digital Divides, and a Balkanized Internet

not be this challenging; it may be even more difficult. It is possible, even likely, that the digital divides we are grappling with today will widen still further as social cleavages based on class, gender, race, and other categories intensify. Educational structures and outcomes could mitigate these divides to a degree—or could worsen them.

Academic and IT leaders have the ability—indeed, the obligation—to think carefully about the future. Strategic plans are predicated on this type of extended vision, as are college and university commitments to supporting generations of students for lifelong learning. If new and deeper digital divides loom ahead, threatening to split apart not only students but also communities, can higher education leaders in good conscience resist taking action now?

The alternative is to acquiesce to an increasingly Balkanized Internet, in an increasingly divided nation, with increasingly accepted inequalities. Is that a future we can accept? Is that a world we can help build through our actions and policies? Or is it a future that higher education academic and IT leaders, with all of their creativity and commitment to students, can and should oppose?

Notes
1. For reasons of space, I will confine the discussion in this article to the United States.
10. Ibid.

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There are powerful narratives being told about the future, insisting we are at a moment of extraordinary technological change. That change, according to these tales, is happening faster than ever before. It is creating an unprecedented explosion in the production of information. New information technologies—so we’re told—must therefore change how we learn: change what we need to know, how we know, how we create knowledge. Because of the pace of change and the scale of change and the locus of change—again, so we’re told—our institutions, our public institutions, can no longer keep up. These institutions will soon be outmoded, irrelevant. So we’re told.
These are powerful narratives, as I said, but they are not necessarily true. And even if they are partially true, we are not required to respond the way those in power or in the technology industry would like us to.

**Technology as Myth**

As Neil Postman has cautioned us, technologies tend to become mythic—unassailable, God-given, natural, irrefutable, absolute. And as they do so, we hand over a certain level of control—to the technologies themselves, sure, but just as importantly to the industries and the ideologies behind them. Take, for example, Kevin Kelly, the founding editor of the technology trade magazine *Wired*. His 2010 book was called *What Technology Wants*, as though technology is a living being with desires and drives; the title of his 2016 book was *The Inevitable*, as though we humans have no agency, no choice. The future—a certain flavor of technological future—is preordained.

So is the pace of technological change accelerating? Is society adopting technologies faster than ever before? Perhaps it feels like this is happening. It certainly makes for a good headline, a good stump speech, a good keynote, a good marketing claim. (A good myth. A dominant ideology.) But the claim falls apart under scrutiny.

Figure 1 is based on a *Vox* article that includes a couple of those darling, made-to-go-viral videos of young children using “old” technology (e.g., rotary phones and portable cassette players)—all highly clickable, highly sharable stuff. The visual argument in the graph is that the number of years it takes for one-quarter of the U.S. population to adopt a new technology has been shrinking, overall, with each new innovation. But the data is flawed. Some of the dates given for these inventions are questionable at best, if not outright inaccurate. Of course, it’s not easy to pinpoint the exact moment, the exact year, when a new technology came into being. There are competing claims as to who invented a technology and when, for example, and there are early prototypes that may or may not “count.” James Clerk Maxwell did publish *A Treatise on Electricity and Magnetism* in 1873. Alexander Graham Bell made his famous telephone call to his assistant in 1876. Guglielmo Marconi did file his patent for radio in 1897. John Logie Baird demonstrated a working television system in 1926. The MITS Altair 8800, an early personal computer that came as a kit you had to assemble, was released in 1975. Martin Cooper, a Motorola exec, made the first mobile telephone call in 1973, not 1983. And the Internet? The first ARPANET link was established between UCLA and the Stanford Research Institute in 1969. The Internet was not invented in 1991.

So we can reorganize the bar graph, as done by Matt Novak (figure 2). But it still has problems. For instance, if you’re looking at when technologies became accessible to people, you can’t use 1873 as the date for electricity, you can’t use 1876 as the year for the telephone, and you can’t use 1926 as the year for the television. It took years for the infrastructure of electricity and telephony to be built, for access to become widespread; and subsequent technologies, let’s remember, have simply piggybacked on these existing networks. Our Internet service providers today are likely telephone and television companies.

**Figure 1. Technology Adoption, Years until Used by One-Fourth of the U.S. Population**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>46</td>
</tr>
<tr>
<td>Telephone</td>
<td>35</td>
</tr>
<tr>
<td>Radio</td>
<td>31</td>
</tr>
<tr>
<td>Television</td>
<td>26</td>
</tr>
<tr>
<td>PC</td>
<td>16</td>
</tr>
<tr>
<td>Mobile Phone</td>
<td>13</td>
</tr>
<tr>
<td>The Internet</td>
<td>7</td>
</tr>
</tbody>
</table>

**Figure 2. Technology Adoption (Revised)**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>45</td>
</tr>
<tr>
<td>Telephone</td>
<td>35</td>
</tr>
<tr>
<td>Radio</td>
<td>31</td>
</tr>
<tr>
<td>Television</td>
<td>26</td>
</tr>
<tr>
<td>The Internet</td>
<td>29</td>
</tr>
<tr>
<td>Mobile Phone</td>
<td>25</td>
</tr>
<tr>
<td>PC</td>
<td>16</td>
</tr>
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</table>
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Economic historians who are interested in these sorts of comparisons of technologies and their effects typically set the threshold at 50 percent—that is, how long does it take after a technology is commercialized (not simply “invented”) for half the population to adopt it? This way, you’re looking at the economic behaviors not only of the wealthy, the early adopters, the city-dwellers, and so on (but to be clear, you are still looking at a particular demographic—the privileged half).

Figure 3 incorporates this 50 percent threshold. How many years do you think it’ll be before half of U.S. households (or Canadian ones) have a smart watch? A drone? A 3D printer? Virtual reality goggles? A self-driving car? Will it be fewer than nine years? It would have to be if, indeed, “technology” is speeding up and we are adopting new technologies faster than ever before.

Some of us might adopt technology products quickly, to be sure. Some of us might eagerly buy every new Apple gadget that’s released. But we can’t claim that the pace of technological change is speeding up just because we personally go out and buy a new iPhone every time Apple tells us the old model is obsolete.

Technology Consumption Is Not Innovation
Some economic historians—for example, Robert J. Gordon—content that we’re not in a period of great technological innovation at all; instead, we are in a period of technological stagnation. The changes brought about by the development of information technologies in the last forty years or so pale in comparison, Gordon argues, to those “great inventions” that powered massive economic growth and tremendous social change in the period from 1870 to 1970—inventions such as electricity, sanitation, chemicals and pharmaceuticals, the internal combustion engine, and mass communication.

We are certainly obsessed with “innovation”—there’s this rather nebulously defined yet insistent demand that we all somehow do more of it and sooner. We are surrounded by new consumer technology products that beckon us to buy buy buy the latest thing. But I think it’s crucial, particularly in education, that we do not confuse consumption with innovation. Buying hardware and buying software does not make you or your students or your institutions forward-thinking. We do not have to buy new stuff faster than we’ve ever bought new stuff before in order to be “future ready.”

Figure 3. Technology (from Commercialization to 50%) Adoption

<table>
<thead>
<tr>
<th>Technology</th>
<th>Years to 50% Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity (1917)</td>
<td>45</td>
</tr>
<tr>
<td>Telephone (1920)</td>
<td>26</td>
</tr>
<tr>
<td>Radio (1922)</td>
<td>8</td>
</tr>
<tr>
<td>Television (1938)</td>
<td>9</td>
</tr>
<tr>
<td>PC (1976)</td>
<td>17</td>
</tr>
<tr>
<td>Mobile Phones (1980)</td>
<td>15</td>
</tr>
<tr>
<td>WWW (1993)</td>
<td>9</td>
</tr>
<tr>
<td>E-Books (2004)</td>
<td>9</td>
</tr>
<tr>
<td>Home Robots (2002)</td>
<td></td>
</tr>
<tr>
<td>Fitness Tracker (2007)</td>
<td></td>
</tr>
<tr>
<td>Consumer 3D Printer (2009)</td>
<td></td>
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<tr>
<td>Smart Watch (2010)</td>
<td></td>
</tr>
<tr>
<td>Consumer Drone (2013)</td>
<td></td>
</tr>
<tr>
<td>VR Goggles (2015)</td>
<td></td>
</tr>
</tbody>
</table>

Buyers hardware and buying software does not make you or your students or your institutions forward-thinking. We do not have to buy new stuff faster than we’ve ever bought new stuff before in order to be “future ready.”

(Incidentally, Future Ready is the name of the U.S. Department of Education initiative that has school districts promise to buy new stuff.)

We can think about the changes that must happen to our educational institutions not because technology compels us but because we want to make these institutions more accessible, more equitable, more just. We should question this myth of the speed of technological change and adoption (and by “myth” I don’t mean “lie”; I mean “story that is unassailably true”) if it’s going to work us into a frenzy of bad decision-making. Into injustice. Inequality.

We have time—when it comes to technological change—to be thoughtful. (We might have less time when it comes to climate change or to political pressures, since these challenges operate on their own, distinct timetables.) To be clear, I’m not calling for complacency. Quite the contrary. I’m calling for critical thinking.

Information Overload
We should question too the myth that this is an unprecedented moment in
“There’s no chance that the iPhone is going to get any significant market share. No chance.”

Microsoft CEO Steve Ballmer, 2007

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human history because of the changes brought about by information and consumer technologies. This is not the first or only time period in which we’ve experienced “information overload.” This is not the first time we have struggled with “too much information.” The capacity of humans’ biological memory has always lagged behind the amount of information humans have created. Always. So it’s not quite right to say that our current (over)abundance of information began with computers or was caused by the Internet.

Often, the argument that there’s “too much information” involves pointing to the vast amounts of data that is created thanks to computers. Here is IBM’s marketing pitch, for example: “Every day, we create 2.5 quintillion bytes of data—so much that 90% of the data in the world today has been created in the last two years alone. This data comes from everywhere: sensors used to gather climate information, posts to social media sites, digital pictures and videos, purchase transaction records, and cell phone GPS signals to name a few. This data is big data.”

IBM is, of course, selling its information management services here. It is selling data storage—“big data” storage. Elsewhere the company is heavily marketing its artificial intelligence product, IBM Watson, which is also reliant on “big data” mining.

Again, these numbers demand some scrutiny. Marketing figures are not indisputable facts. Just because you read it on the Internet doesn’t make it true. How we should count all this data is not really clear. Does something still count if it gets deleted? Do we count it if it’s unused or unexamined or if it’s metadata or solely machine-readable? Should we count it only if it’s human-readable? Do we count information only if it’s stored in bits and bytes?

Now, I’m not arguing that there isn’t more data or “big data” today. What I want us to keep in mind is that humans throughout history have felt overwhelmed by information, by knowledge known and unknown. We’re curious creatures, we humans; there has always been more to learn than is humanly possible.

With every new “information technology” that humans have invented—dating all the way back to the earliest writing and numeric systems, back to the ancient Sumerians and cuneiform, for example—we have seen an explosion in the amount of information produced, and as a result, we’ve faced crises, again and again, over how this surplus of information will be stored and managed and accessed and learned and taught. (Hence, the development of the codex, the index, the table of contents, for example. The creation of the library.) According to one history of the printing press, by 1500—only five decades or so after Johannes Gutenberg published his famous Gutenberg Bible—there were between 20 million books in circulation in Europe.

All this is to say that ever since humans have been writing things down, there have been more things to read and learn than any one of us could possibly read and learn.

