Digital Fellows Program

Convening #1

Scottsdale, AZ • July 16-19, 2017

Association of Chief Academic Officers

ACAO Digital Fellows Program
First Convening

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The ACAO Digital Fellows Program is supported by a generous grant from the Bill & Melinda Gates Foundation.

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ACAO Digital Fellows Program

Convening #1 • Scottsdale, AZ (Old Town) • July 16 – 19, 2017

Sunday, July 16	Monday July 17	Tuesday July 18	Wednesday July 19
Afternoon Arrivals Marriott Suites Hotel Scottsdale (Old Town) AZ	**Group Breakfast Buffet** Marriott • Ocotillo Room 7:30 – 8:30 **Session 1: Introductions and Overview** (8:30 – 10:00) • ACAO Welcome and project overview • Foundation welcome and overview • *Presentation:* Innovation and Infrastructure **BREAK: 10:00 – 10:20** **Session 2: Provosts, Pedagogy & Digital Learning** (10:20– 12:15) • Group discussion about project goals, digital learning, campus needs, implementation challenges, faculty roles, and CAO leadership on digital learning. **Lunch • 12:15- 1:30** **Session 3: Design Thinking on Digital Learning** (1:30 – 4:30) • Erin Casey, Design Quake *BREAK: 3:15 – 3:30* **Session 4: About ACAO** (4:30 – 4:45) **Session 5: Day One Summary** (4:45 – 5:30)	**Breakfast:** 7:30 – 8:30 (individual; in hotel restaurant) **8:45: Board bus for travel to EdPlus (ASU SkySong campus)** **9:15 – 4:00 @ EdPlus** *please see attachment for the detailed EdPlus Schedule* *P*resentations on • Adaptive Learning • Analytics / Action Lab • Adaptive Learning • Digital Teaching & Learning • Instructional Design • University Innovation Alliance • Global Freshman Academy • Student Success & User Support **4:00 Bus Back to Marriott**	**Group Breakfast Buffet** Marriott • Ocotillo Room 7:00 – 8:00 **Session 1: Follow-up on the Tuesday EdPlus Presentations** (8:30 – 8:30) **Session 2: Adam Newman, Tyton Partners (8:30 – 10:30)** • Courseware in Context • Time for Class 2017 **Session 3: Closing Session** (10:30 – 11:30) • Summary • Campus Teams and Grants • Fall Convening: mapping EDUCAUSE conference • Campus Visits • Other Closing Comments **LUNCH:** on your own *Participants head to the PHX airport for flights home*
Dinner • 6:30 **Cien Agaves** (Mexican) 7228 E. First Street .3 mi / 5 minute walk	*Dinner • 6:30* **Evo** (Italian) 4175 N. Goldwater Blvd. .4 mi / 7 minute walk	*Dinner* On your own	

EdPlus Schedule • Tuesday, July 18th

ASU EdPlus
Arizona State University

ACAO Digital Fellows at EdPlus

Tuesday, July 18

8:45 - 9:15	**Bus from Scottsdale Marriott to EdPlus at SkySong**
9:15 - 10:00 EdPlus @SkySong Bldg 3 • EdPlus Cafe	**EdPlus Tour and Opening Remarks** **Phil Regier,** University Dean for Educational Initiatives & CEO, EdPlus at ASU **Patricia Feldman**, Chief Culture Officer & Assistant University Dean for Educ. Initiatives **Sean Hobson,** Chief Design Officer and Acting Chief of Staff, Ed Plus
10:00 – 10:15	**Walk to SkySong Building 1**
10:15-10:45 SkySong Building 1 Room Global #201	**Adaptive Learning Overview** **Arthur "Art" Blakemore,** Vice Provost for Academic Success **Sean Hobson,** Chief Design Officer and Acting Chief of Staff, Ed Pl
10:45 - 11:45	**Action Lab Overview** **Tom Fikes,** Director of Research Operations
11:45 – 12:00	**Break**
12:00 – 1:00	***Keynote Lunch*** **EdPlus Overview: Digital Teaching and Learning at Arizona State** **Phil Regier,** University Dean for Educational Initiatives & CEO, EdPlus
1:00 - 1:45	**Instructional Design Overview** Online course design, development & scale; course and program quality assurance; faculty Inclusion, support & professional development; learning & assessment, **Vicki Harmon,** Senior Instructional Designer and Manager, Professional Development **Athena Kennedy,** Senior Instructional Designer
1:45 - 2:15	**Global Freshman Academy Overview** Adaptive approach to freshman mathematics; ALEKS demo **Adrian Sannier,** Chief Academic Technology Officer
2:15 - 3:00	**Operations and Student Success Initiatives Overview** **Jocelyn Rojeck,** Senior Director of Implementation & Strategy
3:00 - 3:15	**Break**
3:15 - 3:45	**Closing Remarks** **Mark Serale,** Executive Vice President and University Provost **Phil Regier,** University Dean for Educational Initiatives & CEO, EdPlus at ASU
3:45	**Bus back to Scottsdale Marriott Suites Hotel, Old Town**

Digital Pedagogy and Learning

Digital pedagogy and learning refer to any type of teaching/learning facilitated by technology. Simple applications of technology include accessing digital content and grading online, while more complex applications include use of digital tools to collaborate, apply, model, curate, and/or create and also the use of adaptive learning technologies.

> Digital courseware is a solution with the potential to support student-centered learning at scale in post-secondary education. While millions of students use digital courseware today in their college courses, significant opportunity remains for effective digital courseware use to support new teaching and learning strategies, improve course accessibility, and drive improvements in learning outcomes for postsecondary students. (*source:* Courseware in Context)

HIGHER EDUCATION IN THE DIGITAL AGE

Technology and digital tools are ubiquitous in the lives of students and faculty. Yet these resources are still not utilized to their full potential in promoting meaningful learning, facilitating retention and degree completion, and enhancing student outcomes.

- Students and faculty routinely communicate using e-mail.
- Students and faculty regularly use mobile devices, but infrequently use them as teaching and learning tools.
- Learning managements systems (LMS) are now ubiquitous, but institutions and faculty typically continue to use the LMS in ways that mimic a traditional classroom setting. As with other technology applications, much of the actual LMS activity is often in just 20-25 percent of the application's features and functions.
- Colleges and universities across all sectors now offer more online courses, but many continue to design online courses in ways that mimic traditional brick and mortar classes.
- Campuses have more technology available, but students and faculty are often unaware of it, are or unsure how to use/access it, or feel that it is not effectively supported by their department or institution.
- Despite the continuing campus and public conversations about the important role of information technology in instruction, comparatively few campuses have adapted an expanded notion of scholarship that acknowledges faculty instructional innovation in the review and promotion process.

OPPORTUNITIES FOR USING DIGITAL PEDAGOGY

(Adapted from: odl.mit.edu)

Digital tools help...

- ***Instructors improve instructional techniques*** through evidence-based research and hybrid learning models that enable instructors to measure how students learn most effectively.
    - Can draw from the best content previously developed by other instructors and colleagues, from within the same or from other institutions.
- ***Students learn more fully*** through dynamic opportunities for discussion, debate, collaboration, application, conjecture, and edification.
    - Tools for learning include: rapid assessment, games, annotation technology, videos with multiple instructors, discussion boards, and online support.
    - Tools for application include: flipped classrooms, simulations, visualizations, modules, and digital labs.

- ***Universities collect more accurate data about students' progress and abilities.***
    - Better data and analytic tools identify opportunities to *do better* to enhance student learning, retention, and outcomes.
    - Changing the campus culture to use data as a resource, not a weapon.
- ***Instructors leverage time better*** by providing them with quick feedback regarding where students are struggling and thriving.
    - Facilitates targeted instruction based on students' real time needs
    - Eases or eliminates routine grading
- ***Students learn more efficiently*** with the aid of digital assessments that give them rapid feedback on their understanding.
    - Within digital assessments, students also benefit from adaptive hinting, which provides guidance to incorrect responses, corrects misperceptions immediately, and helps students to figure out problems in real-time.
- ***Universities intervene more quickly and effectively with students who are struggling.***
- ***Instructors differentiate for students' diverse needs*** by recommending or providing students with personalized and existing digital tools and resources.
- ***Students learn with mastery*** by pacing their own learning, reviewing material as needed, and assessing their understanding before moving on to a new concept/skill.
- ***Universities ensure more students persist*** by developing customizable pathways to degrees.
- ***Instructors spread knowledge widely*** through digital platforms that can reach more students.
- ***Students learn anytime, anywhere*** through affordable and accessible asynchronous classrooms.

Additional Opportunities

- Cost savings through open resources and textbooks
- Adaptive technology that anticipates and responds to learners' skill levels and needs
- Learning spaces that facilitate more productive use of digital and technology tools and resources
- Learning analytics and data that grow increasingly nuanced
- Integrated planning and advising
- Embedded peer interactions and connectedness
- Group messaging

IMPLEMENTATION CHALLENGES

- Students experience disparities in access to technology platforms, high-speed broadband connectivity, and engagement.
- Faculty resist adoption due to general resistance to change compounded by technology and digital anxiety. Many also often believe that online and digital tools are inferior and/or cumbersome.
- Too absence of clear and compelling evidence about the impact and benefits of information technology and digital learning resources on student learning and outcomes. Too much of the discussion remains drven by opinion and epiphany rather than evidence of impact.
- Faculty feel overwhelmed by selecting and implementing the right tool for any particular learning objective.
- Faculty feel ill-prepared or supported to adopt digital tools.

- Fragmented implementation, as individual academic units go their own way with leveraging digital resources for teaching, learning, and instruction.
- Absence of a clear and compelling institution plan for leveraging digital resources to improve student learning, enhance institutional outcomes, and improve retention and graduation rates.

ONLINE RESOURCES AND REFERENCES

Cal Recommended Sources on Digital Reading	Annotated bibliography of articles and studies regarding digital reading
Teaching in a Digital Age	Open access textbook
Digital Tools for the Classroom	List of digital tools generated by MIT's Office of Digital Learning
Strive for College/I'm First	Tools, mentorships, and support for first gen college students
CUNY Innovation Survey	Disruptive and innovative projects and assignments
EdSurge Digital Learning Network	Digital tools and examples
UNC reviewed EdTech/Apps	Reviewed apps and digital tools
The Pedagogy Project	Examples of how to incorporate digital tools
EdSurge Newsletter	Newsletter regarding education technology
EDUCAUSE Constituent & Discussion Groups	Various Listservs about IT issues in higher education
The Merlot Project	Offers a curated collection of free and open online teaching, learning, and faculty development services.
Courseware in Context	Provides an inventory and assessment of digital learning resources.

Beginning the Fourth Decade of the "IT Revolution" in Higher Education

Plus Ça Change

Plus ça change, plus c'est la même chose.
("The more things change, the more things stay the same.")