But that’s okay, because we can write things down. We can preserve ideas—facts, figures, numbers, stories, observations, research, ramblings—for the future. Not just for ourselves to read later, but to extend beyond our lifetime. The challenge for education—then and now—in the face of the overabundance of information has always been, in part, to determine what pieces of information should be “required knowledge”—not simply “required knowledge” for a test or for graduation, but “required knowledge” to move a student toward a deeper understanding of a topic, toward expertise perhaps.

Obligatory Socrates Reference
Of course, the great irony is that “writing things down” preserved one of the most famous criticisms of the technology of writing: by Socrates in Plato’s Phaedrus. Plato tells the story of Socrates telling a story, in turn, of a meeting between the king of Egypt, Thamus, and the god Theuth, the inventor of many arts including arithmetic and astronomy. Theuth demonstrates his inventions for the king, who does not approve of the invention of writing.

But when they came to letters, This, said Theuth, will make the Egyptians wiser and give them better memories; it is a specific both for the memory and for the wit. Thamus replied: Of most ingenious Theuth, the parent or inventor of an art is not always the best judge of the utility or inutility of his own inventions to the users of them. And in this instance, you who are the father of letters, from a paternal love of your own children have been led to attribute to them a quality which they cannot have; for this discovery of yours will create forgetfulness in the learners’ souls, because they will not use their memories; they will trust to the external written characters and not remember of themselves. The specific which you have discovered is an aid not to memory, but to reminiscence, and you give your disciples not truth, but only the semblance of truth; they will be hearers of many things and will have learned nothing; they will appear to be omniscient and will generally know nothing; they will be tiresome company, having the show of wisdom without the reality.

In Phaedrus, Plato makes it clear that Socrates shares Thamus’s opinion
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of writing—a deep belief that writing enables a forgetfulness of knowledge via the very technology that promises its abundance and preservation. “He would be a very simple person,” Socrates tells Phaedrus, “who deemed that writing was at all better than knowledge and recollection of the same matters.”

Writing will harm memory, Socrates argues, and it will harm the truth. Writing is insufficient and inadequate when it comes to teaching others. Far better to impart knowledge to others via “the serious pursuit of the dialectician.” Via a face-to-face exchange. Via rhetoric. Via discussion. Via direct instruction.

But now, some two thousand years later, we debate whether it’s better to take notes in class by hand or to use a computer. We’re okay with writing as a technology now; it’s this new information technology that causes us some concern about students’ ability to remember.

Information technologies do change memory. No doubt, Socrates was right about this. But what I want to underscore is not just how these technologies affect our individual capacity to remember but how they also serve to extend memory beyond us.

Collective Memory
By preserving memory and knowledge, these technologies have helped create and expand collective memory—through time and place. We can share this collective memory. This collective memory is culture—that is, the sharable, accessible, alterable, transferable knowledge we pass down from generation to generation and pass across geographical space, thanks to information technologies. The technologies I pointed to earlier—the telephone, radio, television, the Internet, mobile phones—have all shifted collective memory and culture, as of course the printing press did before that.

One of the challenges that education faces is that while we label one of its purposes as “the pursuit of knowledge,” we’re actually greatly interested in and responsible for “the preservation of knowledge,” for the extension of collective memory. Colleges and universities do demand the creation of new knowledge. But that’s not typically the task assigned to most students; for them, education consists of learning about existing knowledge, committing collective memory to personal memory.

Human Memory Is Not Data Storage
One of the problems with this latest information technology is that we use the word memory, a biological mechanism, to describe data storage. We use the word in a way that suggests computer memory and human memory are the same sort of process, system, infrastructure, architecture. They are not. But nor is either human memory or computer memory quite the same as some previous information technologies, those to which we’ve outsourced our “memory” in the past.

Human memory is partial, contingent, malleable, contextual, erasable, fragile. It is prone to embellishment and error. It is designed to filter. It is designed to forget.

Most information technologies are not. They are designed to be much more durable than memories stored in the human brain. These technologies fix memory and knowledge—in stone, on paper, in moveable type. From these technologies, we have gained permanence, stability, unchangeability, materiality.

Digital information technologies aren’t quite any of those. Digital data is more robust, perhaps. Digital data doesn’t include only what you wrote but also when you wrote it, how long you took to write it, how many edits, and so on. But as you edit, something else is apparent: digital data is easy overwritten; it is easily erased. It’s stored in file formats that—unlike the alphabet, a technology that’s thousands of years old—can become quickly obsolete, become corrupted. Digital data is reliant on machines in order to be read; that means too these technologies are reliant on electricity or on battery power and on a host of rare earth materials, all of which do take an environmental and political toll. Digital information is highly prone to decay—even more than paper, ironically enough, which was already a more fragile and flammable technology than the stone tablets that it replaced. Of course, writing on paper was more efficient than carving stone. And as a result, humans created much more information when we moved from stone to paper and then from writing by hand to printing by machine. But what we gained in efficiency, all along the way we have lost in durability.

If you burn down a Library of Alexandria full of paper scrolls, you destroy knowledge. If you set fire to a bunch of stone tablets, you further preserve the lettering. Archeologists have uncovered tablets that are thousands and thousands of years old. Meanwhile, I can no longer access the data I stored on floppy
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disks twenty years ago. My MacBook Air doesn’t read CD-ROMs, the media I used to store data less than a decade ago.

The Fragility of Digital Data
The average lifespan of a URL, according to the Internet Archive’s Brewster Kahle, is 44 days. That is, the average length of time from when a web page is created to when the URL is no longer accessible is about a month and a half. Again, much like the estimates about the amount of data we’re producing, estimates about web lifespans really aren’t reliable; the lifespans are actually quite difficult to measure. Research conducted by Google pegged the amount of time that certain malware-creating websites stay online at less than two hours, and certainly this short duration, along with the vast number of sites spun up for these nefarious purposes, skews any sort of “average.” The website GeoCities lasted fifteen years; Myspace lasted about six before it was redesigned as an entertainment site; Posterous lasted five. But no matter the exact lifespan, we know that it’s pretty short. According to a 2013 study, half of the links cited in U.S. Supreme Court decisions—certainly the sort of thing we’d want to preserve and be able to learn from for centuries to come—are already dead.

Web service providers shut down, websites go away, and even if websites stay online, they regularly change (sometimes with little indication that they’ve done so). “Snapshots” of some 322 billion web pages have been preserved as of August 2017, thanks to the work of the Wayback Machine at the Internet Archive, Brewster Kahle’s San Francisco–based nonprofit. The “Wayback Machine” offers us some ability to browse archived Web content, including from sites that no longer exist, but not all websites allow the Wayback Machine to index them. It’s an important but partial effort.

We might live in a time of digital abundance, but our digital memories—our personal memories and our collective memories—are incredibly brittle. We might be told we’re living in a time of rapid technological change, but we are also living in a period of rapid digital-data decay, leading to the potential loss of knowledge, the potential loss of personal and collective memory.

Who Are the Stewards of Our Digital Memory?
“This will go down on your permanent record”—that’s long been a threat in education. And we’re collecting more data than ever before about students. But what happens to it? Who are the stewards of digital data? Who are the stewards of digital memory? Of culture?

With our move to digital information technologies, we are entrusting our knowledge and our memories—our data, our stories, our status updates, our photos, our history—to third-party platforms, to technology companies that might not last until 2050, let alone preserve our data in perpetuity or ensure that it’s available and accessible to scholars of the future. We are depending—mostly unthinkingly—I fear—on these platforms to preserve and to not erase, but they are not obligated to do so. Most companies’ “Terms of Service” decree that if your “memory” is found to be objectionable orsalable, for example, they can deal with it as they deem fit.

Digital data is fragile. The companies selling us the hardware and software to store this data are fragile. And yet we are putting a great deal of faith into computers as “memory machines.” Now, we’re told, the machine can and should remember for you.

As educational practices have long involved memorization (along with its kin, recitation), these changes to memory—that is, offloading this functionality specifically to computers, not to other information technologies like writing—could, some argue, change how and what we learn, how and what we must recall in the process. And so the assertion goes, machine-based memory will prove superior: for example, it is indelible, searchable. It can include things read and things unread, things learned and things forgotten. Our memories and our knowledge and the things we do not know but should know can be served to us “algorithmically” we’re told, so that rather than the biological or contextual triggers for memory, we get a “push” notification. “Remember me.” “Do you remember this?” Memory—and indeed all of education, some say—is poised to become highly “personalized.”

It’s worth asking: what happens to “collective memory” in a world of this sort of “personalization”? It’s worth asking: who writes the algorithms? How do these algorithms value knowledge or memory? And whose knowledge or memory, whose stories get preserved?

The “Memex”
A vision of personalized, machine-based memory is not new. The following is an excerpt from the 1945 article “As We May Think,” by Vannevar Bush, director of the U.S. Office of Scientific Research and Development:

Consider a future device for individual use, which is a sort of mechanized private file and library. It needs a name, and, to coin one at random, “memex” will do. A memex is a device in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.
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It consists of a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture at which he works. On the top are slanting translucent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers. Otherwise it looks like an ordinary desk.

In one end is the stored material. The matter of bulk is well taken care of by improved microfilm. Only a small part of the interior of the memex is devoted to storage, the rest to mechanism.

Most of the memex contents are purchased on microfilm ready for insertion. Books of all sorts, pictures, current periodicals, newspapers, are thus obtained and dropped into place. Business correspondence takes the same path. And there is provision for direct entry. On the top of the memex is a transparent platen. On this are placed longhand notes, photographs, memoranda, all sorts of things. When one is in place, the depression of a lever causes it to be photographed onto the next blank space in a section of the memex film, dry photography being employed.

A special button transfers him immediately to the first page of the index. Any given book of his library can thus be called up and consulted with far greater facility than if it were taken from a shelf. As he has several projection positions, he can leave one item in position while he calls up another. He can add marginal notes and comments.

There’s a lot that people have found appealing about this vision. A personal “memory machine” that you can add to and organize as you deem fit. What you’ve read. What you hope to read. Notes and photographs you’ve taken. Letters you’ve received. It’s all indexed and readily retrievable by the “memory machine,” even when human memory might fail you.

Bush’s essay about the Memex influenced two of the most interesting innovators in technology: Douglas Engelbart, inventor of the computer mouse, among other things; and Ted Nelson, inventor of hypertext. I think we’d agree that, a bit like Nelson’s vision for the associative linking in hypertext, we’d likely want something akin to the Memex to be networked today—that is, to be not simply our own memory machine but one connected to others’ machines as well. But hypertext’s most famous implementation—the World Wide Web—doesn’t quite work like the Memex. It doesn’t even work like a library. Links break; websites go away. Copyright law, in its current form, stands in the way of our ability to readily access and share materials.

We Can Do Better Than (Re)Build Digital Flashcards
While it sparked the imagination of Engelbart and Nelson, the idea of a “memory machine” like the Memex seems to have had little effect on the direction that educational technology (edtech) has taken. The development of “teaching machines” during and after WWII, for example, was far less concerned with an augmented intellect than with enhanced instruction. As Paul Saettler writes in his book *The Evolution of American Educational Technology* (1990), most of the computer-assisted instruction (CAI) projects in the 1960s and 1970s were directly descended from Skinnerian teaching machines and reflected a behaviorist orientation. The typical CAI presentation modes known as drill-and-practice and tutorial were characterized by a strong degree of author control rather than learner control. The student was asked to make simple responses, fill in the blanks, choose among a restricted set of alternatives, or supply a missing word or phrase. If the response was wrong, the machine would assume control, flash the word “wrong” and generate another problem. If the response was correct, additional material would be presented. The function of the computer was to present increasingly difficult material and provide reinforcement for correct responses. The program was very much in control and the student had little flexibility.