By Kenneth C. Green

January 24, 1984, will be remembered in the technology world and elsewhere as the day that Apple launched the Macintosh computer. In the crowded Flint Center at De Anza College, a community college across the street from the Apple campus in Cupertino, California, Steve Jobs pulled a beige computer out of a gray travel bag and formally introduced the Mac to the world.[1]

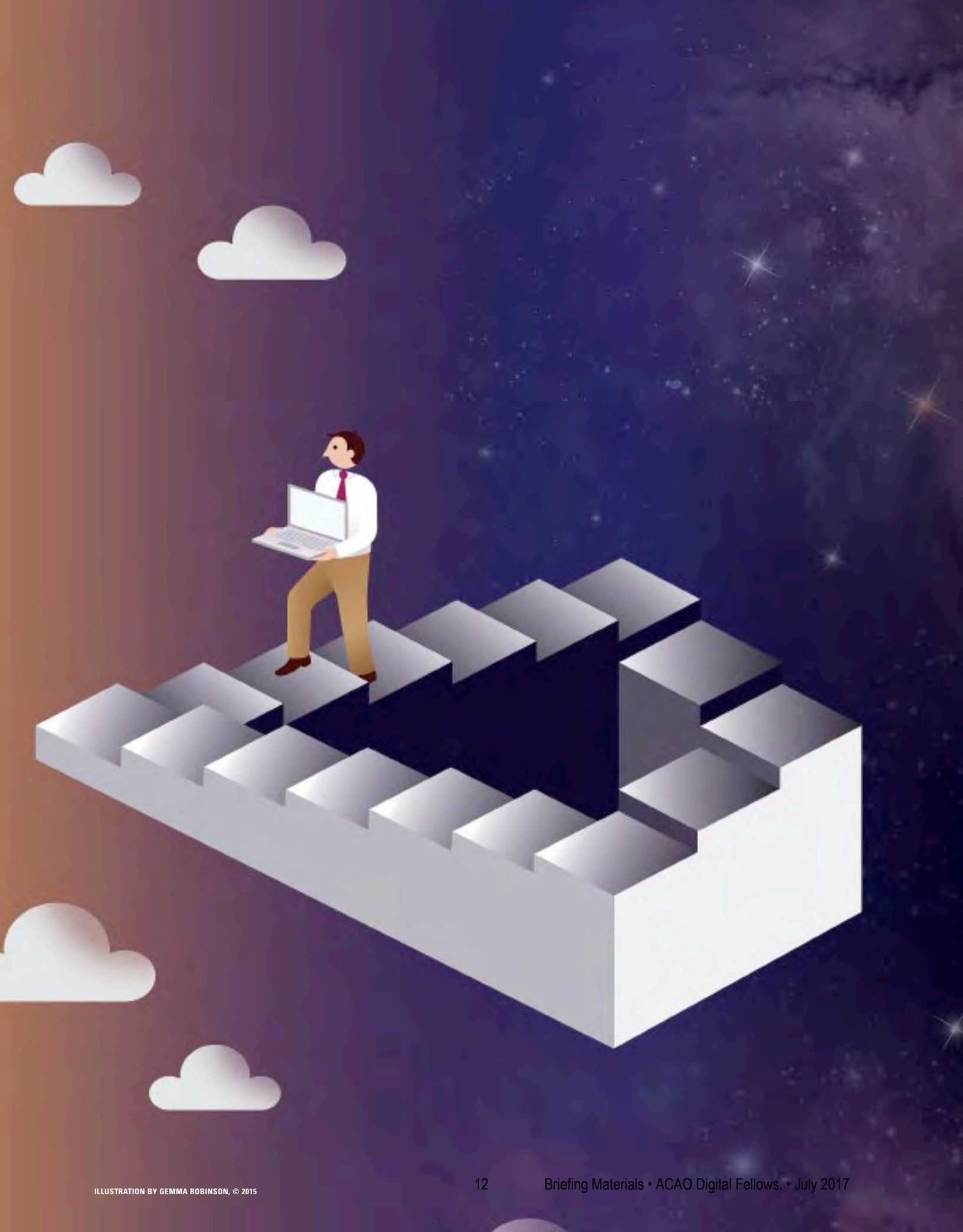


ILLUSTRATION BY GEMMA ROBINSON, © 2015

Less known or remembered about the day is that concurrent with the Macintosh launch at De Anza College, undergraduates at Drexel University in Philadelphia were the first college students anywhere in the world to see the Mac up close and personal. In the run-up to the 1984 Macintosh launch, Apple negotiated agreements with some two dozen, primarily private, Ivy League or other highly selective colleges and universities to sell Macs to college students for $1,000 (well below the retail price of $2,495). Drexel, then viewed by many as a blue-collar engineering school that lived in the shadow of the University of Pennsylvania, was somewhat of an outlier in the group of largely elite institutions that made up the Apple University Consortium (AUC). Yet Drexel, under the technology leadership of Brian Hawkins (who would become the founding president of EDUCAUSE fourteen years later), was the first college or university to sign a Macintosh purchase agreement with Apple, in the spring of 1983; moreover, the Drexel agreement, unlike most of the other AUC contracts, provided a Mac to *all* first-year students. And so because Drexel made the early and significant commitment to Apple, Drexel students were the first in the nation to get Macs through campus-purchase programs.

Given the current ubiquity of technology on college and university campuses and in the consumer market, it can be difficult to understand the excitement and impact of the first generation of *personal* computers—IBM PCs and Apple Macs—some thirty years ago. The arrival of these devices on campuses was the catalyst for what, in 1986, EDUCOM Vice President Steve Gilbert and I called the "new computing" in higher education: "Thousands of faculty members and administrators have decided that 1986 is the year that they will have a personal relationship with computing. . . . Most academics now getting started on computing are professionals who haven't been computer users before and who will never think of themselves as computer experts. What they realize is that they are embarking on a journey they can no longer delay."[2]

Great Expectations

That technology journey—*our technology journey*—has taken all of us many places over the past three decades. The journey has been fueled, in part, by great expectations for the use of new technologies in education—expectations that were articulated well before the first PCs and Macs even arrived on college and university campuses. For example, in a 1913 newspaper interview, the prolific inventor Thomas Edison proclaimed: "Books will soon be obsolete in the public schools. Scholars will be instructed through the eye. It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed in ten years."[3]

A key responsibility of and challenge for IT leaders is to manage expectations and to communicate the effectiveness of IT investments.

A half century later, in a 1966 *Scientific American* article, Stanford Professor Patrick Suppes observed: "Both the processing and the uses of information are undergoing an unprecedented technological revolution." Anticipating that technology could bring great benefits to education, Suppes added: "One can predict that in a few more years millions of schoolchildren will have access to what Philip of Macedon's son Alexander enjoyed as a royal prerogative: the personal services of a tutor as well-informed and responsive as Aristotle."[4]

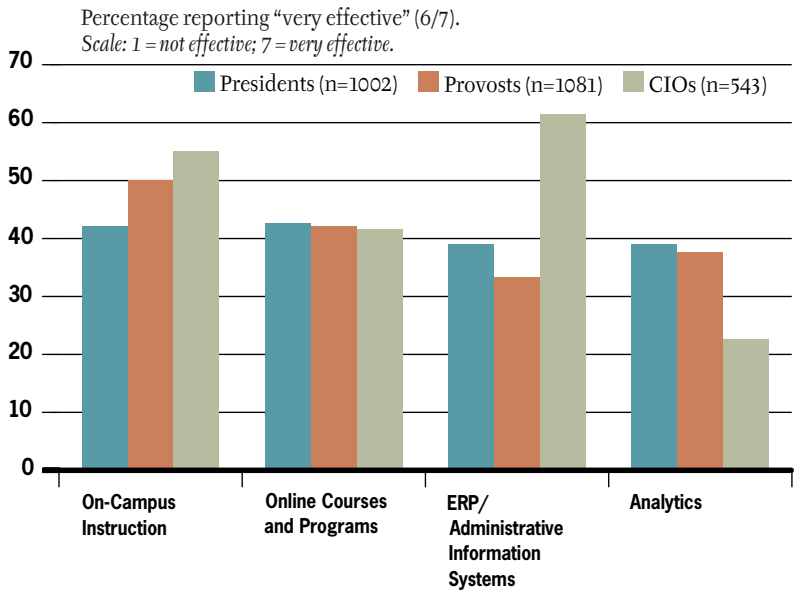
Note that Edison's 1913 prediction for the demise of books in public schools was offered eleven years before sound came to motion pictures. Suppes's 1966 prediction of the digital Aristotle was published just a year after IBM released the game-changing IBM 360 mainframe computer and about a decade before the arrival of the Apple II computer. Edison did not secure his fame or fortune by providing motion pictures that would supplant textbooks in public schools. Suppes, however, went on to co-found the Computer Curriculum Corporation in 1967, one of the first companies to create instructional software for education.

A more sobering view of the challenges involved in deploying technology resources in education was put forth in 1972 by George W. Bonham, founding editor of *Change* magazine, an influential publication in higher education:

> For better or worse, television today dominates much of American life and manners. . . . Part of [the] lackluster record of the educational uses of television is of course due to the heretofore merciless economies of the medium. But fundamental pedagogic mistrust of the medium remains also a fact of life. The proof of the pudding lies in the fact that on many campuses today fancy television equipment . . . now lies idle and often unused. . . . Academic indifference to this enormously powerful medium becomes doubly incomprehensible when one remembers that the present college generation is also the first television generation.[5]

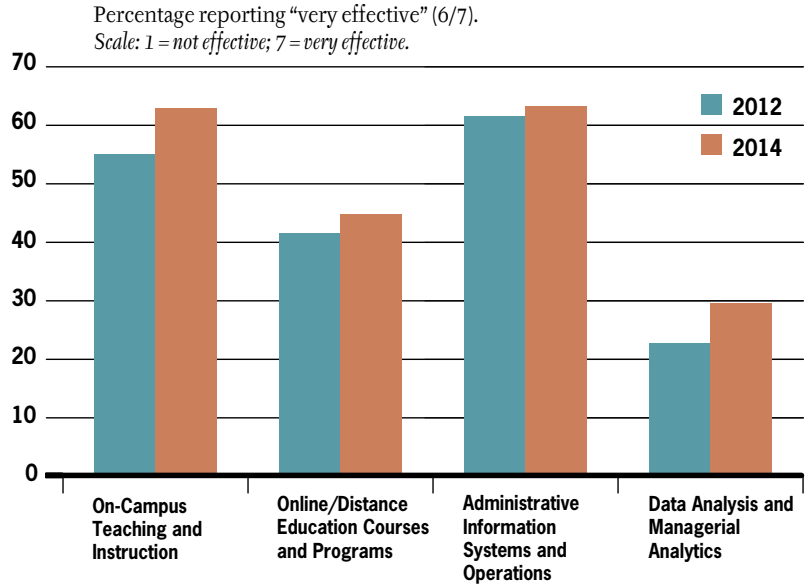
Substitute the word *technology* for *television,* and Bonham's assessment speaks volumes about similar challenges inherent in current efforts with information technology: the high costs of creating useful and effective instructional content, pedagogic distrust (or, at a minimum, ambivalence) about the impact and benefits of instructional content and technologies, and expensive equipment

FIGURE 1. Rating the Effectiveness of Campus Investments in Information Technology, 2012



Source: The 2012 Inside Higher Ed Survey of College and University Presidents; The 2011–12 Inside Higher Ed Survey of College & University Chief Academic Officers; Kenneth C. Green, *Campus Computing Survey, 2012*

FIGURE 2. CIO Assessments of the Effectiveness of Campus Investments in Information Technology, 2012 vs. 2014



Source: Kenneth C. Green, *Campus Computing Survey, 2012 & 2014*

lying fallow on college and university campuses. Moreover, the irony of Bonham's assessment is that the "present college generation" he referenced in 1972 is the middle-aged (and older) members of today's professorate!

Campus leaders' perspectives on the impact and effectiveness of the institutional investment in information technology are reflected in three roughly concurrent surveys that I conducted from December 2011 to September 2012. The three groups of survey participants—presidents, chief academic officers, and chief information officers (CIOs) across all sectors of higher education—were asked to assess eight separate areas of technology investment: academic support services; alumni services; on-campus instruction; online instruction; libraries; management and operations; research and scholarship; and student services. For the purposes of this discussion, it is useful to look at the responses of presidents, provosts, and CIOs on the "big four" issues: on-campus instruction; online instruction; management and operations; and analytics.

As shown in figure 1, less than half (and often just 40 percent) of presidents and provosts assessed campus IT investments to be "very effective" (a 6 or 7). CIO assessments were slightly different from those of presidents and provosts, but not by much—except for the over 60 percent of CIOs who assessed the institutional investment in "administrative information systems and operations" as "very effective."[6]

By 2014, the percentage of CIOs reporting "very effective" on these same four metrics improved slightly (see figure 2); comparable data for presidents and provosts is not available.