Rather than building devices that could enhance human memory and human knowledge for each individual, edtech has focused on devices that standardize the delivery of curriculum, that run students through various exercises and assessments, and that provide behavioral reinforcement.

Memory as framed by most edtech theories and practices involves memorization—Edward Thorndike’s “law of recency,” for example, or H. F. Spitzer’s “spaced repetition.” That is, edtech products often dictate what to learn and when and how to learn it. (Ironically, this is still marketed as “personalization.”) The vast majority of these technologies and their proponents have not demanded that we think about either the
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challenges or the obstacles that digital information technologies present for memory and learning other than the promises that somehow, when done via computer, memorization, and therefore learning, become more efficient.

Proprietary Digital Silos (Containing Our Data)
Arguably, the Memex could be seen as an antecedent to some of the recent pushback against the corporate control of the web, of edtech, of our personal data, our collective knowledge, our memories. Efforts like Domain of One’s Own and IndieWebCamp, for example, urge us to rethink to whom we are outsourcing this crucial function. These efforts ask: how can we access knowledge, and how can we build knowledge on our terms, not on the Terms of Service of companies like Google or Blackboard?

Domain of One’s Own (http://umw.domains/) is probably one of the most important commitments to memory— to culture, to knowledge—that any school or scholar or student can make. This initiative began at the University of Mary Washington, whereby the school gave all students and faculty their own domain—not just a bit of server space on the university’s domain, but their very own website (their own .dot.com or .dot.org or what have you) where they could post and store and share their own work—their knowledge, their memory.

On the web, our knowledge and memory can be networked and shared, and we can—if we choose—build a collective Memex. But doing so would require us to rethink much of the infrastructure and the ideology that currently govern how technology is built and purchased and talked about. It would require us to counter the story that “technology is changing faster than ever before, and it’s overwhelming, so let’s just let Google be responsible for the world’s information.”

Those Who Control Memory Machines Control the Future
Here’s what I want us to ask ourselves and our institutions: who controls our “memory machines” today? Are the software and the hardware (or in Bush’s terms, the material and the desk) owned and managed and understood by each individual, or are they simply licensed and managed by another engineer, company, or organization? Are these “memory machines” extensible and are they durable? How do we connect and share our memory machines so that they are networked, so that we don’t build a future that’s simply about a radical individualization via technology, walled off into our own private collections? How do we build a future that values the collective and believes that it is the responsibility of the public, not private corporations, to be stewards of knowledge?

I believe we can build that future not by being responsible or responsive to technology for the sake of technology or by rejecting technology for the sake of hoping nothing changes. The tension between change and tradition is something we have always had to grapple with; it’s a tension that is innate, quite likely, to educational institutions. We can’t be swept up in stories about technological change and think that by buying the latest gadget, we are necessarily bringing about progressive change.

Our understanding of the past has to help us build a better future. That’s the purpose of collective memory, when combined with a commitment to collective justice.

Those who control our memory machines will control our future. They always have.

Notes
3. Since the date of first publication in April 2014, Vox has revised this article several times. As Matt Novak explains, the magazine “heavily edited” the original article—correcting errors, adding new research, and switching out graphs. See Matt Novak, “No, Tech Adoption Is Not Speeding Up,” Paleofuture, April 21, 2014.
4. Ibid.

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An Interview with Molly Broad

MOLLY BROAD

A leading spokesperson for American higher education, Molly Corbett Broad has written and presented widely on strategic planning for higher education, K–16 partnerships, information technology, globalization, and biotechnology. She became the twelfth president of the American Council on Education (ACE) in 2008. She was the first woman to lead the organization since its founding ninety years earlier, in 1918.
Broad came to ACE from the University of North Carolina (UNC), where she served as president from 1997 to 2006, leading UNC through a period of unprecedented enrollment growth. Due in large part to the success of the Focused Growth Initiative, minority enrollment at UNC grew at more than double the rate of the overall student body during her tenure. She also spearheaded the creation of a need-based financial aid program for in-state undergraduates and the establishment of the College Foundation of North Carolina.

Before her tenure at UNC, Broad was with the California State University system, where she served as senior vice chancellor for administration and finance from 1992 to 1993 and as executive vice chancellor and chief operating officer from 1993 until her election as UNC president four years later. Earlier in her career, Broad served as the chief executive officer for Arizona’s three-campus university system (1985–1992) and in a succession of administrative posts at Syracuse University (1971–1985).

Broad graduated Phi Beta Kappa with a baccalaureate degree in economics from the Maxwell School of Citizenship and Public Affairs at Syracuse University, where she earned a General Motors Scholarship. She holds a master’s degree in economics from The Ohio State University.

Earlier this year, Broad talked with EDUCAUSE President and CEO John O’Brien about her early career, her gratefulness for opportunities, her views on technology and higher education today, and her advice to IT professionals (“put on your running shoes”).

JOHN O’BRIEN: Throughout your career, you’ve been a champion of the role that information technology can play in higher education. Where did your interest in technology start?

MOLLY BROAD: I think it all started when I was in college and I was taking statistics. I didn’t know anything about statistics, but it was a required course, and I loved it. That’s where I met my future husband, Bob. The story he tells is that I set the curve in the class. After a number of occasions on which that happened, he decided to take me out for coffee.

So this course at Syracuse University was where my interest in information technology began. I was intrigued with statistics. Then, after graduation and after Bob and I married, he was transferred to Ohio, and at that point I went to Ohio State for my master’s degree in economics. While working on my thesis, I had a great opportunity to take advantage of the IT capacities at the university. This was during the time of punch cards. I was doing some analysis on the tax structure of the state of Ohio, so I was calculating the sums of the squares and the sums of the cross products as part of the statistical analysis. For me, using technology in my work led to a joyful series of breakthroughs.

O’BRIEN: I always say that those of us who have “before computers” and “after computers” memories understand the unique exhilaration that comes from seeing how directly technology can solve our problems.

BROAD: You have to be old enough to have experienced this. When I put the plugs in to build the sums of the squares and the sums of the cross products, it was earth-shattering to me, realizing the powerful mathematics that were possible and that you couldn’t do with a pencil and paper. It was such a new expansion of what mathematics can accomplish in partnership with technology.

We returned to Syracuse when Bob was transferred back. At the university, I was working on the earliest effort to use digital technologies as telephones. We did the store-and-forward from one college campus to another university, until it reached the ultimate destination. Can you believe that?

“It was earth-shattering to me, realizing the powerful mathematics that were possible and that you couldn’t do with a pencil and paper.”

O’BRIEN: I remember the first time I saw this thing called email. You could see it go from Boston University, to George Washington, and on . . .

BROAD: It really was quite amazing. I found this all to be so intriguing that it clearly became part of my DNA, even when my job evolved into something entirely different over the course of the years.

O’BRIEN: Do you think we’ve lost that joy, that amazement, that sense of “wow”?

BROAD: No. I absolutely do not think we have. I certainly haven’t lost it. I may be more apprehensive about technology now than I was before, because the level of potential and the complexity is very,
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very challenging. I’m finding it harder to keep up with technology, and I’m sure I’m not alone with this problem. But it is inspiring at the same time. Don’t you think?

O’BRIEN: Oh, I do. My story would be very similar. Technology gives me a sense of wonder that I haven’t lost yet.

BROAD: I believe the role that technology can play in teaching and learning is just beginning to unfold. I can imagine that we could conduct online courses, and using various cognitive capabilities from artificial intelligence, we could provide opportunities for students to think of information technology more as a utility than as a very important vehicle for deepening students’ understanding. We’re going to have to move beyond that.

When we think about what the future holds, and about how we’re going to sustain and grow our economy, clearly we’re going to have to provide opportunities for individuals—potential students—who are juggling family responsibilities and a job. If we want colleges and universities to be successful, and if we want students to be successful, we must deliver education in ways that we have not done traditionally.

Lumina Foundation’s Goal 2025 calls for 60 percent of Americans to hold a degree, certificate, or other postsecondary credential by 2025. This involves increasing the number of people with credentials by more than half. I think this is going to result in some uncomfortable changes. But don’t we all need to be able to adapt when change is on the horizon?

I think technology holds the promise of achieving both scale and individuality. Isn’t that an exciting thought?

O’BRIEN: What is needed for us to move beyond taking technology for granted? Do you believe that the senior campus IT leader needs to be part of the president’s cabinet?

BROAD: Absolutely. It’s very worrisome to me that IT leaders are not engaging as fully as possible with the chief academic officer and with the president. I hope that changes.

O’BRIEN: This is the biggest component of the EDUCAUSE “Expanded Partnerships and Collaboration” priority. Information technology is both a strategic opportunity and a strategic risk, and it can’t be buried in an institution.

BROAD: Right. I remember when I was on the first board of trustees for Internet2 in 1997. This was at a time when U.S. corporations wouldn’t invest in the development of an expanded Internet because the leaders didn’t think that they could recover their investment. So in October 1996, 34 universities made a multi-year commitment to build the first version of Internet2. We did it because we had faculty and students who were eager to take full advantage of the potential of the Internet.

To think about it now, and about the potential loss of net neutrality today, it seems that what higher education invested in has somehow been eclipsed by wealthy corporations that have the capacity to outbid us. If only the FCC chairman would have a further thought and conclude that net neutrality is good for the whole country—not just for certain parts of it.

O’BRIEN: As you look at this and other challenges facing colleges and universities today, what else would you urge EDUCAUSE members to pay attention to and why?

BROAD: I think the transformation of how higher education is delivered and how faculty members support, advise, and guide learners is going to be critical to a significant segment of colleges and universities.

But I also hope that we will continue to have strong liberal arts colleges, along with other higher education institutions where 18-year-olds can go and be transformed in the process of deciding what they want to be when they are fully developed.

At the same time, it is vital that we find ways—very different ways, no doubt—to make it possible for individuals to get a job, or to keep a job, or to get a better job. This is, I think, going to be very taxing on all of us. But to fail to keep up is to have an economy that is not maximizing our potential.

O’BRIEN: We’ve also seen a lowering...
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of the public’s perceptions of the value of higher education. It’s distressing.

**BROAD:** Yes, it is distressing. I don’t want to blame it on the media, but I do think that the simplicity of how the media is describing higher education is not fully accurate. It’s quite disturbing to have so many students believe that their higher education wasn’t worth what it cost them. We’ve got to do a better job, certainly, but I think the press has hyped the cost of higher education. When states were not generating enough revenue in the 2008 recession and they had to make cuts, the largest discretionary part of their budget was higher education. It was very easy to just chop off the funding for a portion of higher education.

**O’BRIEN:** Another disconcerting trend, and another that is a priority for EDUCAUSE, is the continuing underrepresentation of women in information technology. As a pioneering woman in higher education, do you have thoughts on this topic?

**BROAD:** In June 2017, ACE released *American College President Study 2017,* which shows that women (30%) and persons of color (17%) are still far behind in the percentage that they represent in leadership positions. We’re making progress, but it is very slow. I am nevertheless very optimistic that, ultimately, the full value that women can bring to their families, and also to the economy and the workforce, is going to be increasingly important. Maybe because we need that talent, we’ll be able to reach out more deeply than we have.

**O’BRIEN:** Your career is an inspiration not just to women but to all of us. Of your accomplishments, what makes you most proud?

**BROAD:** I don’t feel a sense of pride. I just feel so fortunate. People saw in me what I didn’t see in myself and gave me a chance and urged me to try new things. I’m very grateful and appreciative of all the faculty members who urged me to reach out a little farther than I thought was safe.

**O’BRIEN:** Who were your mentors? Who were the people inspiring you to reach?

**BROAD:** I was so lucky. I received a full scholarship—tuition plus room and board—at Syracuse University, and I felt a strong responsibility to make that investment in me worthwhile. I had the benefit of an extraordinary number of faculty members who supported me throughout my college life and beyond—the finest faculty members.