Unfortunately, the data provides clear evidence that the great expectations for technology to aid and improve instruction, operations, and data analysis have fallen short. Over the years, both technology providers and campus technology advocates/evangelists may have contributed to unrealistic expectations about how quickly an investment in information technology could deliver expected gains in instructional outcomes or institutional performance and productivity. A key responsibility of and challenge for IT leaders is to manage expectations and to communicate the effectiveness of IT investments. We can—*and must*—do better.

Plus Ça Change

The technologies that are pervasive and ubiquitous both on and off campus today have changed dramatically since the arrival

of the first PCs and Macs in the mid-1980s. Without question, we have witnessed amazing technological change (*the more things change*) over the past three decades: hardware, software, the Internet, wireless networks that foster mobility, digital content, social media, and "big data" analytics. However, at least in the higher education arena, this change has been bounded by continuing challenges that often impede efforts to leverage and effectively exploit the full value of technology investments (*the more they stay the same*). These challenges largely involve the *enabling infrastructure*: integrating technology into instruction; improving productivity; furthering online education; recognizing and rewarding faculty who "do IT" in instruction; using data to aid and inform decision making; and managing expectations about information technology.

In many ways, colleges and universities now lag behind where they once led. Consumer markets and corporations move and adopt more quickly. Consequently, higher education's concurrent delay in implementation and effective exploitation of many common consumer- and corporate-sector technologies causes many students, faculty, administrators, board members, and other observers to ask: "Why can I do these things off campus but not on campus?"

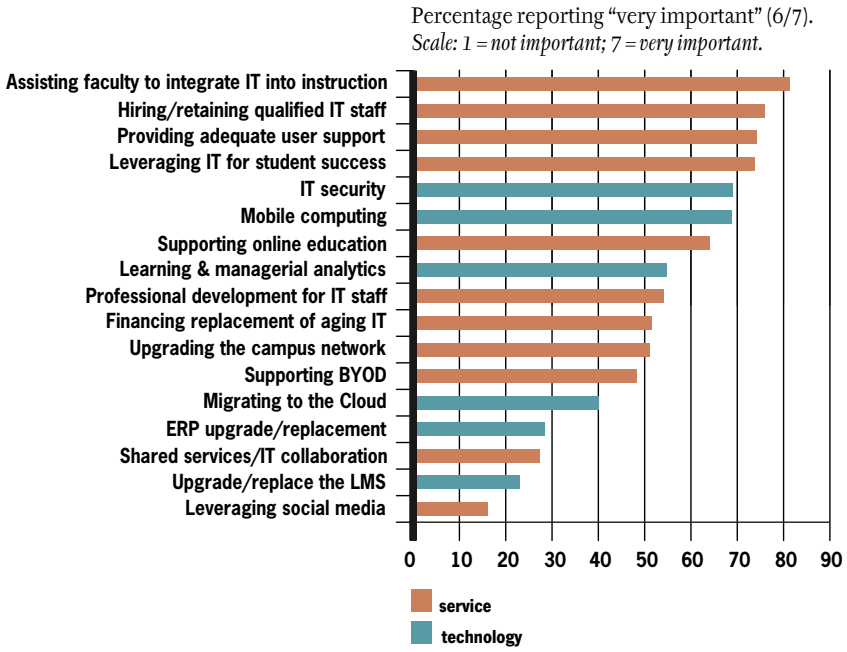
Three decades into the much-discussed and often overhyped technology revolution in higher education, it is increasingly clear that the major technology challenges confronting higher education are not about technology per se (i.e., the things we buy). Rather, as EDUCAUSE publications have often noted, the challenges involve how we *deploy* various technologies effectively (the things we do with technology). And I would argue that perhaps most important, these challenges are about the people, program, policy, planning, political, and budget issues that often impede implementation efforts.

Technology Priorities

We should not be surprised that the biggest technology challenges focus on continuing efforts with the instructional integration of IT resources. That's the clear message that emerges from more than a decade of data about IT priorities from the annual Campus Computing Survey of CIOs and senior campus officials. For example, in the fall of 2014, 81 percent of the CIOs and senior IT officers participating in the survey identified the instructional integration of information technology as a "very important" campus IT priority over the next two to three years (see figure 3), followed by "hiring/retaining qualified IT staff" (76 percent), "providing adequate user support" and "leveraging IT for student success" (both at 74 percent), and "IT security" (69 percent). And although the fall 2014 numbers for top IT priorities vary slightly by sector (e.g., research universities vs. community colleges), there is great consistency about the top three items across sectors: instruction, staffing, and user support.[7]

How is higher education addressing the top technology priority of instructional integration of IT resources? Are colleges and universities assessing their work in this area?

FIGURE 3. Campus IT Priorities, Fall 2014



Source: Kenneth C. Green, *Campus Computing Survey, 2014*

TABLE 1. Campuses with a Formal Program to Assess the Impact of Information Technology on Instruction and Learning Outcomes

	2002 (%)	2005 (%)	2008 (%)	2011 (%)	2014 (%)	Percent Change 2002–2014
All Institutions	19.8	35.9	43.6	40.5	23.2	17.1
Public Research Universities	29.2	39.5	52.0	46.7	26.2	-11.3
Private Research Universities	34.2	35.4	52.3	50.0	26.2	-23.4
Public BA/MA Institutions	18.7	42.3	45.3	40.9	29.8	43.3
Private BA/MA Institutions	13.2	31.0	35.6	32.8	15.8	19.7
Community Colleges	21.7	34.4	45.1	44.5	27.5	26.7

Source: Kenneth C. Green, *Campus Computing Survey* (selected years)

Unfortunately, most institutions over the past decade or so have not invested in formal efforts to assess the impact of technology in instruction and learning; moreover, whereas some sectors have experienced modest gains, the numbers have declined between 2002 and 2014 for public research and private research universities (see table 1) and generally remain lower overall: under 30 percent across all sectors in the fall of 2014. Without a commitment to evaluating investments in innovation, we can't know what works.

The Productivity Conundrum

Recent reports suggesting that productivity in the United States has declined should be a catalyst for the continuing conversation about productivity and technology in higher education. Some productivity experts argue that the productivity-enhancing impacts of new technologies (e.g., iPhones, social media) are less than the productivity gains that followed the emergence of the personal computer and the Internet three decades ago.[8] And then there is the May 2015 assessment by Paul Krugman, a Princeton University economics professor and Nobel laureate: "The whole digital area, spanning more than four decades, is looking like a disappointment. New technologies have yielded great headlines, but modest economic results." Krugman added: "New technology is supposed to serve businesses as well as consumers, and should be boosting the production of traditional as well as new goods [and services]. The big productivity gains of the period from 1995 to 2005 came largely in things like inventory control, and showed up as much or more in non-technology businesses like retail as in high-technology industries themselves. Nothing like that is happening now."[9]

Most institutions over the past decade or so have not invested in formal efforts to assess the impact of technology in instruction and learning.

"Great headlines, but modest results" (to paraphrase Krugman) might also be an appropriate characterization of technology and productivity in higher education. Admittedly, economists have a precise definition for *productivity* and specific metrics for measuring productivity. However, you'll need more than a good economics textbook to secure consensus on the meaning of "academic productivity" among faculty and administrators, with the latter recognizing the need to improve "academic productivity" as a way to reduce (or at least contain) the rising cost of higher education.

Indeed, much as we struggle with the meaning and attributes of *quality* in higher education, so too do we struggle with the meaning and attributes of *productivity*, particularly in the context of campus investments in and expenses for technology in research, instruction, operations and management, and support services. Yet there is an implied expectation that IT investments in higher education should result in improved productivity. The questions then become: *How would we know? What should we measure?*

Yes, we can probably measure productivity in the research domain, and it is likely significant. Simulations and analysis that once consumed huge computer resources for computation and storage and that previously required significant (and expensive) mainframe time are now routinely run, often quickly,

on notebook, desktop, and lower-cost supercomputers.

It is in the other domains—instruction, operations and management, and support services—that the conversation about information technology and productivity becomes problematic. To be sure, many of higher education's IT investments over the past three decades have made improvements in these domains. The Internet has brought rich digital content to students and faculty across all sectors, segments, and disciplines. Online registration and fee payment have saved countless students countless hours previously spent standing in long registration and payment lines at the beginning of each term. Analytic systems now automatically pour data into dashboards as part of the effort to aid and inform decision making. Monitoring systems send automatic e-mails to students and faculty when they detect signs that students may be falling behind in coursework. But in many ways, these examples reside at the margin, not the core, of the productivity conundrum. Despite these gains, higher education costs have not declined. The understanding that technology will enhance productivity and consequently reduce costs has not played out in most sectors of American higher education.

Although campus IT budgets may ebb and flow somewhat during good and bad economic times, institutions continue to spend significant sums on information technology—about 5 to 6 percent of the total institutional operating budget—for instruction, operations and management, and support services.[10] Yet few would argue that individual institutions, as well as higher education as an "industry," are now more productive because of IT expenditures and investments.

MOOCS and Online Education

Online enrollments have exploded over the past fifteen years.[11] Online courses and programs would seem to be the one higher education domain that could showcase the productivity gains from technology investments.

Yet despite the big gains in online enrollments across all sectors and segments, it is not clear that "going online" has reduced costs and increased instructional or institutional productivity. Part of the problem is that colleges and universities do not do a good job of dealing with cost accounting—particularly cost accounting for instructional programs. Instructional "costs" in online programs are often taken as the direct cost of faculty time, with little acknowledgment of any of the other costs involved in developing and supporting online programs: course and content development, the use of instructional support services, the time provided by IT support staff to assistant students and faculty, and allocating the true overhead costs involved in individual online courses and programs.

The productivity pressures are reflected in the fawning endorsements for MOOCs we witnessed several years ago. Part of the attraction of MOOCs was the potential for scale—the opportunity to enroll 10,000 or 100,000 students in a single course. But completion rates are dismal (in the single digits), user support issues are significant, development costs are high, and revenues (for the institutions that seek to make money from "free" courses") may be problematic.

If campus officials are truly committed to advancing the role of technology in instruction, then it is time for these leaders to stand up for and stand with the faculty who are doing this work.

Over the past two years, the response to the low-completion critique of MOOCs has involved a revisionist redefinition of "course completion" in the context of student intention. That is, course completion is calculated based on those whose intent, at the time of MOOC registration, was to complete the course, rather than just browse or audit. For example, a recent HarvardX report revealed that 22 percent of the "intend to complete" registrants across nine HarvardX courses earned a certificate.[12] These numbers are better than the single-digit completion rates generally reported for the larger population of MOOC registrants, but something is missing here. Where is an appropriate (indeed, necessary!) comparison number for more "conventional" online courses or more traditional classroom-based courses? In the case of the latter courses—such as developmental math, introductory psychology, organic chemistry, or Elizabethan sonnets—almost all those who register probably "intend to complete" the course. Would the faculty, department chairs, and deans who supervise these courses be satisfied with a 22 percent or even a 35 percent completion rate? Unlikely.

In this context we might consider the data from a recent study—conducted by the Community College Research Center at Teachers College, Columbia University—of online and on-campus courses at two community colleges. Students who enrolled in (non-MOOC) online courses were almost twice as likely to withdraw from or fail the class than were their counterparts in face-to-face (F2F) courses. But even here, the completion rate was 70–80 percent for students in online courses and 80–90 percent for students in F2F courses.[13] Also of interest may be a 2013 study of the completion rates for some 5,700 students enrolled in either (non-MOOC) online or traditional (F2F) courses at a public comprehensive university. Although

TABLE 2. Campuses with a Formal Program to Recognize and Reward the Use of Information Technology as Part of the Routine Faculty Review and Promotion Process

	1997 (%)	2002 (%)	2005 (%)	2008 (%)	2011 (%)	2014 (%)	Percent Change 1997–2014
All Institutions	12.2	17.4	19.3	19.1	19.8	16.4	32.7
Public Research Universities	7.8	16.9	14.5	16.0	13.3	18.5	137.2
Private Research Universities	10.0	5.9	10.4	9.1	7.1	9.5	-5.0
Public BA/MA Institutions	12.2	22.3	25.0	21.7	25.8	16.9	38.5
Private BA/MA Institutions	14.4	15.4	20.1	16.4	19.0	12.3	-15.3
Community Colleges	12.1	18.2	19.8	24.6	25.5	23.9	97.5

Source: Kenneth C. Green, *The Campus Computing Survey* (selected years)

there was a statistically significant difference in the completion rates (higher for F2F courses), both the online and F2F courses reported completion rates over 93 percent.[14]

The course completion numbers for non-MOOC online and F2F courses cited in these two reports are more than three to four times better than the 22 percent completion rate reported for the HarvardX students "who intend" to complete MOOCS. To date, the experience with MOOCs suggests that they are one point on the continuum of online education options for students and institutions. But at present, MOOCs may at best supplement, not supplant, more conventional approaches to both online and F2F courses.

Faculty Recognition and Reward

Across all sectors, most colleges and universities loudly and proudly proclaim their commitment to the innovative use of technology in online and on-campus instruction. Concurrently, most institutions continue to ignore and, more often, punish faculty members who would like to have their efforts in innovative and effective uses of IT resources in instruction considered in the review and promotion process. The conventional wisdom often offered to younger faculty is "don't do tech" until after they have earned tenure. Indeed, the issue of recognition and reward remains one of the most daunting issues facing faculty of all ranks—but especially junior (tenure-track) faculty—as they build their scholarly portfolios.

Data from the fall 2014 Campus Computing Survey reveals that on average, two-fifths of institutions support instructional innovation with grants to help faculty redesign courses or create simulations, ranging from 26.9 percent in private BA/MA institutions to 56.9 percent in public research universities.[15] Yet too few institutions have expanded the algorithm for faculty review and promotion to include technology. Consider, for example, the trend data on "review and promotion" from the annual Campus Computing Survey. The good news is that in many sectors, the proportion of institutions that have expanded the faculty review and promotion criteria to include technology has increased dramatically. The exceptions are private research universities and private BA/MA institutions, where the numbers remain largely the same as they were in 1997. But even with the gains, the numbers in all sectors are still very low: less than 25 percent in the fall of 2014 (see table 2).

The survey data cited above provides clear evidence that despite the proclamations of presidents, provosts, and

board chairs about how their institutions have made significant investments to leverage information technology for instruction, the operational decisions about tenure and promotion depend on the decisions of senior faculty and department chairs—and on whether these departmental leaders will recognize and support the technology efforts and activity of faculty into and through the review and promotion process.

If campus officials—including IT leaders—are truly committed to advancing the role of technology in instruction, then it is time for these leaders to stand up for and stand with the faculty who are doing this work, affirming the value of technology for those who wish to affirm it as part of their scholarly portfolio.

In the effort to make better use of data for decision making, we also have to address the *data culture* in higher education.

The Data Challenge

The third "A" in the accessibility, affordability, and accountability mandates of *A Test of Leadership* (the 2006 Spelling Commission report) was a clear directive to higher education and to college and university leaders to *bring data* to address the "remarkable shortage of clear, accessible information about crucial aspects of American colleges and universities."[16]

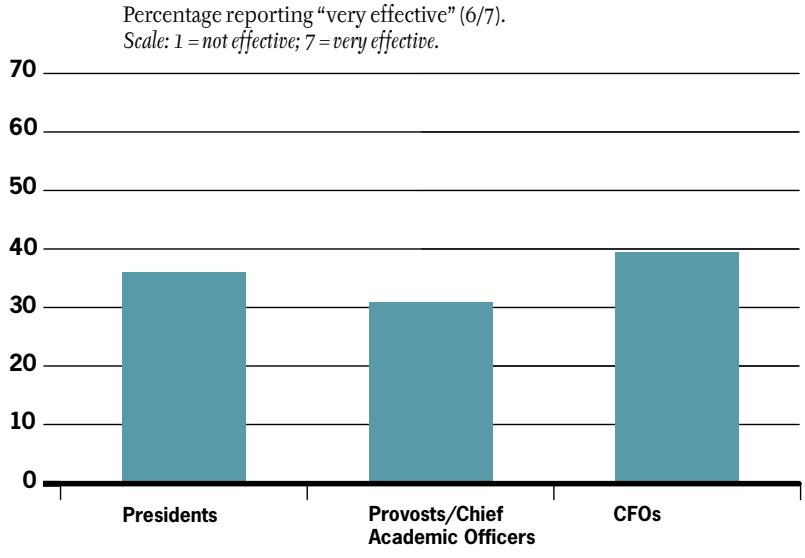
As I wrote in *EDUCAUSE Review* at the time: "The issue before [the higher education IT community] in the wake of the Spellings Commission report concerns *when* college and university IT leaders will assume an active role, a *leadership* role, in these discussions, bringing their IT resources and expertise—*bringing data, information, and insight*—to the critical planning and policy discussions about institutional assessment and outcomes that affect all sectors of U.S. higher education."[17]

Admittedly, we have made some important gains in the data domain. Technology providers have improved the range of the analytic resources they now offer campus clients. Colleges and universities are beginning to leverage real-time student data from the learning management systems and other sources to send warning notices to both faculty and students regarding course progress. On a broader scale, the EDUCAUSE Core Data Service (CDS), launched by former EDUCAUSE President Brian Hawkins in 2002, provides benchmarking data on various IT metrics. Whereas the Campus Computing Project focuses primarily on IT planning and policy issues, the CDS provides detailed institutional data on IT financials, staffing, and services.[18]

Yet in 2011, less than two-fifths of presidents, provosts, and chief financial officers ranked their institutions' use of data to aid and inform decisions as "very effective" (see figure 4). In 2012, only 22.7 percent of CIOs, 37.7 percent of provosts, and 39 percent of presidents rated their institutional investment in analytics as "very effective" (see figure 1). By 2014, just 30 percent of CIOs rated investment in analytics at their institutions as "very effective" (see figure 2).

Finally, in the effort to make better use of data for decision making, we also have to address the *data culture* in higher education. Too often, data is used as a *weapon* (What was done wrong?) as opposed to a *resource* (How can we do better? What's the path to doing better?). The model here should be continuous quality improvement: using data to aid and inform decision making and to help improve programs, resources, and services.

FIGURE 4. Using Data to Aid and Inform Campus Decision Making, 2011



Source: The 2011 Inside Higher Ed Survey of College and University Presidents; The 2011–12 Inside Higher Ed Survey of College & University Chief Academic Officers; The 2011 Inside Higher Ed Survey of College and University Business Officers

Priorities: What We Must Do Better

For the past several decades (and particularly over the past ten years), there has been much talk about the need for change in higher education. Concurrently, there has been much talk about technology as a catalyst for change. Yet as noted above, the key technology challenges that confront higher education are not about technology per se; rather, they are about our efforts to make effective use of technology resources, and they are about the people, planning, program, policy, and budget issues that often impede these efforts.

As we look ahead to the fourth decade of the technology revolution in higher education, campus and IT leaders must focus on the *enabling infrastructure* that will allow (a) students of all ages and backgrounds to realize their educational aspirations; (b) faculty across all disciplines and sectors to realize their instructional aspirations and scholarly goals; and (c) institutions across all sectors to do a better job of exploiting the power and potential of technology resources to enhance instruction, operations and management, and support services.

Accordingly, as we look beyond bits and bytes, beyond hardware and software, beyond network speeds and feeds, and beyond the ebb and flow of IT budgets in good times and difficult times, the priorities for information technology in higher education for the next decade are clear:

- *User Support.* Colleges and universities across all sectors must commit to major improvements in user training and support, including support for faculty who want to do more with IT resources in their instructional activities.
- *Assessment.* Opinion and epiphany cannot be allowed to dominate the conversations about institutional IT policy and planning. If colleges and universities are going to invest in technology to support instruction, they also need to assess the impact of these continuing efforts and investments in teaching, learning, and educational outcomes.
- *Productivity.* Much as higher education has struggled with the conversation about quality, so too will academe continue to struggle with a candid discussion about productivity. It is now time for academic leaders, including higher education's IT leadership, to have frank, candid, and *public* conversations about productivity: What are the appropriate metrics? What are reasonable expectations? What might technology contribute? And what are the limits of information technology in the discussion about productivity?
- *Online Education.* The large numbers of students enrolled in online courses and the growing number of institutions that offer online programs speak to both student interest and institutional aspirations and opportunities. The data on the educational outcomes of (non-MOOC) online courses and programs remains mixed. To do better, institutions must commit to significant and sustained efforts to evaluate their online efforts, documenting what works and what needs to improve. Concurrently, we need a new candor about the true costs of developing online programs, which includes full cost accounting for the people and the institutional resources required to support online programs and online students.
- *Recognition and Reward.* We must move to an expansive definition of *scholarship* in order to value the efforts of faculty who commit to making technology and experiments with IT resources part of their instructional portfolios. It is time for the deans, department chairs, and senior faculty who populate review and promotion committees to stand up for and stand with their colleagues who are innovating with technology.
- *Data as a Resource.* Higher education institutions must stop using data as a weapon against students, faculty,

and programs. Rather, they should commit to using data as a resource that provides information and insight about the need for change and the path toward that change.

- *The Value of Information Technology.* In general, IT leaders have not done a good job of communicating the value of information technology to campus audiences. Moreover, institutional leaders must do a better job of conveying the value and impact of higher education's investments in information technology to off-campus audiences: board members, project sponsors, patrons, alumni, and government officials.

Higher education has invested significant time and money in information technology over the past three decades. And admittedly, academe has experienced some significant benefits in the areas of content and services. However, our reach continues to exceed our grasp, our aspirations continue to fall short of our implementations, and the corporate and consumer experience continues to cast a shadow over campus efforts. A renewed commitment to an enabling infrastructure, as part of our ongoing investment in IT resources, will help to ensure that the more things change, the less they will stay the same. ■

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TOP 10 IT ISSUES, 2017

Susan Grajek and the 2016–2017 EDUCAUSE IT Issues Panel

The 2017 EDUCAUSE Top 10 IT Issues are all about student success.[1] Information technology in higher education continues to have many priorities and serve numerous constituents. IT service catalogs comprise hundreds of services to meet the many needs of faculty, students, and staff in various fields: the humanities; social, biological, and physical sciences; law; music; theater; art; business; and healthcare and allied professions. You name it, higher education offers it, and the IT organization supports it. Every academic and administrative area makes its own, separate demands on the IT organization, at any time and from any place. Despite the many and disparate requirements of each user and each technology, a predominant focus has risen to the top for higher education information technology in 2017, and that focus is student success. Colleges and universities are concentrating on student success to address concerns about the costs, value, and outcomes of higher education. Student success initiatives are making use of every available resource and opportunity and are involving every relevant stakeholder. Institutional technology is all three: resource, opportunity, and stakeholder.