When I went to Ohio State, there was a very senior, very smart individual who thought I looked like “a deer in the headlights.” He was very helpful to me in getting my arms around the next phase of technology. So I have had the benefit of many individuals who gave me a chance because they saw something that I might not have seen in myself.

**O’BRIEN:** Clearly you haven’t lost that sense of gratefulness and humility. How did you keep that even while you took on all your prestigious appointments, with their incredible influence and power?

**BROAD:** I don’t know how to answer. I’m grateful for all the opportunities that I have been given, which went way beyond what I could ever have expected. It is easy to be humble when you’re the beneficiary of some investment or some hard work that somebody else provided for you. I hope that students in American higher education can feel that way—can feel that there’s someone who sees in them what they may not see in themselves and who helps them reach as far as they can.

**O’BRIEN:** Do you have any advice for IT professionals who may be...
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wondering where they want to go or whether they want to be a CIO?

BROAD: I'd say they need running shoes, because the pace at which technology and higher education is changing is so rapid that it is very difficult to stay still. No one really knows what the impact of technology is going to look like—not even as soon as two, three, or four years from now. So my advice is: put on your running shoes.

O’BRIEN: Do you have education-related plans for your retirement?

BROAD: We have seen a fifty percent increase in mental illness in college students over just one year. That is stunning to me. We also have large numbers of college students who do not have food security. I’ve been asked if I would be willing to collaborate with two other former university presidents and with some foundations doing work in these areas. My overall plan is to see if I can help other people in the ways that I was so lucky to have support and help, both from my family and from higher education. Since I have been the beneficiary of so many good things, I would be grateful to have a chance to help others.

O’BRIEN: Will there be a Facebook account in your future?

BROAD: I have a Facebook account now, but it’s very quiet. That’s mostly because my time continues to be consumed by current work. I will not be at the cutting edge, for sure, but I will try to be as technologically strong as I possibly can.

O’BRIEN: So it’s not your dream to be off the grid?

BROAD: No, no, no. I am definitely not going to be off the grid in my retirement.

Notes
1. Lumina Foundation, Goal 2025 (website).

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Molly Corbett Broad retired as ACE president on August 31, 2017. Ted Mitchell, a former college president and top federal policy maker, assumed the presidency on September 1.

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The EDUCAUSE Awards Program, under the guidance of the EDUCAUSE Recognition Committee, brings peer endorsement and distinction to professional accomplishments in higher education information technology.

The Leadership Award is the association's highest recognition and honors exemplary leaders whose work has had significant positive impact on advancing the theory and practice of information technology in higher education.

The Community Leadership Award recognizes members for their roles as community leaders and active volunteers in professional service to the broader higher education IT community.

The Rising Star Award spotlights rising higher education IT leaders whose records reflect ongoing and exceptional growth in contribution to the profession and increased levels of leadership and responsibility.

Moran Technology Consulting, Gold Partner, is proud to sponsor the recognition of visionary leaders who are addressing today's realities and transforming the strategic role of information technology across higher education.
The 2017 EDUCAUSE Leadership Award is given to Susan Metros, former associate vice provost for Information Technology Services and deputy CIO for Technology Enhanced Learning at the University of Southern California (USC), to recognize her wide-ranging and remarkable contributions to leadership in higher education and technology-enabled teaching and learning.

With career experience that spans four decades and myriad roles in higher education, Susan has combined an expansive and highly creative vision with an infectious “can-do” attitude and a keen ability to motivate and energize her staff toward a common purpose. Her transformational leadership has touched on all forms of educational and instructional technology, multimedia, social networking and collaboration, online learning, visual literacy, mobile learning, and more. One colleague remarked that Susan “is one of those rare individuals who possess the skills to imagine what might be possible and the organizational and management prowess to turn such ideas into reality.”

Susan began her career as an academic and quickly advanced into leadership roles at the University of Tennessee, where she established the first BFA and MFA degrees in Computer-Enhanced Visual Design. At the Ohio State University, she conceived and helped launch the Digital Union, an innovative space that served as a testing ground for creative and scholarly activities and for multidisciplinary, experimental projects promoting technology in teaching and learning. At USC, she led teams that reimagined and renovated the university’s 200-plus learning spaces and redesigned the university’s web and mobile presences. She also provided vision and operational expertise and support for developing and delivering technology-enabled learning, across multiple disciplines, both on campus and online. In the role of interim CIO at the university’s Marshall School of Business, she conducted an important year-long study that resulted in a report and recommendations for “The Future Directions for IT Leadership and
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Organization.” Finally, serving as associate dean for the USC Jimmy Iovine and Andre Young Academy for Arts, Technology and the Business of Innovation, she helped design the curriculum, plan the program’s makerspace, and directed the creation of a new online master of science degree in Integrated Design, Business and Technology.

With deep academic roots, Susan has held tenured professorships at Michigan State University, the University of Tennessee, and the Ohio State University. At USC, she was appointed to faculty positions in three schools: Art and Design; Education; and Communication and Journalism. She has an impressive list of refereed and invited publications on topics running the gamut from leadership and mentoring to creativity and innovation, to visual and multimedia literacy, to the role of educational technology in transforming higher education. A committed and compassionate educator, she has taught courses on digital literacies and has served as a principal designer on several international award-winning multimedia and web-based projects.

Susan’s many contributions to EDUCAUSE include service on the association’s board of directors and an appointment as dean for the Breakthrough Models Academy, a program to advance next-generation leadership in higher education. She has written widely for EDUCAUSE publications and has presented keynotes and conference sessions at a variety of venues. She was a Frye Leadership Fellow in 2001 and later served as a mentor for others in the program. She has an unwavering commitment to developing leadership abilities in others and has worked to ensure that EDUCAUSE creates new strategies and programming for identifying, cultivating, and mentoring the future generation of IT leaders. In addition to her EDUCAUSE service, she was a board member for the New Media Consortium (NMC) and currently sits on the advisory council for the Colorado State University Global Campus and serves as a senior fellow for the Center for Digital Education.

Susan has embraced leadership from the unique perspective of a seasoned technology professional, experienced designer, and lifelong educator. Her accomplishments in higher education lie at the strategic intersection between the discovery and adoption of new and emerging technologies that support teaching, learning, research, and outreach, and the IT core enterprise. Drawing on her...
creative vision, problem-solving skills, collaborative work style, and big-hearted enthusiasm to support others in their professional journeys, Susan has made a significant and lasting impact on the higher education IT profession and in the greater higher education community.

**EDUCAUSE Review:** What advice would you give to those who aspire to leadership roles in higher education? How have your values and ethos shaped the choices you’ve made in your career?

**Metros:** The most meaningful advice I can give to those aspiring to be leaders, whether in higher education or another industry, is that leading comes from within. It’s not something you can study and overnight become a leadership expert. There is no test to pass, no
certificate to earn. Leadership is heartfelt and experiential. For me, it takes into account past encounters, current experiences, and future potential. It is built on a foundation of common sense, acquired wisdom, dogged tenacity, keen observation, and a hefty dose of unbridled curiosity. You must reflect on your own life experiences to determine which ones hold leadership insights. It is the unpacking of these experiences that serves as the basis for shaping the values you stand by and for creating your own unique and personalized leadership philosophy.

I have made some good leadership decisions, and I have made some that I have regretted. The good ones always come after I am afforded the luxury of time to examine the various facets of a situation and to listen carefully to those who would be influenced by the decision. By reflecting on my past experiences and visualizing myself in the shoes of those affected, I am able to imagine future scenarios, weigh options, and make what I hope will be informed and heartfelt decisions.

**EDUCAUSE Review: Who inspired you to leadership?**

**Metros:** I have worked in higher education for close to four decades, serving as staff, faculty, technology executive, and academic leader. During that time, I have worked for many great leaders and for some really bad ones. First, the bad: I have reported to bullies, narcissists, sociopaths, sexual harassers, embezzlers, micromanagers, and bosses who were just downright incompetent. In almost every case, karma eventually ruled, and they were relieved of their positions or moved on—but not before causing havoc and dissonance within the organization. Although these situations were highly stressful and personally demoralizing, I learned how to protect my team and survive difficult working conditions. I learned, firsthand, important lessons on how not to lead.

On the other hand, I was fortunate to have worked for many great leaders. Joseph Kuszai, professor emeritus in Graphic Design at Michigan State University, was my teacher and mentor when I served as his graduate assistant while earning my MFA and, later, as his colleague when I was hired into the department as an assistant professor. Joe taught his students that learning to be a designer was never about the destination; it was always about the journey: process over product. I was inculcated in his unique style of creative problem-solving, now popularized as **design thinking**. I have incorporated this lesson into my own
leadership philosophy. How you go about solving a problem—empathizing with the user, alternating between convergent and divergent thinking, and brainstorming—is as important as the eventual outcome. While solutions succeed or fail, processes evolve and improve with use over time. I chose to honor Joe by donating the generous scholarship funding that comes with the EDUCAUSE Leadership Award to the Joe and Shirley Kuszai Endowed Scholarship, in support of undergraduate graphic design education at Michigan State.

Later I served as deputy CIO for Ilee Rhimes when he was the CIO at Ohio State and, again, at USC. Ilee was an inspirational leader as well as a gifted mentor. He taught me that there is no wrong way to do something, there are simply better ways: listening before I speak, and always taking the long view and doing what’s best for the organization. Ilee cared deeply about his staff and made all of us, no matter where we sat in the organization, feel heard and appreciated. He encouraged us to have pride in our work and trusted us to deliver on our promises. He was fond of repeating the truism: “I don’t care how much you know until I know how much you care.” Following his example, I aspire to be the kind of leader who values and respects people over the technology and tools they support.

EDUCAUSE Review: How did coming from a nontraditional field affect your ability to lead technology organizations?

Metros: My background and academic degrees are in art and design. Even as a child, I interacted with the world visually. Novelist E. F. Forster quipped: “How do I know what I think until I see what I say?” That describes me perfectly! I would much rather illustrate my thoughts than write them down. I see patterns in everything; I map concepts and chart progress; I visualize ideas. This acute state of visual awareness has provided me with an ability to picture processes, envision scenarios, and diagram hierarchies of order where chaos once existed. I communicate best through storytelling. Storytelling is painting a picture with words: describing an event, creating personas, forming relationships and weaving them through a plot, then concluding with an outcome.

Much of my academic research has been in the realm of visual literacy. We teach our students to read and write but not to see. In an interview with George Lucas, the question was asked: “If students aren’t taught the language of sound and images, shouldn’t they be considered as illiterate as if they left college without being able to read or write?” We live in a visually saturated world, and being able to express ourselves using the universal language of vision can bridge cultural gaps. Leaders who can communicate visually have the ability to share an alternative
EDUCAUSE Review: Do you have suggestions on how best to stay current as a higher education IT professional?

Metros: Many of the IT leaders who are drawn to jobs in academia are committed to continuing their education and sharing that knowledge with their staff and constituents. Fortunately, we work in an environment that respects the quest for knowledge and rewards intellectual effort.

I was able to make the case for professional development support throughout my career. Highlights included being selected to participate in the Committee on Institutional Cooperation (CIC) Fellows and Emerging Academic Leaders Program and acceptance into the EDUCAUSE Frye Leadership Institute. I have always encouraged my staff to continue their education, even if doing so meant they were promoted to positions outside of the organization. Ilee Rhimes often quoted motivational speaker Zig Ziglar, who remarked: “The only thing worse than training an employee and having them leave, is to not train them, and have them stay.”

I have a responsibility to give back to the profession that prepared me for what I consider to be a successful career. I have served as a leader, instructor, and mentor for many EDUCAUSE professional development programs and often present and publish with colleagues new to the profession. Most recently, I earned my professional coaching credential and work almost exclusively with clients employed in information technology. This is hardly altruistic. There is a well-known adage among seasoned educators: “Nobody learns as much as the teacher.” While I provide guidance to others, I also gain knowledge, build new skills, and make new acquaintances that often grow into lasting friendships.

EDUCAUSE Review: In what ways can our profession be more welcoming of women in the field and in leadership roles?

Metros: I believe that women today have more opportunities to move into IT leadership roles. The IT profession is no longer the exclusive domain of “guys” with heavy-duty technical expertise but is now a space where a balance of technical knowhow and soft skills is sought out and commended. IT leaders today are a more
diverse group, many with nontraditional backgrounds in the humanities, education, and the arts. They are technology-savvy individuals who can lead teams, prioritize clients' needs, communicate across a variety of constituencies, and recruit and retain talent.

So, how do women move into leadership roles? First, like their male counterparts, they need to network and actively support each other in their career quests. They also must be willing to take action. When I arrived at USC, there was no such network, so I organized Wine, Women, Whatever. WWW was an informal group of upwardly mobile women leaders across campus who were eager to meet like-minded women and support each other's professional growth (while sipping wine!).

Women often have to take initiative and ask for what they want. I have a confession. When I received the 2017 EDUCAUSE Awards Request for Nominations, I flagged it and did nothing until a month before it was due. I finally got up the nerve to ask a USC colleague of mine to consider nominating me. Making this request was really difficult for me, but I knew that I was not a typical choice. Over the 37 years the leadership award (in its many iterations) has been awarded, it has been given to 52 men, 1 institute, and 10 women (including me). You also can count, on one hand, the number of times the award has been bestowed on someone in educational technology.

EDUCAUSE Review: How can we prepare ourselves for the higher education IT challenges ahead?

Metros: Academia is an industry vulnerable to disruption. If we don't vet and implement the newest and most promising technologies, and provide our academic communities with the training and support to use them, we will be left behind by entrepreneurial companies that will do so. We, as leaders, need to carve out time for our staff to explore and play with new technologies, push the limits, make mistakes, and start the process all over again. That requires empathic leaders who value the contributions of staff, respect their expertise, and provide them with opportunities to take risks and make a difference. At the end of the day, it's always about the people, never about the technology!

This year, EDUCAUSE is granting its Community Leadership Award to Mark Bruhn, associate vice president for public safety and institutional assurance at Indiana University (IU), for his wide-ranging and tireless efforts in leading and advancing the critical work of the higher education security community.

At Indiana University, Mark’s visionary leadership has led to IU’s national prominence in the areas of technology and information security, policy, and privacy. During his three decades at the university, Mark has served in several positions of increasing responsibility to meet the continually shifting and expanding security landscape. Currently, Mark not only continues as the executive responsible for information security, privacy, and policy for IU but also, for the past eight years, has taken the lead in other important areas of safety and security, including emergency management, environmental health and safety, law enforcement, events management, and physical security for more than 130,000-plus faculty, staff, and students on eight campuses across the state of Indiana.

Mark played a leading role in identifying the need for, and then conceptualizing a plan for, a national information-sharing and analysis center to serve the higher education community. In 2002, he co-founded the Research and Educational Networking Information Sharing and Analysis Center (REN-ISAC), based at Indiana University, which provides critical threat information to institutions, along with recommendations on mitigating these risks. As a testament to Mark’s executive oversight and community-driven approach to improving cybersecurity, REN-ISAC has grown substantially—from 60 institutions in 2006 to over 560 institutions in 2017—and has dramatically changed the way the higher education community shares security information across institutions.

Among his many other accomplishments, Mark led a project to develop the Indiana Information Interchange, forerunner of the current Indiana University Information Environment. In a stint as associate vice president for...
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telecommunications, he was the university’s lead executive on the advancement of I-Light, Indiana’s statewide optical network for higher education, a process requiring extensive work with elected state officials, state agencies, and CIOs at colleges and universities throughout the state. He is an adjunct faculty member at Indiana University and was instrumental in the creation of the IU Center for Applied Cybersecurity Research, where he serves as the associate director.

Mark has been active in all aspects of EDUCAUSE involvement: writing, mentoring, presenting, and taking on numerous volunteer roles, including serving as chair of the EDUCAUSE Annual Conference Program Committee in 2010. He has authored or coauthored many publications and has provided peer assessments for other colleges and universities to offer sound advice and best practices for reducing security risks. He was a founding member of the Higher Education Information Security Council (HEISC), originally established in 2000 by EDUCAUSE and Internet2 as the Computer and Network Security Task Force. Over his long tenure with HEISC, he has been instrumental in advancing the topics of policy, legal, compliance, and security awareness, among many other issues. He was part of a dedicated group that helped launch the EDUCAUSE Security Professionals Conference in 2004, and through his involvement with IU’s Center for Applied Cybersecurity Research (CACR), he established an annual Indiana statewide security conference that has served as a model for other regions.

Over the span of his career, Mark has been a voice of clarity and authority for security issues in higher education and a role model for others in the IT profession. Cited for his generosity of spirit and his ability to foster strong partnerships and bring people together around a common cause, Mark exemplifies the qualities of a true leader in our community.

**EDUCAUSE Review:** You were in a security role before most of us recognized the risks inherent in information technology. Did you foresee the threats and challenges of cybersecurity today?

**Bruhn:** IU President Michael McRobbie likes to say that Tom Davis (now the IU chief security officer) and I were “in a dark dank basement working on security in relative obscurity” when he arrived at the university, as vice president for information technology, in 1997. The part about a dark dank basement wasn’t accurate, except maybe metaphorically. Our dedicated attention to security started circa 1987, and the notion that we could follow a single dedicated cable from a monitor
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on a desk to a controller to the mainframe was comforting to us. But the writing was already on the white board (literally), and we immediately recognized we would have to struggle to get our colleagues to understand the risks attached to the favored strategy to make things more open and accessible. As connections to the mainframe became less concrete, we were able to get additional security tools, primarily CA-Top Secret—and I give Pol- ley McClure credit for good foresight as the initial head of global IT at IU. She approved the implementation of two-factor authentication for access to certain mainframe systems.

We started to meet up with other host-control product administrators at a vendor conference called CA-World, which was our first foray into interacting with and learning from others. The point at which we really became more active in the fledgling higher education security community—the same point at which many college and university security administrators started to come above ground, so to speak—was when our mainframe was connected to Bitnet and to the campus Ethernet (~1988). At that point, I remember Tom and I looked at each other over our cubicle tops and agreed that our world had just gotten dramatically more complex and that what we had been doing in that “dank dark basement” was no comparison to what we were now up against. We were right, of course.

**EDUCAUSE Review: How did you work with the higher education IT community to advance cybersecurity?**

**Bruhn:** I wandered into a security meeting at the University of Michigan (in Oxford Hall, I think), where I met Virginia Rezmierski of the University of Michigan and Chuck Smith of Penn State, from whom many of us subsequently learned a lot about necessary approaches and attitudes. We are still active in the descendent of that group, now called the Security Working Group of the Big Ten Academic Alliance (BTAA), and I think everyone who is or has been a member of that group considers it to be a family and a very beneficial forum. We discuss and share practical operational issues, of course, but we also push the envelope on the advancement of education and awareness, dwelling on risk management around data classifications.

Our community contact grew as the already expanding security staff started to attend Educom, CAUSE, and then EDUCAUSE meetings, where security presentations became more and more prevalent. At an early EDUCAUSE conference, some of us convened in a small conference room to talk about creating a task force—and as I recall, the room was packed with attendees. Out of this meeting—facilitated I believe by Don Riley, Gordon Wishon, Rodney Petersen, Jack Suess, and Steve Worona, among others—came the seeds for the EDUCAUSE/Internet2 Computer and Network Security Task force (now HEISC), within which I played various roles and which not only fostered valuable discussion and an increase in emphasis on security but also guided the development of many good practices and practical tools. This group was, and is, a recognition and encouragement of the classic “raise all boats” approach. Those of us at IU threw much into the pot, but we took a lot out as well, and many other institutions participated in the same way.

**EDUCAUSE Review: What changes have you seen in the EDUCAUSE and higher
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education IT community over the years, and how do you think these might affect our future?

Bruhn: The “miscreants,” our adversaries, have been collaborating and teaching each other much longer than we have. In fact, anyone can buy hacking tools that he/she can deploy with minimal technical experience—and in some cases can receive technical support for that deployment as well. But with the advent of the EDUCAUSE collaborations, more presentations about operations and strategies, interactions with other entities such as SANS, the creation of the REN-ISAC, many regional meetings, Internet2’s work on security-related NET+ offerings, and much more, we are now talking a lot and interacting and sharing a lot. This has to continue, and it should even advance to shared hands-on expertise and joint automated mitigations (the OMNISOC partnership within the BTAA is an early example), because when other higher education institutions are more secure, the rest of us are also more secure, and the chance that exploitation of college/university-based technologies will cause havoc on the Internet at large is minimized.

EDUCAUSE Review: What recommendations would you give to someone trying to build a community of practice? How can we build communities to solve our common problems?

Bruhn: There has to be recognition that there are common goals, aside from any natural competition. And there has to be recognition that each collaborator likely has strengths that are complementary to everyone else's strengths. In higher education, we all like to think that we have our own ducks-in-a-row, but we need to recognize that someone out there very likely has a better scheme for duck arrangement, and we need to reach out to compare. We can compete for students, and we can compete in athletics, but if some of our campuses are badly secured, that represents a serious risk for the rest of us.

EDUCAUSE Review: What goals could IT professionals across higher education pursue collectively, as a community?

Bruhn: First, to quote Stephen Hawking as sampled in Pink Floyd’s Keep Talking, we need to keep talking. And we need to keep sharing. The REN-ISAC needs to keep growing. EDUCAUSE and Internet2 and similar organizations need to continue to provide support for and facilitation of advancement. The goal, then, is an environment that discredits the historical headlines decrying campuses as bases of operations for all manner of attacks on commercial and government entities. Simply put, we need to strive for a situation in which the miscreants don’t see us as an easy target and as a place from which they can comfortably and confidently wage war on the Internet. Working together as a community, we can create this environment.
The 2017 EDUCAUSE Rising Star Award is presented to Liv Gjestvang, associate vice president in the Office of Distance Education and eLearning at the Ohio State University, for her exemplary leadership and achievements in the area of teaching and learning technologies and how they can be used to improve the student experience and for her commitment to promoting and supporting issues of diversity within and beyond the workplace.

Since her arrival at Ohio State in 2006, Liv has led or participated in many inventive educational technology projects. She helped launch the OSU Digital Storytelling program for teaching faculty to share their stories and increase the visibility of their academic work. She founded Youth Video OUTreach, a project to teach nine gay and lesbian teens the skills to create a documentary about their lives, in partnership with Ohio State’s Wexner Center for the Arts and with funding from the Ohio Arts Council. Under her direction, Ohio State’s Digital First initiative, recognized for the development of digital content to transform teaching and learning, received the New Media Consortium (NMC) Center of Excellence Award in 2013 and Apple’s Distinguished Program status in 2015.

Liv’s energy, enthusiasm, and commitment to higher education resonate through every project in which she is involved. She led Ohio State’s Innovate Conference, featuring best practices in digital pedagogies, and supported the launch of Ohio State’s open content initiatives. She was coauthor of College Ready Ohio, a $13.5 million grant from the Ohio Department of Education in support of college readiness for high school students in Ohio, and Liv and her team launched Ohio State’s Affordable Learning Exchange, a campus-wide partnership to reduce the cost of course materials with the commitment...
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of saving $10 million by 2020. Liv’s dynamic, collaborative leadership style and contributions were recognized by Ohio State when she received the university’s Distinguished Staff Award in 2014.