FOUNDATIONS FOR STUDENT SUCCESS

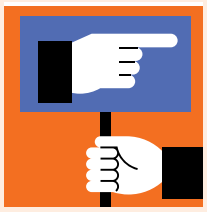
2017 Top 10 IT Issues

1. ***Information Security:*** Developing a holistic, agile approach to reduce institutional exposure to information security threats

2. ***Student Success and Completion:*** Effectively applying data and predictive analytics to improve student success and completion

3. ***Data-Informed Decision Making:*** Ensuring that business intelligence, reporting, and analytics are relevant, convenient, and used by administrators, faculty, and students

4. ***Strategic Leadership:*** Repositioning or reinforcing the role of IT leadership as a strategic partner with institutional leadership

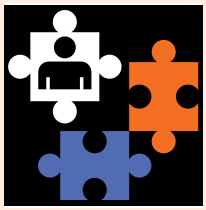


5. ***Sustainable Funding:*** Developing IT funding models that sustain core services, support innovation, and facilitate growth

6. ***Data Management and Governance:*** Improving the management of institutional data through data standards, integration, protection, and governance

7. ***Higher Education Affordability:*** Prioritizing IT investments and resources in the context of increasing demand and limited resources

8. ***Sustainable Staffing:*** Ensuring adequate staffing capacity and staff retention as budgets shrink or remain flat and as external competition grows



9. ***Next-Gen Enterprise IT:*** Developing and implementing enterprise IT applications, architectures, and sourcing strategies to achieve agility, scalability, cost-effectiveness, and effective analytics

10. ***Digital Transformation of Learning:*** Collaborating with faculty and academic leadership to apply technology to teaching and learning in ways that reflect innovations in pedagogy and the institutional mission

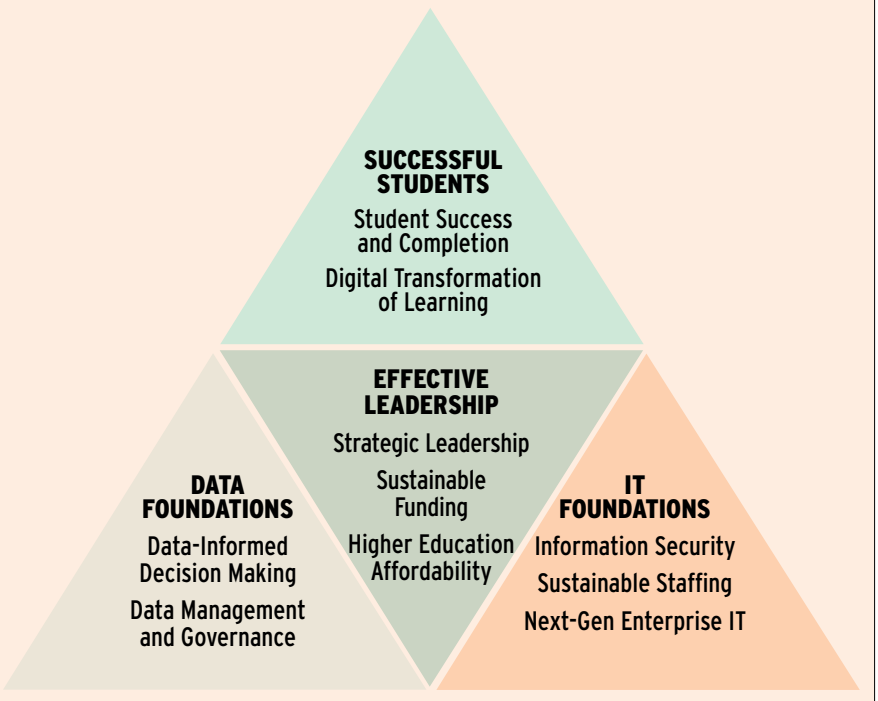
- Middle Tennessee State University (MTSU) launched a predictive analytics platform two years ago. By February of this year, the institution had seen a 3 percentage point increase in first-year student retention, achieving the highest retention rate for new freshmen in fifteen years. MTSU has been selected as one of five institutions to be profiled by the Association of Public and Land Grant Universities (APLU) for best practices in implementing student success programs. Technology has a major role in MTSU's efforts, but does not predominate. As Richard Sluder, vice provost for student success, wrote: "70 percent of success involves getting the people side of the equation correct, 15 percent involves technology, and 15 percent involves process."[2]
- At Montgomery County Community College, focused work on student success has been under way since 2013. The institution implemented a Student Success Network that includes an early alert system, an educational planning tool that allows each student to map out his or her degree or certificate program, and a student dashboard that integrates financial aid, the learning management system, and early alert and education planning information. Both advisors and students have access to the dashboard. Student persistence[3] has increased steadily as students have gained greater access to planning resources and as they have received more feedback on their progress. The faculty are enthusiastically adopting the new tools and processes: their participation in midterm reporting increased from 73 percent to 90 percent, and in a change faculty asked for, class attendance reporting by the deadline required for financial aid disbursement increased 30 percentage points, to 93 percent of faculty. Celeste Schwartz, vice president for information technology and chief digital officer, emphasized: "The technology is not driving this work, but it is a tool that can help us better serve our students on their path to earning their degree or certificate."[4]
- Colorado State University (CSU) incorporates a student success focus into many areas of institutional life, including the institutional research office. Institutional Research, Planning, and Effectiveness (IRP&E) at CSU has restructured its work to move beyond accountability reporting: data review and reporting now enables more effective use of financial aid, more appropriate placement of students in foundational courses, and fuller information, shared with advisors, about at-risk students. Technology is a foundational component of the work. Laura Jensen, associate provost of planning and effectiveness, relies on technology to "automate as much of the reporting, both internal and external, as possible," and to "explore new tools . . . as technology improves, adopt it."[5]

These examples characterize the changing role of information technology in higher education. Technology is an enabler, not a primary driver, of institutional strategies and IT investments. Information technology provides the traction to move hard-to-move needles.

The theme of student success is not immediately apparent when scanning the 2017 Top 10 IT Issues list. In many ways, the list differs from previous years only on the margins. But in interviews with panel members—a new part of our methodology this year—we learned that the summative motivation for addressing today's digital challenges is student success and, accordingly, institutional success. IT leaders realize that the success and potentially the future of their institutions rest on the success of their students and that digital technology is an essential foundation for both institutional and student success.

Concerns about higher education affordability and value are one driver

FIGURE 1. Themes of the 2017 Top 10 IT Issues



of today's student success initiatives. Advances in technology and data science are another. Those advances make it possible to use information technology to improve students' institutional experiences, such as engaging technology-enhanced learning that helps students learn more effectively, data and analytics that assist students in planning and attaining their credentials expeditiously, and digital applications and experiences that are seamless and effective. Applications that collect and report student information provide the path into and out of algorithms that analyze and model student data and that help students, faculty, and advisors draw insights and recommendations for curricula, majors, courses, and extracurricular activities and support systems. Courseware that adapts its pace and pathway to individual learners helps optimize learning experiences. Technology does not lead student success efforts, but it is indispensable to them.

Student success initiatives exemplify major technology and process transformations, with all their attendant risks and hoped-for benefits. Like all transformative efforts, student success is multidimensional and requires strong foundations and leadership. The 2017 Top 10 IT issues coalesce into four related themes that colleges and universities are addressing: IT foundations; data foundations; effective leadership; and successful students (see figure 1).

IT Foundations

So much rests on the IT organization's shoulders. Data needs to be available and secure, open and private. The systems and applications that run mission-critical operations and support strategic priorities like student success must be available, effective, and cost-efficient. They must provide the data that student success and other initiatives depend on—which entails integrating data from multiple applications and across multiple locations including both on-premises data centers and the cloud. And of course, the effective provisioning of information technology depends on a stable, competent, and engaged IT workforce.

The EDUCAUSE Top 10 IT Issues website offers the following resources:

- A video summary of the Top 10 IT issues
- Recommended readings and EDUCAUSE resources for each of the Top 10 IT issues
- An interactive graphic depicting year-to-year trends
- Top 10 IT Issues lists by institutional type
- Additional subject-matter-specific viewpoints on the Top 10 IT Issues
- The Top 10 IT Issues presentation at the EDUCAUSE 2016 Annual Conference

http://www.educause.edu/ITissues

Information Security is the #1 IT issue for 2017. Last year's top challenge persists: to develop "a holistic, agile approach to reduce institutional exposure to information security threats." As both data and threats become more consequential, personally identifiable information, as well as institutional assets and reputations, is more important and more difficult to safeguard than ever. What did change this year is that the margin between the #1 issue and the other issues is smaller. Whether that is due to progress, habituation to ongoing threats, or the greater importance of the other issues is not clear.

Today's enterprise IT is no longer sufficient, and a *Next-Gen Enterprise IT* (issue #9) is needed. Institutional expectations of enterprise IT applications and architecture have changed, thanks to priorities like student success and capabilities like analytics. Enterprise IT costs are a significant portion of the IT (and institutional) budget and seemingly siphon off more strategic digital investments in education or research.[6] Traditional enterprise resource planning (ERP) suites are costly without necessarily meeting contemporary needs, including the analytics and functionality to support degree planning, student advising, and digital learning. New cloud-based solutions and shared services offer alternatives to on-site institutional services, yet they entail significant investments of time and expertise as well as a rethinking of the

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The EDUCAUSE IT Issues Panel comprises individuals from EDUCAUSE member institutions to provide feedback to EDUCAUSE on current issues, problems, and proposals across higher education information technology. Panel members are recruited from a randomly drawn and statistically valid sample to represent the EDUCAUSE membership.

IT organizational structure and staffing. They may also require an institutional effort to redesign business processes to avoid new and ongoing future customizations. Many of the costs and implications are opaque and difficult to estimate; many of the benefits remain unproven or uncertain.

So much of the value of information technology in higher education depends on the IT staff and *Sustainable Staffing* (issue #8). IT leaders are struggling to find and retain the talent and staffing levels they need to meet institutional expectations of them. With an improving job market, especially in the technology sector, IT staff are getting restless, and the best have the most options. According to EDUCAUSE data, an astonishing 48 percent of the IT workforce is at risk of leaving. To worsen the challenge, CIOs report that it's relatively easy to secure funding for replacement positions but difficult to fund new positions engendered by priorities and advances in analytics, student success, e-learning, research computing, and changing enterprise IT architectures.[7]

A weak IT foundation can topple an initiative, a strategy, a career, and perhaps even an institution. A strong one can advance the institution and provide a competitive advantage. EDUCAUSE members understand that and in 2017 are working to develop strong IT foundations.

Data Foundations

Today's student success initiatives are building on the ongoing data and analytics revolution. Like most other

revolutions, this one signals a great deal of reimagining and rebuilding. Colleges and universities are doing both with data, applications, and even the process of decision making. The 2017 theme of data foundations includes two issues: *Data Management and Governance* (issue #6) and *Data-Informed Decision Making* (issue #3). Institutions are eager to apply today's tools and algorithms to their data to improve individual, departmental, and institutional outcomes, such as increased efficiencies, streamlined processes, contained costs, and better experiences and outcomes for students. Putting all that data to good use is a challenge, and doing so entails providing the right people with access to the right information in the right forms at the right times. Even that is not sufficient, because those people need help and incentives to act most effectively on the information they receive.

Data-informed decision making depends on reliable data. That foundation is still being built at most institutions, one element at a time. The very abundance of data that is enabling the data revolution is also undermining it. Multiple sources of data need to be inventoried and coordinated through data standards and governance and need to be integrated through architecture. Making data both more available and more useful through reports and analytics also makes it more consequential and exposed. Students, faculty, and staff have privacy rights and preferences, all of which need to be accounted for. Many institutions are working to adopt data management and governance structures and policies to clarify and strengthen roles, responsibilities, and standards.

Effective Leadership

Leadership is the not-so-secret key ingredient in institutional success. Some experts say follow the money, but most will place their money on the leadership. The 2017 Top 10 IT Issues make explicit the implicit and deepening interdependence of IT effectiveness and institutional success.

Most important is *Strategic Leadership* (issue #4): repositioning or reinforcing the role of IT leadership as a strategic partner with institutional leadership. As institutional strategy becomes increasingly digital in nature, institutional leaders need a competent and coherent IT capability to achieve their strategic priorities. That means presidents, provosts, and other executives

Top 10 Strategic Technologies and Trend Watch

The EDUCAUSE IT issues research is complemented by *Higher Education's Top 10 Strategic Technologies for 2017* and *Trend Watch 2017* from the EDUCAUSE Center for Analysis and Research (ECAR). The two ECAR reports provide a snapshot of the relatively new technological investments on which colleges and universities will be spending the most time implementing, planning, and tracking, as well as the trends that influence IT directions in higher education. Together, the trends and forecasts reported in the Top 10 IT issues, strategic technologies, and trend research help IT professionals enhance decision making by understanding what's important and where to focus.

need to do more than just talk with CIOs; they need to continually collaborate with them. CIOs need to be credible and informed partners. They need to be strategically influential. EDUCAUSE data indicates that CIOs who are members of the presidential cabinet are more likely to engage in discussions about institutional decisions and help shape administrative and academic directions. With only about half of CIOs serving on the cabinet today, there is room for growth.[8]

And yes, institutional and IT leaders do need to follow the money. Finding it is the first challenge. As institutional priorities have increased and as technology solutions have changed, CIOs are having difficulty locating sufficient and usable funding—that is, *Sustainable Funding* (issue #5). Campus leaders view technology as both a solution and a concern for institutional affordability and look to IT leaders to

- *run* the IT function more efficiently by containing or reducing infrastructure costs,
- manage the cost of *growth*, whether in information security risks or bandwidth or mobility, and
- invest in *transformation* (such as student success technologies, business intelligence, e-learning, and research computing).