Perhaps Liv’s greatest impact on the higher education IT community comes from her personal commitment to her peers and to future IT leaders. She is a faculty member and co-director for the EDUCAUSE Learning Technologies Leadership Institute through 2019. An active contributor to EDUCAUSE and other professional societies, she has served as a reader for EDUCAUSE programs and has several presentations at EDUCAUSE conferences to her credit. She has presented widely on transformational leadership, learning technology, and community change at NMC events and at international conferences on LGBTQ human rights. She displays a selfless commitment to the success of others and is known as a generous collaborator, thoughtful listener, wise consultant, and consummate coach.

Liv’s work at Ohio State is complemented by her service as a member of the Board of Directors and the Teaching and Learning Group of Unizin, a consortium of eleven universities working to improve the teaching and learning experience through digital environments. Liv also helped to shape what is now the Big Ten Academic Alliance Learning Technology Leaders (LTL). Through her leadership in the Alliance, she has created new partnerships to advance the topics of analytics, flexible learning spaces, and the pedagogies that support those spaces. An example of this is her team’s proposal for a Faculty Content Camp, in which faculty create banks of open-assessment questions for use by others in their disciplines free of charge.

Liv’s demonstrated track record of sustained service and increasing impact in higher education and her collaborative and innovative style of leadership are clear evidence of her position as a rising star in the profession.

**EDUCAUSE Review: To what do you attribute your early success?**

Gjestvang: I have always worked on projects that are important to me personally. Finding the connections between the opportunities for change in higher education, my role, and the things I care most about has been really motivating for me. Also, at Ohio State I’ve had the privilege to work with a team of people who inspire me every day—who are creative and passionate about what they do, who are hard-working and committed to the university and our team, and who are honest, open, and supportive on a daily basis. I love the people I work with and am humbled and honored to work with them. I think it’s the combination of passion, vision, and strong partnerships that has helped me grow professionally.

**EDUCAUSE Review: Are there specific projects you are particularly proud of?**

Gjestvang: In 2004, Ohio voters supported a constitutional amendment to define marriage specifically as the relationship between one man and one woman. I was shocked and hurt and thought a lot about what it must have felt like for younger LGBTQ people who didn’t have a support system in place. I wrote a proposal for a project, called Youth Video OUTreach, to teach LGBTQ high school students documentary skills they could use to tell their stories about being out in high school. With a $10,000 grant from the Ohio Arts Council and in partnership with a local youth drop-in center, the university, and a contemporary art gallery on campus, we created a piece that helped start conversations at schools, community centers, film fests, and campuses around the world. I was amazed by the honesty and courage of the nine student filmmakers. We were in a really different place in terms of inclusion of the LGBTQ community, even ten years ago, and the bravery of these students—their willingness to initiate honest, hard conversations about the right every student should have to feel safe at school—was inspiring. This model, collaborating across the academy and the community, is one that I return to often. Building partnerships that leverage the strengths of different communities is a powerful way to launch projects that are meaningful and long-lasting.

**EDUCAUSE Review: Have you had to overcome hurdles as a woman in information technology? Do you still face obstacles in the profession?**

Gjestvang: Ohio State’s central IT team has more female than male senior leaders, which is unusual. But yes, I have still struggled. My career started to take off just as my partner and I were trying to get pregnant and have kids—which was, as you can imagine, an involved process for us. Trying to increase my responsibilities at work during a time when I needed to give a lot of attention to my home life was hard. Looking back, I think that the pull I felt from both my work and my home life made me a better leader. I think it’s often the case that people who are passionate and committed at work are also people who are passionate and committed outside of work. And I believe in creating work environments to support this duality. When we take care of the people who work for us, not just as employees but as whole people with kids, parents, pets, homes, and communities, we not only support stronger and happier people but also create more engaged and healthy workplaces. I try to let myself be visible when I’m going for a run at lunch, or have to cancel meetings because I have a sick kid, or choose not to check email on vacation. These practices are critical to being the kind of person I want to be, and they are an important part of creating the kind of workplace I want to have.

**EDUCAUSE Review: Whose leadership do you follow or admire the most, and why?**

Gjestvang: I recently finished reading the book *Just Mercy* by Bryan Stevenson, and I am in complete awe of his compassion and commitment to his work. I
was inspired by reading not only about his tireless support of people wrongly imprisoned on death row but also about his generosity and sense of humanity. I also admire Brené Brown—in particular her work around vulnerability. And I’ve been lucky to work with leaders who have helped me grow throughout my career. Victoria Getis, now at Northwestern University, hired me and stood alongside me while she helped me learn the ropes in higher education. Joanne Dehoney gave me an early stretch project; her tireless leadership, irreverence, and humor were a total inspiration. Finally my current boss, Mike Hofherr, threw open the doors of opportunity and asked me to step through them even when I wasn’t totally sure I could do it. He has created possibilities for Ohio State and for so many people here; I am remarkably grateful to have him and his vision, candor, and friendship in my life.

**EDUCAUSE Review:** What are your goals for the future? Where do you see yourself in five to ten years?

**Gjestvang:** There’s a lot more I’d like to achieve in my current role, but I am also interested in thinking more about leadership and how to build engaged, high-performing teams. We spend so much of our lives at work, and as long as this is the case, I think work should be a place where we get to be our best selves. I’d like to explore ways to create environments that give us the space to grow as professionals and also offer us the time we need to be fulfilled as parents, partners, friends, activists, community members, and more.

**EDUCAUSE Review:** What advice would you give to other “rising” leaders?

**Gjestvang:** Find work that inspires you, and find a workplace that will help you grow. Think about how you can bring kindness and humanity to the people around you and to the work that you do every day. Look for the things you can do to support the most important successes for your team. Then focus on those things and try to let the less important stuff fall away. Find collaborators, ask for help, and if you have a chance to try something new, unfamiliar, or hard, do it. Being successful will not come from knowing exactly how to do it before you start but, rather, from allowing yourself to try. You will learn as you go. Look for opportunities, find partners, and get started.
Tens of thousands of respondents participated in the EDUCAUSE student and faculty studies to shape the higher education IT community’s understanding of higher education technology use in 2017.

**Students and faculty preferences for the learning environment are closely aligned.**

Students and faculty differ in their opinions about the effectiveness of learning environments.

Students match their preference for hybrid learning with a belief that it is the most effective learning environment for them. Despite the fact that faculty prefer teaching in a hybrid environment, they remain skeptical of online learning. Nearly half do not agree online learning is effective.

What students and faculty want

We asked students what technologies they wish their instructors used more, and we asked faculty what technologies they think could make them more effective instructors. Both agree that content and resource-focused technologies should be incorporated more and social media and tablets should be incorporated less.

**Experience with online courses**

Students took, on average, 3.7 courses with at least some online components last year, and faculty taught an average of 3.2 sections.

**Satisfaction with technology services**

Students and faculty are most satisfied with... Students and faculty are least satisfied with...

**More of these...**

- Lecture capture
- Early-alert systems
- OER
- Video and multimedia production
- Collaboration tools
- LMS

**Less of these...**

- Tablets
- Social media
- E-portfolios
- Smartphones
- Polling tools
Experiences with campus technology

Both faculty and students have positive technology experiences on their campuses. Nearly 8 in 10 students and 7 in 10 faculty members say their overall campus technology experience is positive.

Students and faculty are satisfied with most features of their institution’s learning management system (LMS). For both groups, course content and student progress are primary concerns.

Students are most satisfied with...
- Submitting course assignments: 77%
- Accessing course content: 75%
- Checking course progress: 66%

Faculty are most satisfied with...
- Creating or posting content: 83%
- Receiving course assignments reliably: 81%
- Entering student progress information and managing assignments: 75%

Classroom policies on device use

Faculty are more welcoming of devices than students think, especially when it comes to students’ smartphones.

<table>
<thead>
<tr>
<th>Device</th>
<th>Banned or discouraged in class</th>
<th>Encouraged or required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptops</td>
<td>Students say: 19% Faculty’s policies: 20%</td>
<td>35 48</td>
</tr>
<tr>
<td>Tablets</td>
<td>40 24</td>
<td>20 41</td>
</tr>
<tr>
<td>Smartphones</td>
<td>70 52</td>
<td>7 21</td>
</tr>
</tbody>
</table>

What would motivate faculty to integrate more or better technology into their teaching?

- Clear indication of evidence that students would benefit: 37%
- Release time to design, predict, and course redesign: 34%

START STRATEGIC CONVERSATIONS WITH STUDENT AND FACULTY DATA

Colleges and universities use the EDUCAUSE Technology Research in the Academic Community (ETRAC) data to develop and support their strategic objectives for educational technology. With ETRAC data, institutions can understand and benchmark what students and faculty need and expect from technology. Institutions can use data to improve IT services, prioritize strategic contributions of IT to higher education, and become more technologically competitive among peers. There is no cost to participate and campuses will have access to all research publications, the aggregate-level summary/benchmarking report, and the institution’s raw/anonymous response data. Learn more at http://www.educause.edu/etrac.
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JANUARY
- ELI Annual Meeting
  1/29–1/31 | New Orleans, LA

MARCH
- Enterprise IT Summit
  3/5–3/7 | Orlando, FL
- NERCOMP Annual Conference
  3/26–3/28 | Providence, RI

APRIL
- Security Professionals Conference
  4/10–4/12 | Baltimore, MD

JUNE
- Leading Change Institute
  6/3–6/8 | Washington, DC

OCTOBER
- EDUCAUSE Annual Conference
  10/30–11/2 | Denver, CO

COMING IN SUMMER 2018:
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- Management Institute
- Learning Technology Leadership Institute
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Actualizing the Online Community College

Earlier this year, California Governor Jerry Brown asked the head of the state’s community college system to develop a proposal for a fully online community college by November 2017. If the proposal moves to an implementation stage, California would be the only state to offer such an institution. With some surveys indicating that enrollment growth is attributable more to online education than to on-campus courses, what if other states followed California’s lead? What would be the building blocks of such institutions, and what can a traditional brick-and-mortar community college learn from them to enhance its online learning initiatives?

Commitment to “Accessibility First”
Community colleges are open-access institutions. However, online courses are not always designed, at their inception, to include content that aligns with accessibility standards. Most higher education institutions lack the ability to determine the extent to which online learning content is accessible across instructors and the many sections they offer each semester of every year. It’s counterintuitive to think that institutions such as community colleges, which pride themselves on their commitment to access, would offer courses with content that is not fully accessible to all students, including those with disabilities. Although traditional institutions honor accommodation requests for students with disabilities, this tends to happen on a case-by-case basis instead of before the start of classes.

Another issue to highlight is the fact that colleges and universities are at risk of litigation if their courses do not align with accessibility standards. For example, in March 2017 the University of Berkeley decided to remove public access to more than 20,000 audio and video files when the U.S. Department of Justice requested this content be made accessible to individuals with disabilities. Although some evolving tools like Blackboard Ally can help an institution determine how much of its content is accessible and can even offer original content in accessible formats, an institution still needs to undergo its own due diligence to ensure that all of its course content is accessible to all of its students. A new institution such as a fully online community college has the opportunity to ensure that each of its courses is “accessible-first” and to thus serve as a leader in this approach to course development among community colleges.

Model Course Approach
A new community college—whether or not it is fully online—could benefit from the affordances of using a model course approach to course development. This approach focuses on ensuring that the student experience is consistent across sections of the same course as well as across different courses. The consistency can include standard instructional content and organizational structure. Although the use of model courses in a traditional institution might be seen by some faculty as a threat to academic freedom, model courses can be a helpful baseplate that faculty can build on in terms of adding their own content, assignments, and assessments. This can be especially helpful for new adjunct faculty who might be hired very close to the start of courses. A model course approach would enable a fully online community college to provide a high level of consistency to its courses as it scales the number of sections it offers.

Flexible Course Scheduling
A new fully online institution will have the opportunity to rethink how often it offers online courses for certificate and degree programs. A course schedule based on online courses can be created without fear of a lack of classroom space. The institution could offer online courses in a variety of ways that include accelerated session formats, such as four or five weeks. It could also borrow from institutions such as Western Governors University and Southern New Hampshire University’s College for America, which offer competency-based education (CBE) certificates and degrees. Specifically, a new fully online community college could offer CBE courses that allow students to move faster through their programs once they demonstrate they have mastered specific course- and program-based competencies. This approach respects the fact that students learn at different paces, and it moves beyond traditional thinking that assumes all students must end courses at the same time.

Out-of-State Faculty
A fully online community college may not have anxiety about needing classroom space as it scales, but it will need to focus on developing a rich pool of talented faculty to offer its courses. But unlike traditional colleges, which often lack the interest and/or the internal capacity to manage the necessary processes and resultant paperwork required to file taxes in an out-of-state faculty member’s home state, an online learning provider can maximize the flexibility of hiring faculty regardless of their geographic location. With the potential to have many full- and part-time faculty from various states, a fully online community college will need to use a rich combination of online and face-to-face meetings and professional development opportunities to engage and support these faculty.
Zero-Textbook-Cost Degrees

Several community colleges are adopting the use of open educational resources (OER) in place of more expensive proprietary textbooks. A new fully online community college could adopt such a model across each of its courses so that it could offer degree pathways that have no textbook costs for students. Leaders of such efforts include Tidewater Community College, Northern Virginia Community College, and several community colleges working with Achieving the Dream to adopt such a model. Given the preliminary data that suggests students who take zero-textbook-cost courses are as successful as, or more successful than, students in courses with traditional textbooks, more community colleges should investigate and implement this approach.4

Use of Analytics

A new fully online community college has an opportunity to define how it will leverage the use of analytics to gather varied data in support of both students and faculty. The institution can use learning management system (LMS) data to gauge student and faculty behaviors and to see how those behaviors relate to student success. An institution can track how often students are visiting the LMS on a daily and/or weekly basis, review which content they are accessing, and determine how timely students are in the submission of their assignments and assessments. An institution can also use LMS data to find out how engaged faculty are with their courses in terms of their presence in the LMS; their daily habits of accessing the LMS; their level of participation in discussion forums; and how often they post grades.

Data from adaptive courseware can offer further insight into student learning. Adaptive courseware delivers remediation to students when needed and provides data that faculty can use to adjust their instruction to meet gaps in a student’s learning. Analytics can also be pooled from other systems, such as student success and online tutoring platforms. Services such as Tutor.com give tutors the ability to send early alerts to faculty for students who spend large amounts of time in online tutoring sessions and/or struggle with understanding course topics. Student retention systems such as Hobsons Starfish Early Alert provide institutions with tools that faculty and success coaches can use to offer helpful outreach to students.

Next Steps

Regardless of whether California develops and launches its first fully online community college, this topic should inspire all of us working in community colleges to find ways to enhance our approaches to offering online courses and programs. We should begin or continue to research and appropriately adopt good practices in accessibility, course development, course scheduling, faculty hiring and support, OER selection, and the use of analytics to help us offer online learning experiences of the highest quality. Such work is crucial to ensuring that the future of online learning at community colleges truly benefits the students and faculty we strive to serve.

Notes

1. Ashley A. Smith, “New Models for Community Colleges,” Inside Higher Ed, June 27, 2017. Although Rio Salado College offers the majority of its courses fully online and is an online learning provider at the community college level, its history began with onsite locations throughout Arizona beginning in 1978, and it continues to maintain a physical presence.


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Participatory and Post-Custodial Archives as Community Practice

The proliferation of digital content has been a disruptive force in the archival profession, in terms of both volume and volatility. The ease with which electronic files can be generated and manipulated and can be found in proprietary formats presents a host of challenges to appraisal and long-term access. Rather than stabilizing a single authentic analog original, digital content must be actively managed, backed up, and preserved, and it must remain human-readable. Benign neglect, though never desirable, is not a viable option. Yet though the paradoxical fragility of electronic records—digitized as well as born-digital—poses a challenge to the many archives already operating with minimal resources, this also presents an opportunity to recast and reimagine the role and relevance of archives, in terms of professional ethics as well as public perception.

When archivists are asked about some of the primary stereotypes they encounter in daily interactions and media coverage, “dusty boxes,” materials waiting to be “discovered,” and “repositories for the old, the obsolete, and the analog” are often cited. The literature and the discourse of allied professional organizations clearly show that the archival profession—like related fields such as higher education, libraries, and museums—is grappling with ways to diversify the voices represented in its collections and its workforce.

From questioning the presumed neutrality of the terms used to describe and categorize archival collections for access, to calling attention to the conspicuous absence of people of color in both the archival record and the profession, and even to pushing back on the reductive notion that archives and archivists are passive, reactive, and static, it is clear that archives are at a crossroads as such arguments increasingly gain traction in the mainstream of the profession.

One recent example is the 2017 annual meeting of the Society of American Archivists (SAA), which featured a day-long forum—“The Liberated Archive”—that sought to go “beyond good intentions to explore how archivists might partner with the public to repurpose the archive as a site of social transformation and radical inclusion.” Due to a confluence of factors, including a workforce that is increasingly contingent, socially aware, and eager to interrogate and embrace the ethical responsibilities and ramifications of cultural record-keeping in a tech-savvy and culturally sensitive way, such explorations are becoming commonplace at the grassroots level. Nonetheless, SAA’s endorsement of such a progressive program, one that featured community activists as archival equals, feels significant—signaling that perhaps the mainstream profession is turning away from the notion of archives and archivists as unequivocal custodians, authority figures, and de facto gatekeepers of the historical record and moving toward an archival praxis that is collaborative, empathetic, and more fully self-aware of its limitations and strengths.

While technology has certainly been a disruptive force in an archival profession already in flux, it also presents a significant opportunity for participatory and post-custodial approaches that seek to shift curatorial authority and access to the communities represented. In this model, archivists work side-by-side with community members to actively rectify gaps in historical coverage and proactively document the present day. Digital preservation best practices already call for earlier intervention and dialogue with prospective donors or collaborators, both to draw on their subject expertise and to work with them to ensure that archived content is viable in terms of longevity and findability. Digital archives likewise have the potential to reach audiences beyond the physical space of a brick-and-mortar repository.

Digital archiving, moreover, invites archivists to revisit core assumptions about authorship and authority, about context and hierarchy, and about advocacy versus agency. In short, “we occupy a moment in history in which the largest percentage of the world’s population ever possesses the power and potential to author and create documentation about their lived experiences.” While power and potential do not equate to effortless or automatically all-encompassing archiving, various types of digital archiving initiatives are harnessing the power of technology to expand the reach of participatory archiving, develop increasingly sophisticated and sensitive post-custodial approaches, broaden the cultural record to represent more diverse voices, and respond to current events.

Participatory archives in a digital context can include crowdsourcing description, such as enlisting community members for describing images, transcribing handwritten script, translating from or into other languages, tagging items, or otherwise contributing to making sense of what is preserved. Some examples...
include DIY History from the University of Iowa Libraries, the U.S. National Archives and Records Administration’s Citizen Archivist program, and Metadata Games.

Post-custodial archives, as the moniker implies, seek to separate records management from physical custody. In this model, records creators retain custody of their records, and archivists provide some oversight into management of the records. A prominent institutional example of this approach is the University of Texas Libraries, which have partnered with organizations in several countries to digitally document human rights struggles, the records of which are often extremely fragile and susceptible to loss. This work includes the Human Rights Documentation Initiative, Genocide Archive Rwanda, and the Digital Archive of the Guatemalan National Police Historical Archive.

Increasingly, participatory and post-custodial digital archives initiatives are also visibly and proactively responding to document current events, seeking contributions on an ongoing basis, and documenting events close to home, with an emphasis on a digital presence. Participatory and multifaceted archives initiatives have arisen in response to events such as the 2013 Boston Marathon bombing (Our Marathon), the nationwide Women’s Marches in January 2017 (Women’s March on Washington Archives Project, Art of the March, UW Libraries Special Collections, Women’s March on Washington Archives Project), various efforts to document the Black Lives Matter movement (#blacklivesmatter Web Archive) and police violence (A People’s Archive of Police Violence in Cleveland), as well as exclusively digital archives dedicated to documenting underrepresented communities and stories in their own words and on their own terms (the South Asian American Digital Archive, the Transgender Archive).

Social media is another area ripe for collaboration, as evidenced by projects such as Documenting the Now, a partnership between Washington University in St. Louis, the University of California at Riverside, and the Maryland Institute for Technology in the Humanities to develop tools for archiving and analyzing tweets and related links in an ethical and effective way. Archivists are also collaborating with data scientists and many others to archive vulnerable government data related to climate change (the Environmental Data & Governance Initiative Archiving Data) and other areas of current political contention (Data Rescue Boston).

Technology has greatly democratized the archival process in some ways, introducing a proliferation of open-access tools and nascent participatory initiatives. On the other hand, the digital divide is real. Online access does not necessarily mean improved access for everyone, nor should it be mistaken for digital preservation in and of itself. Moreover, there are significant ethical considerations: What constitutes consent in an online environment, particularly when personal data can be mined by government or private organizations for punitive purposes? When we digitize collections, who is doing the labor? What about communities that do not want their information made publicly available? Careful consideration and engagement of these ethical issues is a crucial component of a truly participatory archival practice.

As demonstrated here with just a few examples, many repositories and individuals are taking increasingly collaborative and interdisciplinary approaches to meet record creators where they are and to think critically about what gets saved, who has access, and who is at the table when these decisions are made. Ultimately, libraries and archives are not neutral, and technology is not neutral. Naming something, preserving something, valorizing something—all are critical acts that should be undertaken with great intention and recognition of our own biases and limitations.

Notes

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Info-Environmentalism: An Introduction

When I worked at Keene State College, one of the student life groups was heavily into environmentalism: many extracurricular and student learning activities were structured around making the local environment better. For example, the group held a clean-up day each year, when the students, faculty, and staff would pick a target—a local river or park—and remove garbage from the area. They would start by picking up small pieces of trash but eventually end up pulling a defunct television set or a grocery cart out of a stream somewhere.

Participating in the event was enjoyable because (a) you could see how much the work was needed, and (b) you could see the impact you had after you were done. Some things feel good; some things do good. This was both. Lately, as I’ve been looking at our information environment, I’ve started to wonder if we can utilize student engagement in a similar way.

Let’s walk through this step-by-step.

Our information environment is dangerously polluted. What do I mean by this? Consider a simple Google search such as “Can avocados cure cancer?” Figure 1 is a screenshot of the top results.

I love avocados. I do. And they have health benefits. But these top results hype small, inconclusive studies as part of a strategy to sell supplements. In the process, they possibly give patients the false hope that they can treat cancer without medication or fend off dangerous diseases without vaccines. These web pages belong in the search results somewhere. But having them at the top of the search results is like having a broken television set sitting in a public reservoir.