Of total central IT spending, 80 percent is spent on running the institution and only 13 percent on growth and 5 percent on transformation.[9] Gartner's cross-industry average for these categories is 70 percent, 19 percent, and 11 percent.[10] Without effective IT governance that brings together institutional and IT leadership to communicate and collectively negotiate and set IT priorities and fund them realistically for *Higher Education Affordability* (issue #7), IT leaders are left with an IT budget that can never match the institution's run, growth, and transformation needs.

Successful Students

Higher education IT leaders get it. Their goal is not simply a balanced budget, a fully staffed organization, a useable and reliable infrastructure, effective dashboards, or sufficient security. All these achievements are *in service* to the institution and the success of its students. Relevant priorities include (1) *Student Success and Completion* (issue #2), using analytics to help students, faculty, and advisors improve retention, course completion, and credential attainment; and (2) *Digital Transformation of Learning* (issue #10), applying technology to improve teaching and learning in ways that are informed by both pedagogy and institutional culture and mission.

Student success analytics and technologies are recent arrivals in higher education. Some institutions, such as those profiled at the beginning of this article, are leading the way and providing examples of innovations and lessons in execution for mainstream institutions, many of whom are just beginning to define their priorities and plan their initiatives. Many of these new technologies reach beyond the classroom, to give students access to feedback and resources to plan their education and understand where they stand and how to get help, and to give faculty and advisors tools and resources to help them advise and support students.

EDUCAUSE supports early adopters in this area through the Integrated Planning and Advising for Student Success (iPASS) grant challenge, a program in which EDUCAUSE helps develop models for the field by working closely with a small number of institutions that are pioneering iPASS systems. As Ana Borray, EDUCAUSE director of iPASS implementation services, describes the work: "Every one of our grantee sites has involved a mix of many different technologies and a very strong commitment to 'breaking silos' in order to deploy these solutions and address the students more holistically—throughout the many touchpoints in their educational journey. So the complexity of integrating technologies is just the start. The monumental work of 'change'—breaking walls, changing processes, sharing information across units about the student, and being able to see and analyze results throughout the 'areas' (academic, support, financial, etc.) to address student success—is the big task at hand."[11]

Another set of innovations is occurring inside the classroom, and here higher education has years of experience in developing and delivering technology-augmented teaching and learning. Advances in technology,

bandwidth, and mobility have broken many of the barriers that inhibited earlier generations of educational technology from providing the access and experiences desired. In parallel, faculty and instructional technology staff have had years to learn how to adapt technology to pedagogy, and vice versa. Students have never been more eager to use technology to learn, and faculty have never more open to using technology to teach.[12]

Our choice of "Foundations for Student Success" as the subtitle and overall theme for the 2017 Top 10 IT Issues article is not simply joining the growing chorus of voices raising student success as a priority; rather, it is true to our times, data-driven—supported by insights from the panel and data from EDUCAUSE members. The Top 10 IT Issues is part of an annual EDUCAUSE series of reports. The soon-to-be-released *Top 10 Emergent Technologies for 2017* and *Trend Watch 2017* reinforce student success as a central theme for higher education information technology in 2017. Indeed, more than half of the EDUCAUSE Top 10 Emergent Technologies pertain to student success:

- Active learning classrooms (e.g., student-centered, technology-rich learning environments)[13]
- Technologies for improving analysis of student data
- Incorporation of mobile devices in teaching and learning
- Technologies for planning and mapping students' educational plans
- Technologies for triggering interventions based on student behavior or faculty input
- Technologies for offering self-service resources that reduce advisor workloads[14]

The annual *Trend Watch* report tracks the influence of various trends (36 for 2017) on IT strategy. Of the three most influential 2017 trends (i.e., those that influence IT strategy at 61%–80% of institutions), two are pertinent to student success: student success focus/imperatives; and data-driven decision making.

Perhaps even more compelling is the fact that during the IT issues interviews that were the basis of this report, panel members spontaneously linked issues to student success, particularly for seven of the issues: *Student Success and Completion; Data-Informed Decision Making; Strategic Leadership; Data Management and Governance; Higher Education Affordability; Next-Gen Enterprise IT;* and *Digital Transformation of Learning*.

IT foundations, data foundations, effective leadership, successful students: The 2017 Top 10 IT Issues touch every aspect of information technology and the institution, but they also collectively support higher education's focus on student success.

Issue #1: Information Security

Developing a holistic, agile approach to reduce institutional exposure to information security threats

Timothy M. Chester, Patricia Patria, Marden Paul, and William R. Senter

Like all other assets that an institution maintains, including physical and intellectual assets, information assets are highly valuable. A lot of people would love to steal those assets, whether they be the identities of current and former students or financial information such as credit card numbers. Unlike physical assets, because of the Internet, information assets are vulnerable anywhere, anytime, from any place on the planet. Risk management provides layers of protection, but bad actors (whether individuals or nation-states) are constantly searching for the soft underbelly of institutions' information assets.

To contextualize this, a staff member at one major research university reports that each day, 100,000 people access the

> "People think that information security is about technology, but it is really about educating people. 90 percent of all breaches have some sort of human component."
>
> **—Patricia Patria, Vice President for Information Technology, Becker College**

university network using two to three devices, 75 percent of incoming email is spam, and 1,000-plus attempts are made to penetrate the campus network *each second*.[15] Community members connect from home, offices, classrooms, labs, dormitories, airports, and other locations, locally and around the world. Vast amounts of valuable research data and personally identifiable information are stored, transmitted, and accessed. All colleges and universities have a commitment to openness, yet the many thousands of services and devices on campus are often managed in a very distributed manner and to differing standards. How safe do you feel?

Information security is not binary: there is no state of complete security. Instead, security is layered and constantly adapting. A comprehensive security program that emphasizes risk reduction can greatly reduce exposure. That program should encompass people, process, and technologies:

- Educate users
- Develop processes to identify and protect the most sensitive data
- Implement technologies to encrypt data and find and block advanced threats coming from outside the network via from any type of device

Who Outside the IT Department Should Care Most about This Issue?

- End-users, to understand how to avoid exposing their credentials
- Unit heads, to protect institutional data
- Senior leaders, to hold people accountable
- Institutional leadership, to endorse,

fund, and advocate for good information security

The Misconceptions

- Someone else is taking care of security.
- Security is a one-time project and not an ongoing process.
- IT staff can handle security issues by themselves. (Information security is multilayered and must involve everyone within an organization.)
- Security is binary: we are either secure or we are not. (There are different maturity levels throughout the organization. A continual process of monitoring, operating, and implementing improvements must be repeated to keep up with the threat landscape.)
- Security is all about technology. (Although security technologies are critical to protecting information and networks, 90 percent of all breaches have some sort of human component. Human factors—such as education on information security practices—are essential adjuncts.)
- A data breach might happen. (A data breach *will* happen. You must prepare, because it is going to happen to you.)

The Risks

- Ignoring the risk: a major incident can reduce application volumes, damage a capital fundraising campaign, and/or destroy the institution's reputation and brand
- Underestimating the likelihood and impact of breaches
- Hesitating to get started or taking a long time to make decisions and implement security protections
- Incompleteness: failing to involve the entire institutional community, institute sufficient process, or implement many layers of technology

The Opportunity

A well-run program decreases institutional liability for information security. Individual faculty, staff, and students retain their intellectual and personal assets. Funds and time not spent on a poorly run information security program can be spent more productively elsewhere.

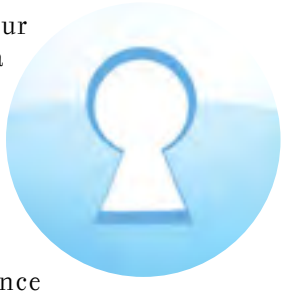
Advice

To get started:

- Create data classification and compliance policies (e.g., PCI, HIPAA) and procedures. Find low-hanging fruit to move forward (e.g., procurement policies that require encryption on new machines).
- Engage in network protection activities (e.g., firewalls, application protection, building assurances into the network).
- Educate constituents on risk and the dangers that arise daily. Focus on simple awareness messaging: don't leave laptops in the car, use the VPN (virtual private network) to access files remotely. Provide training.
- Use the resources of those who have gone before you.

To develop further:

- Require annual information security awareness training that is meaningful and compelling: it should be done in a way that staff and faculty can take seriously.
- Identify where your most sensitive data is stored, and implement technologies, including two-factor authentication, to protect that data.



- Create a governance structure, such as an information security council that includes representation across the community. Develop KPIs and metrics to assess and communicate the state of information security.
- Move beyond low-hanging fruit (e.g., network protection) to technologies such as next-generation

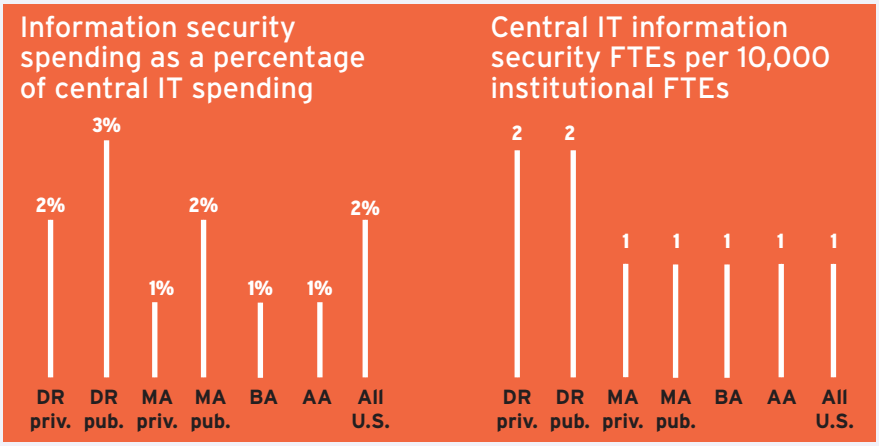
(continued on page 25)

EDUCAUSE Benchmarking Service

Higher education leaders can measure progress on campus-wide information security and risk management strategic initiatives by reviewing their EDUCAUSE Benchmarking Service information security capability report, which includes data contributed to the information security maturity and deployment indexes in the EDUCAUSE Core Data Service (CDS). The EDUCAUSE Benchmarking Service is built on the CDS database, but it broadens both audience and application. The service takes the use of analytics to the next level by providing capability reports comprising maturity and deployment indexes for analytics, culture of innovation, e-learning, IT GRC, information security, research computing, and student success technologies. Participants gain access to semi-customized benchmarking reports, which can be used to (1) assess the organizational capability for initiatives and (2) communicate the value and relevance of information technology. (*Note:* Currently the EDUCAUSE Benchmarking Service is a beta service available only to ECAR and ELI member institutions. The service will be available to all EDUCAUSE members starting in July 2017.)

http://www.educause.edu/benchmarking

FIGURE 2. Information Security Spending and Staffing, 2015



Source: Joanna L. Grama and Leah Lang, *CDS Spotlight: Information Security*, research bulletin (Louisville, CO: ECAR, August 15, 2016)

With limited resources, higher education institutions must be creative and collaborative in addressing information security awareness needs. To help institutions continue to improve end-user security awareness in 2017, the HEISC Awareness and Training Working Group has prepared the Campus Security Awareness Campaign (http://www.educause.edu/securityawareness), a framework that includes ready-made content that security professionals and IT communicators can customize and integrate into their information security education communications.