This isn’t an isolated case. Until recently, hitting the “I’m Feeling Lucky” button on Google when asking the question “Did the Holocaust happen?” would lead to Stormfront, a white supremacist site highlighting a page explaining why the Holocaust was a myth. Using the “I’m Feeling Lucky” button when searching on “What happened to dinosaurs?” produced a creationist site in Google Snippets (see figure 2).

In response to a search for “presidents in the Ku Klux Klan,” the Google Snippet reports (erroneously) that U.S. Presidents William McKinley, Woodrow Wilson, Warren G. Harding, and Harry S. Truman were all members of the KKK.

These issues are not harmless. People forgo treatments that could save them or make them less sick. People fear threats that are minor (e.g., Islamic terrorism in Topeka, killings by clowns, Ebola in the United States) while not being aware of real threats (e.g., climate change, declining productivity gains, painkiller addiction). Tragedies are the result: the path to radicalization for Dylann Roof, the white supremacist who killed nine people at the Emanuel African Methodist Episcopal Church in Charleston, South Carolina, in 2015 began with a set of search results for a query on “black on white crime.”

Institutions of higher education are partially to blame. It may be tempting to lay all the blame at the feet of Google, herbal remedy sites, or white supremacist newsgroups, but the truth is that higher education is at least partially to blame for this state of affairs. Sites like the ones above produce these pages because there is a public demand for explanations and guidance. Although some of that desire reflects a need to see one’s views vindicated, many people who arrive at these pages do so as a result of earnest questions. And both sets of people are affected by what they see on Facebook, Google, or Wikipedia pages.

Meanwhile, those of us in higher education are answering much more important questions than “Do avocados cure cancer?” or “Were any U.S. presidents in the Ku Klux Klan?” We’re too busy to improve the Wikipedia page on a subject or to post an informative page on a silly, poorly formed question. But in walking away from this demand, we cede the field to corporations, hacks, and charlatans. How can we complain about our “post-fact moment” if we are unwilling to supply the public with facts in the places where the public is looking, be that Facebook, Wikipedia, or Google?

Now is the time for an info-environmentalism curriculum. It’s true that information pollution has been a longstanding problem in mass media. But unlike the nightly news, the web is still a collectively maintained and produced environment. We can clean it up. We can pull those television shows and shopping carts and plastic bags out of our shared information streams and Google results.

I call the pedagogy of teaching students how to improve our online information environments info-environmentalism. Like environmentalism, info-environmentalism requires a...
curriculum that can approach the challenge from multiple angles, providing students with understandings of various issues:

- How the economic incentives of ad-tech and e-commerce contribute to information pollution
- What social media companies can do to address these issues
- How marginalized groups often endure abuse when trying to contribute to information spaces
- How polarization, bots, corporate money, and state-sponsored action are impacting information quality
- How individuals can minimize their own “misinformation footprint” by being more careful about what they post and using basic web research techniques

One of the most powerful ways to teach this is through action. And action in this space is about getting students to improve the information environment by posting better-quality information to the web. This can be achieved in many ways: editing Wikipedia; answering questions on Quora or StackExchange; creating explanatory YouTube videos; or posting pages on blogs or wikis that provide helpful guidance on these issues.

At Washington State University Vancouver, we’ve begun info-environmentalism projects with classes on climate change, human development, neuroscience, library research, health policy, and anthropology. What we’ve found so far is that providing decent information on niche subjects is a surprisingly easy way to top the Google search results. Students have been able to reach the top three Google search results on many questions with barely any effort put into increasing rank. The Internet is flooded with people expressing their opinion on this thing or that, but there is still a dearth of objectively written, well-sourced material on the web, even in 2017. By shifting students’ focus from arguing points to explaining things to others on the web, we can show our students that they can have an impact they never dreamed was possible.

Empower students to make a difference. This work is not new. I started my first info-environmentalism experiment, the Persona Project, twenty years ago, and I’ve pursued many others in the years since. Dozens of other projects, such as Jon Beasley-Murray’s Murder, Madness and Mayhem and Jeff McClurken’s digital history efforts, have inspired me since. The Wiki Education organization continues to do excellent work. Thousands of people are engaged in this field.

But I think the work of info-environmentalism is newly important and newly relevant. As the information environment has degraded over the past few years, many professors have become deeply alarmed. They, and their students, want to make things better. Those of us who are administrators, technologists, and instructional designers need to reorient our work and show them how to do so. Because if we don’t yank that metaphorical broken television set out of the local stream, who will?

**Notes**


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From the Private Sector to Mars: Observations and Advice

Wanted: Chief Information Officer for large (or small), private (or public), decentralized (or centralized) institution of higher learning. Must have high tolerance for committee meetings, consensus decision-making, thousands of independent entrepreneurs (aka faculty), and collaboration. Must be able to tolerate ambiguity and a pace that can be maddeningly slow. The mission—teaching, research, service—matters. Earnings per share, return on investment, return on committed capital, and other business metrics matter less. Must be able to get the most out of existing staff: our culture frowns on letting people go. Must be adaptable to different business models: we turn away 90 percent of prospective “customers,” and we have a predefined market. We offer the opportunity to work with many of the smartest people in the world, doing amazing research and education; to be surrounded by highly motivated, mission-focused people; to enjoy a true work-life balance that the private sector only pretends to embrace; and to know that you are doing work that makes a difference.

As vice president of information technology and the first university CIO at the University of Pennsylvania for the past four and one-half years, I have experienced firsthand the shock and awe of moving into higher education from “corporate America.” And I am not alone: there is a continuing trend toward private-sector IT leaders moving into higher education. To ease that transition, I here offer some observations and advice from the perspective of someone who spent twenty-nine years working in the private sector before coming to higher education.

When the University of Pennsylvania called, my initial response was that they must have the wrong number. Before joining Penn, I had started new jobs seven times (three as global CIO) in three different industry verticals (hospitality, wholesale distribution, and healthcare) for very large (Fortune 30), rapid-growth, aggressively profit-driven, high-stress companies. I experienced the vertigo that comes with such moves—new languages, new metrics, new people, new customs, and new values. Taking a job in a different industry is like moving to another country. But none of that prepared me for the switch to higher education. This was more like landing on Mars. The day I walked onto campus, the CIO tool-belt I had developed and depended on for my success over the years ceased to be useful. I had to develop many new tools as a CIO at Penn because of three main differences associated with working in higher education: motivation, decentralization, and culture.

The most profound difference is motivation, and by this I mean mission versus market. It has taken me much longer to effect change in the organization and to have the kind of overall impact that I have had in other jobs. One reason is the motivation of the university: the mission. In the private sector, motivations are driven largely by market expectations, stock price, and competition, all of which put a premium on information technology. Yet no matter how important information technology is at Penn, it will never be the primary lever for change, the business driver, that it has become in most industries. At Royal Caribbean, American, Bergen, and DaVita, technology drove and enabled the business. I was, quite literally, at the table for the most critical strategic business decisions. At Penn, information technology is important, but it is more foundational and supportive and does not take center stage. That stage is rightfully reserved for education, research, and service.

As a consequence of that reality, the CIO in higher education will not have the quarterly market calendar and expectations to drive pace and decision-making. The academic calendar is very different, and the collaborative and committee-based decision-making can drag out even seemingly inconsequential decisions. Having said that, I believe that the market perspective can be a value driver for the institution. For example, when I first arrived at Penn, the university was planning to build a brand-new, on-campus data center for central computing. I recommended against this capital investment based on the emerging cloud market, software as a service, compute virtualization, and the plethora of strong colocation and outsourc e providers offering raised floor space.

ADVICE: The market perspective is important and will bring value. Use it judiciously, and don’t assume that what you consider to be “rational,” “right,” or “no-brainer” (based on previous experience) is appropriate to the mission of your institution. Try to strike a balance between the institution’s pace and your sense of urgency. In my case, I call that splitting the difference between Penn-time and Tom-time.
Another difference is the degree to which decentralization prevails. At Penn, we operate under a budget model called Responsibility Center Management (RCM). While I have worked in both federated and decentralized companies, I have never experienced anything like the confederation that exists here. Even in the most decentralized companies, there was a unifying force (the stock price), and there was always a CxO who would mandate when necessary. There were shared strategies and priorities across units, and there were market consequences for inefficiency. It's different in the university, where I have some forty peers who run their own IT organizations, control their own budgets, and maintain their own decision rights on behalf of the school or center they represent. It’s for this reason that higher education environments are often compared not to hegemonic corporations but to diverse cities, with at times competing functions and interests. This reality places an enormous emphasis on cultivating relationships, encouraging collaboration, and seeking balance among very different organizations, value propositions, and needs for faculty, staff, and students. From a private-sector lens, this appears to be inefficient and leads to redundant spending. This decentralization may also be the difference that causes the most anxiety for CIOs coming from the private sector and results in self-selection out of higher education or in institutional rejection of those who cannot adapt.

**ADVICE:** Listen carefully to each school and each center. They really are different, and their approaches to and perspectives of “the mission” vary. Look for opportunities to add value by matchmaking, and don’t overemphasize “efficiency.” You won’t own, let alone control, everything. You will have a lot of accountability with little authority.

By far the biggest challenge for me has been the third difference: the culture of higher education. When you start a new job, it’s natural to bring the playbook that has worked in multiple jobs and industries. My private-sector playbook had what I considered to be standard operating principles/norms that I assumed would be understood. They weren’t. At Penn, it took a while for me to realize that in many cases, people honestly did not understand what I was talking about. This was my problem, not theirs. A wise person once compared working at Penn to living in a small town—a place where many people grow up and never leave. Think of every movie or TV show you’ve seen in which an outsider moves to a small town with an unconventional culture all its own. To everyone who has lived there forever, the town is normal, as is the behavior of any number of quirky eccentrics who no longer surprise the long-term inhabitants.

One of the biggest difficulties of stepping into a place like that is not knowing how people are connected to one another. And they always are, usually in unexpected ways. That is important to understand because it helps to explain people's priorities and how they rely on and influence one another and what ideas and experiences support their beliefs. This is where patience, perseverance, and empathy come into play. I now believe that the longer I am at Penn, the more people will connect with me and follow me because they will see me as one of the quirky eccentrics who has stuck around. I hope that over time, I will make more sense to them (or they’ll just become used to me).

**ADVICE:** Take it slow, and really get to know people. Don’t jump to conclusions about behaviors based on initial observations. Don’t push your playbook too hard; there are some gems in there, but you need to adapt to the situation. Empathy, not judgment, is the play here. Most people are in higher education because they honestly and earnestly believe in the mission.

So you’re ready to take the job, right? It’s not for everybody, but for the right person, it’s amazing. As in any other job, there are good days and bad days. There are politics and frustrations and too many demands with not enough supply. But there is something special about higher education. I have helped open the largest hotels in the world and have brought out the largest passenger ships ever built. I have been blessed with great work experiences and colleagues through the years. But I have never, ever gotten so excited from work until coming to Penn. Each time I don my regalia and participate in convocation and commencement, I get goosebumps. We are on a mission: to educate the next generation of leaders, to innovate the next life-altering technology, to further connect with our fellow human beings—in short, to change the world. And I get to play my part at one of the greatest education, research, and service institutions on the planet. Now that’s a job!

Thomas H. Murphy (tom.murphy@isc.upenn.edu) is Vice President of Information Technology and Chief Information Officer at the University of Pennsylvania.
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i. Total: 21,134, 20,046
j. Percent Paid and/or Requested Circulation: 78%, 82%

16) Publication of Statement of Ownership: Publication required. Will be printed in the November/December 2017 issue of this publication. 17) Signature of Editor, Publisher, Business Manager, or Owner: D. Teddy Diggs, Publisher/Editor, 9/20/17.
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