#3: Limited Resources for the Information Security Program

Resource constraints are nothing new to those in higher education, but for an information security department, limited resources can pose an even greater challenge. The 2015 EDUCAUSE Core Data Service survey showed that across all U.S. institutions, about 2 percent of total central IT spending is on information security and that there are 0.1 central IT information security FTEs per 1,000 institutional FTEs.[5] Put another way, there is only 1 central IT information security staffer per 10,000 student, faculty, and staff FTEs (see figure 2). Adding to the staffing challenge, security skill sets continue to be among those in short supply in higher education.[6]

"Our information security team is a sought-after resource on campus with an ever-growing portfolio of security toolsets to deploy, regulatory compliance assistance, and security awareness engagements," said Cathy Bates, higher education IT consultant and former CIO at Appalachian State University. "We have a small team with no immediate ability to add staffing to this area, so we are working to extend our capabilities with graduate assistants and with an information security liaison program across campus. The liaison program supports a two-way working relationship between campus departments and this small team, fostering campus ownership of security responsibilities."

"Our information security team is a sought-after resource on campus with an ever-growing portfolio of security toolsets to deploy, regulatory compliance assistance, and security awareness engagements."

#4: Addressing Regulatory Requirements

The regulatory environment impacting higher education IT systems is complex. Since the United States tends to adopt data-protection laws based on underlying industry (as opposed to one national data-protection law), data elements in higher education IT systems may be protected by a patchwork of different federal and/or state laws. For instance, student data is traditionally protected by the Family Educational Rights and Privacy Act of 1974 (FERPA), although some types of student data, when it is held in healthcare IT systems, may be protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). In addition, some types of student and institutional employee financial data may be protected by the Gramm Leach Bliley Act (GLBA). State laws may have data-breach notification requirements, and contractual agreements may have their own list of security technological controls that must be implemented and validated in IT systems.

At the center of this pastiche is the information security professional, who must ensure that the institution's IT systems are operated in a way that meets these varied regulatory requirements.[7] At many institutions, reviewing and addressing these compliance requirements is a service delivered (for the most part) by central IT units. However, other institutions take a shared approach to meeting information security compliance requirements (see figure 3).

(continued from page 21)

firewalls or adaptive security appliances.

- Start testing security and compliance plans. Create and test business continuity, disaster recovery, and incident response plans. Conduct penetration tests.
- Keep thinking about how to reduce the institution's size as a target. Make sure new systems are secured properly before being placed online. Train IT staff thoroughly and continually: they are on the front line. Purchase third-party services to help protect your network and data.

To optimize:

- Take a leadership role in the community, and communicate what you are doing. Allow other institutions to influence you and where you are going. Peer collaboration among the most mature institutions can help advance all of higher education.
- Keep abreast of new technologies. Learn from peer communities to identify and collaboratively assess the newest technologies (e.g., email data loss prevention or advanced threat protection that is anomaly-based).
- Remember that what may have kept you secure in the past may not help you today.

Issue #2: Student Success and Completion

Effectively applying data and predictive analytics to improve student success and completion

Darcy A. Janzen, Deborah Keyek-Franssen, Patricia Patria, and Eric Sakai

Over a very few years, data-driven decision making and student success have become critical to most higher education institutions. Colleges and universities today are collecting huge amounts of data at the micro and macro levels. By combining and collectively analyzing data stored in retention management, learning management, and student information systems, institutions can develop a better understanding of how students interact with technology systems and how students interact with and flow in and out of curricular programs and majors. With sufficient investment and considerable data, institutions may develop a holistic picture of each student. With this kind and amount of data, and especially with collaborations across campuses at the national level, higher education can begin to move from descriptive to predictive analytics and can use those predictive analytics to make changes in the services provided to students.

Predictive analytics allows us to track trends, discover gaps and inefficiencies, and displace "best guess" scenarios based on implicitly developed stories about students. Analytics can take the guesswork out of advising and can provide faculty with immediate feedback about course- and student-level success indicators.

However, predictive analytics usually entails identifying students who may be at risk, and the resulting changes can involve "intrusive advising." Predictive analytics raises significant concerns: about privacy, about placing institutions *in loco parentis,* and about the extent to which the goal for student completion overrides students' volition and their ability to learn and grow from failure.

Who Outside the IT Department Should Care Most about This Issue?

- Leadership (president, CAO, cabinet), to set the agenda and the strategy and to provide resources
- Student support services, enrollment management, advisors, and faculty, to ensure that analytics are useful and used

The Misconceptions

- More data is better. (People need know what data is useful and how to use it.)
- Advisors and others will misuse or misinterpret and misapply course and performance data.
- Prescriptive data is nothing new. (Traditional descriptive data shows how students are performing or what they are doing, but prescriptive data entails an entirely new level of analysis that facilitates action and use.)

> "It's easier to keep a student than recruit a new one, especially given current demographics. The president and his or her cabinet need to care most about predictive analytics for student success, because frankly, if they don't, nothing is likely to happen."
>
> **—Eric Sakai, Dean of Academic Technology, Community College of Vermont**

The Risks

- Not allocating appropriate resources, which can stall progress and set initiatives back
- Not sufficiently attending to student privacy and other compliance considerations
- Assuming that all faculty will easily provide data in the same way and at the same levels of detail. If that doesn't happen, data will be partial, incomplete, and inadequate, undermining credibility and jeopardizing progress.
- Not realizing that predictive modeling is both an art and a science. If the model is incorrect, it might target the wrong people, and the students who need help won't get it.
- Failing to develop a shared understanding of institutional commitments and obligations regarding predictive data about individual students and the actions the institution must, might, or might not accordingly take
- Assigning too much responsibility to vendors and assuming they know whether data is measuring what it should be. Data definitions and algorithms should be thoroughly defined and discussed to ensure alignment between vendor models and institutional reality.

The Opportunity

Institutions that excel will have measurably greater completion rates, graduation rates, persistence rates, and optimized course enrollments. The student experience will be better because students will have a more holistic support structure as advisors, faculty, and student support staff share information and work collaboratively and in multiple areas on behalf of students.

Advice

To get started:

- Use the EDUCAUSE iPASS program resources to gain information and insights.
- Ensure integrated support across campus, including leadership and a collaboration among the IT organization, student services, and faculty.
- Partner with other institutions and organizations for ongoing student success initiatives and support.
- Communicate the purpose and nature of student success initiatives to all stakeholders, especially faculty, students, and undergraduate students' parents.
- Set goals, determine data requirements and availability, and form a team to create and execute a plan.
- Ensure that planned future systems can be integrated and that all needed features can be used.
- Staff initiatives adequately. Running analytics requires significant time and expertise. The work cannot simply be added to existing workloads. It requires special skills and training.
- Understand that communication is crucial to achieve buy-in. This applies particularly to faculty because the information they supply about how students are doing needs to be provided in a consistent way in order to be able to apply analytics.

To develop further:

- Continue to follow the advice listed above.
- Start a cycle of continuous improvement. Review and assess goals: Were the intended outcomes achieved? Were the changes effective? What needs to be tweaked, stopped, or started to move forward?

To optimize:

- Scale up existing efforts across more programs, divisions, and/or students.
- Share successes nationally to help other institutions get started and be successful.
- Reassess outcomes and goals, and set new, deeper, or greater targets.
- If current programs target advisors and other staff, provide just-in-time alerts and suggestions directly to students.[16]

Issue #3: Data-Informed Decision Making

Ensuring that business intelligence, reporting, and analytics are relevant, convenient, and used by administrators, faculty, and students

Kirk Kelly, Patricia Patria, and David Starrett

Colleges and universities are striving to improve their value by helping more students attain more credentials more quickly and less expensively. Data can help these efforts by providing information to help institutions track performance against targets. Making data-informed decisions is one of the most important and most difficult issues that institutions face.

Higher education information systems generate vast amounts of data daily (including the classroom/LMS). This potentially rich source of information is underused. Even though most institutions have created reports, dashboards, and other distillations of data, these are not necessarily useful or used to inform strategic objectives such as student success or institutional efficiency. Today's challenges include integrating data into ongoing decision making throughout the institution, making data easily accessible for all the people who need it when and where they need it, and moving beyond basic reporting to analytics that are predictive and contextualized.

Who Outside the IT Department Should Care Most about This Issue?

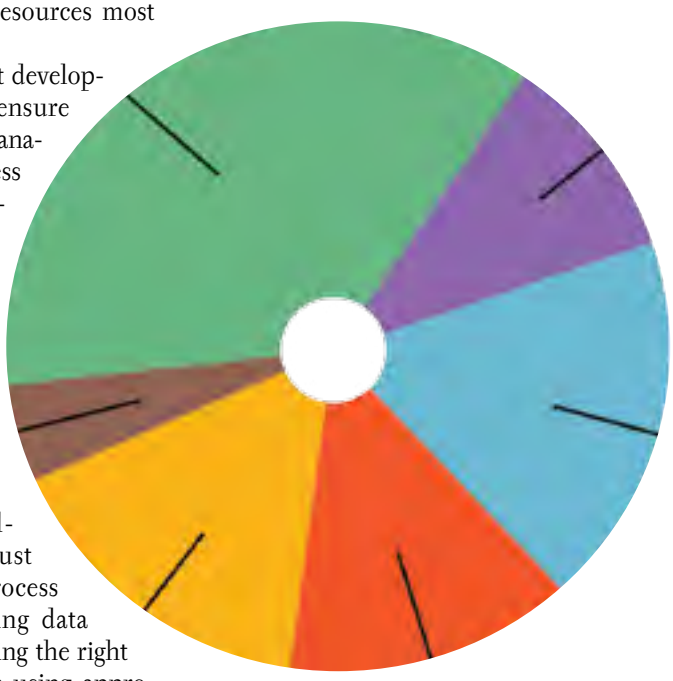
- Institutional leadership, to advocate for good, timely information to help allocate scarce resources most effectively
- Academic and student development leadership, to ensure good information and analytics for student success
- Institutional researchers, to provide institutional expertise for data compilation, analysis, and use

The Misconceptions

- Data collection is the endpoint. (Collecting the data is just the first step in a process that includes ensuring data integrity and conducting the right data analysis, such as using appropriate predictive models to predict outcomes.)
- Progress requires "big data." (It is possible and even sensible to make a difference on campus using the data at hand to make better decisions.)
- Existing transactional data can be used to inform decisions. (Although it is good to start with data at hand, the data often needs to be reformatted or even completely redesigned to ensure that it is consistent over time and measures what is needed.)
- Simple questions are easy to answer. (Sometimes it takes a long time to find the answers to seemingly easy questions.)

The Risks

- Wasting an asset by doing little or nothing with the data
- Not ensuring data quality and integrity. Institutions need to understand how data is generated to understand how it can (and can't) be used.
- Not ensuring data security, which is especially important for personally identifiable information
- Not being successful with initiatives or not meeting campus needs. Good, thorough planning can reduce the risk of failure.[17]
- Failing to continually assess the usefulness and accuracy of data and analytics models. Analytics and reporting tools need to get into the right hands (e.g., advisors and counselors) and into the right decisions.



The Opportunity

Institutions that excel with business intelligence, reporting, and analytics

can put data to work. Data can inform resource allocations to reduce or contain costs and improve institutional value, can enhance the classroom and learning experiences to improve student outcomes, and can help students understand how to attain their degree more efficiently, which will save them money.

Advice

To get started:

- Ensure that sufficient leadership and resources are in place.
- Identify the primary objectives. What decision areas have the highest priority: Student success? Institutional efficiency? Resource allocations?
- Get buy-in from all stakeholders. They need to be comfortable with the goals of data analytics programs, how the data is gathered, and what it is being used for.
- Take baby steps. It takes years to optimize data-informed decision making. Starting small ensures that you can provide some answers to some questions right away.
- Jump-start analytics efforts. Form an agile team to quickly develop a proof of concept on the analytics that matter to leadership.

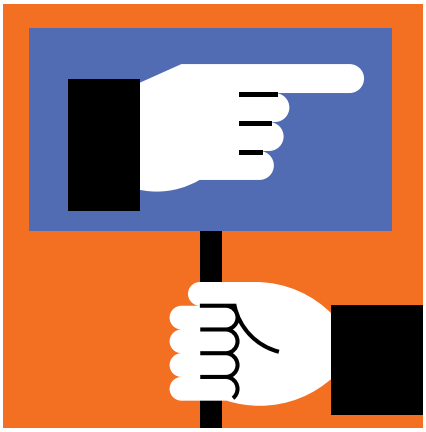
To develop further:

- Solidify your foundations. If you haven't already done so, make sure that common definitions of terms are used and that data confidentiality and security standards are set and met, particularly for personally identifiable data.
- Ensure that data, reports, and analytics are reaching the people who need them; are easy to consume, understand, and manipulate; and are actually informing (and used to inform) their decisions. This will require extensive and ongoing outreach, interaction, and modification of existing reporting and analytics. It's a process, not a project.

To optimize:

- Introduce interactive forms of access to data to enable everyone to drill down into the data to answer questions in context.
- Continue expanding the questions that data can answer and the people who can use data to answer their questions. Make access to data as intuitive and unmediated as possible.
- Deepen the questions that data can answer. Use data for predictive purposes (to inform what will happen) and to optimize services and outcomes (to identify the best that can happen).
- Do what higher education does so well: share knowledge and experiences with others.

> "If you can take data and create efficiencies, best practices, and processes that enhance the classroom and learning experience, then you are really enhancing the efficiency and effectiveness of the institution and student outcomes."
>
> **—David Starrett, Provost and Vice President for Academic Affairs, Columbia College**



Issue #4: Strategic Leadership

Repositioning or reinforcing the role of IT leadership as a strategic partner with institutional leadership

Victoria Duggan, Dwight Fischer, and John P. Landers

Today's students have been living with technology since they were born. It is part of everyone's daily lives. Everything that students, faculty, and other constituents do in higher education has a touchpoint with technology. Decisions about institutional strategy are inevitably decisions about technology. IT leadership needs to participate in those decisions.

CIOs have two challenges in this regard. The first is getting to the table. Contemporary requirements for IT leaders position them well for strategic leadership.[18] Those requirements include expertise in management and business practices, project portfolio management, negotiation, and change leadership. However, business-savvy CIOs can alienate some academics,

particularly those opposed to administrators as leaders. Worse, not all CIOs are well-equipped for a position at the executive table.

The second challenge is staying at the table. CIOs are accountable not only for strategy but also for operational oversight. Major incidents (e.g., significant security breaches, system failures, and service outages) will preempt CIOs from strategic leadership to crisis management.

Even CIOs who don't report to the president or sit on the cabinet have opportunities to discuss objectives and goals with leaders throughout the institution. Establishing conversations and relationships that enable CIOs to learn about academic and administrative aspirations and challenges and to offer realistic solutions may not get CIOs to the table, but doing so will position CIOs as strategic leaders. Influencing strategy should be the goal, not the reporting relationship.

Trusted advisor: that's key—and a great place for IT leaders to be.

Who Outside the IT Department Should Care Most about This Issue?

- Boards, to ensure that risks are managed responsibly and because technology is so often a major component of new institutional investments
- The president, because technology is required to attain so many of today's most important strategic objectives and because technology-related decisions are complicated and risk-laden
- Institutional leaders who are seeking transformative change and overseeing a transition of IT leadership

The Misconceptions

- Innovation, influence, and strategic leadership are intrinsic. (IT leaders need time, patience, and effort to cultivate those skills. Reputation and impact need to be re-created with each new leadership role and even each new relationship.)
- Institutional strategy is separable from IT strategy. (The more broadly, to understand the full context of all institutional objectives, and the earlier, even at the visioning stage, that IT leaders can be involved in institutional strategy, the better.)
- Institutional strategy is the largest determinant of IT investments and resources. (Marketplace changes such as vendor-driven migrations to the cloud, mergers and acquisitions, and end-of-life decisions drive IT costs and "investments" as much as institutional strategy.)

The Risks

- Not understanding the environment. IT leaders are higher education leaders. They need to understand each aspect of the institution well enough to know the type of technologies needed.
- Not fully understanding the institution's needs and requirements or the solution's functionality and usability. A great technology that doesn't fit the business need or the community's technology temperament is a bad technology for the institution.
- Not asking for a seat at the table. When the CIO sits on the president's cabinet, the IT department has to deliver.
- Burying the IT department or casting it as purely operational. This will limit the value the institution can get from information technology and limit the institution's ability to achieve its strategic objectives.

The Opportunity

Institutions that value the influence of IT leadership on institutional strategy are more likely to attract, engage, and retain top IT talent and maintain a high-performing IT organization. When IT leadership partners effectively with institutional leadership, the institution's uses of technology are more likely to be relevant and successful. Misapplications of technology, hasty investments, and redundant investments will lessen. Technology expenditures will be better understood and more effective. Whether technology is directly associated or less clearly visible, it will have been a major contributor to institutional outcomes.

Advice

To get started:

- Establish and maintain strong relationships and ongoing communications between IT leadership and area heads. Schedule recurring meetings to learn about their work, mission, and challenges. Some area heads will be concerned with the big picture, and others will be more tactical (e.g., tools team members had vs. what they needed). Cultivate a perception of IT leadership as helping academic and administrative areas to succeed.[19]
- Start at the levels that are accessible. Leaders who can't get direct access to the president or board can start one level down. Or two levels. Or wherever they can build relationships, create advocates, and become that trusted advisor.

> "IT leaders really are college leaders. They understand the significant roles of each area well enough to translate the business goals to the types of technologies needed to help achieve those goals."
>
> **—Victoria Duggan, Chief Compliance Officer, Montgomery College**

- Become part of campus social life and the institutional community outside your department. Being an active participant in nonwork campus activities can build exposure and relationships.
- Be realistic about the environment and the institution. Conservative, risk-averse institutions are unlikely to make major, transformative commitments. Institutions with few resources are constrained by their limitations. Institutions with highly distributed power structures are going to make a lot of strategic decisions at the local level. It's more realistic to consider switching institutions than to hope to change the existing institution.

To develop further:

- Manage perceptions of the IT organization and reinforce successes. Encourage IT staff to share positive stories (e.g., projects, support, or ways you've partnered around the campus). Reinforce the partnership role of the IT organization and give generous credit to non-IT colleagues and leaders.
- Share experiences or ideas from other institutions that have similar programs/goals.
- Without disengaging too much, find separation from ongoing IT operations to dedicate time to leadership and strategy. Appoint deputies with strong operational management skills and proclivities.

To optimize:

- Work to be a well-rounded IT leader. This takes effort and self-knowledge. The use of 360 assessments and executive coaching can give leaders objective information about themselves and can create realistic and focused development plans.
- Assess the IT organization and its reputation, performance, and impact. The assessment should address the IT organization's value and its ability to provide needed services and contribute to strategic priorities. Set performance targets, measure them, create plans to close gaps, and set new aspirational goals. Augment metrics-based assessments with qualitative conversations about the IT organization's value and contributions.
- If your institution is in transition, seek an IT leader who knows the "business" of information technology and the missions and culture of higher education and who can sell the ideas and engage academic leaders.

Issue #5: Sustainable Funding

Developing IT funding models that sustain core services, support innovation, and facilitate growth

Ellen F. Falduto, Dwight Fischer, Craig A. Fowler, and Thomas Glaser

IT funding has always been a challenge as institutions seek to provide just-sufficient funding for IT services and investments. Two complications have deepened the IT funding challenge in recent years. The first is that information technology is now incontrovertibly core to the mission and function of colleges and universities. It is essential to the way we conduct education, research, patient care, community service, and administration today. Limit IT funding, and we risk the essential work of our institutions slowing, deteriorating, or even ceasing entirely.

The second complication is that at most institutions, digital investments and technology refreshes have been funded with capital expenditures. Operating funds are generally more difficult to increase. Yet IT services and infrastructure are moving outside the institution, generally to the cloud, and cloud funding depends on ongoing expenditures rather than one-time investments.

The shift to ongoing funding of IT services is forcing institutions to explicitly acknowledge their reliance on technology and its strategic value. Can you shift your IT funding paradigm to more sustained resource allocation instead of one-time capital allocations? Only *sustainable* IT funding can support the institution's objectives and long-range strategic plan.

Who Outside the IT Department Should Care Most about This Issue?

- The board, because the strategic needs of the institution will inevitably require IT investments that are different in kind and scale from the past
- The president and institutional leadership team (CAO, CFO, CIO, and others), to ensure that IT funding is responsibly estimated and allocated to strategic priorities

The Misconceptions

- Information technology is an expense that needs to be limited rather than an investment in the ongoing and future health and mission of the institution.
- Information technology is the major and most important expense of a new initiative. (Technology doesn't have to be expensive if it is applied at the right time, in the right way. Technology for its own sake does not facilitate growth. Technology is just one part of the people-process-technology triad of effective IT investments.)
- Institutional funding sources, levels, and allocations are sufficiently understood to support effective cost management. (Ignorance about the actual costs, cost-drivers, and implicit subsidies of IT and other services abounds.)

The Risks

- Failing to establish an effective IT funding model. Without one, technology will be a chronic impediment to the attainment of institutional priorities and effective campus operations.
- Making each new IT funding decision as a one-off. Decisions will take longer and be more arbitrary, reinforcing higher education's reputation as a place where progress is difficult and slow.
- Insufficiently funding information technology to address security risks, thus generating even higher costs as breaches become more frequent and more severe
- Trying to realign all IT resource allocations at once. This runs the risk of overlooking some fundamental expenses or issues, underfunding critical services, or simply wreaking havoc by changing too much too quickly. If a sweeping change is evitable, scenario planning (i.e., identifying potential future scenarios if certain choices are made or consequences occur and creating corresponding mitigation plans) with all stakeholders can help.

> "Failure to fund information technology adequately is failure to provide a fundamental foundation upon which to thrive in the future."
>
> **—Dwight Fischer, Assistant Vice President and CIO, Dalhousie University**

The Opportunity

Institutions with effective IT funding models gain financial efficacy. Responsible IT funding models ensure that IT services and initiatives are sustainable, right-sized, and predictable. This competency can be translated to other institutional services and investments and provide the institution with the ability to effectively make additional value-enhancing investments should other resources become available. A well-functioning IT funding model enables the institution to stay relatively current with appropriate, needed technologies and allows IT managers to accommodate inevitable ongoing spikes in demand for resources (e.g., an information security breach, a surge in network usage, matriculation, new deployments) without needing sudden new infusions of resources or impeding service quality or continuity.

Advice

To get started:

- Gain agreement that institutional funding needs to be sustainable.
- Don't continue digging a deeper hole. Use new initiatives as opportunities to reinvent sustainable IT funding of those initiatives.
- If needed, engage a consultant to help assess the institution's digital needs and funding levels and sources to create a strategic funding roadmap that fits the institution's size, mission, strategic priorities, current state, and available funds.
- Alleviate fears and gain buy-in by communicating campus-wide to help all constituents understand the objectives and opportunities in funding information technology sustainably.
- Fear not the creative idea. Discussions of budgeting and financing models can stall when they run up against our institutional or other generally expected policies, procedures, or principles.

To develop further:

- Communicate clearly, openly, and often. If an incoming CIO encounters a structural deficit, the new CIO should communicate the impact and meaning to institutional leadership and enlist their understanding and support to make the right decisions to eliminate the deficit.
- Initiate conversations about IT's value to change the emphasis from spending to investing.
- Make incremental changes, which are much more realistic than trying to change the entire IT funding model at once. Recognize potential opportunities for new funding models and use them. Technology lifecycle replacements can offer the opportunity to rethink both funding sources and technology solutions.
- Position technology in service to new academic, administrative, and facilities initiatives. Be sure the funding model is engineered to support the project objective rather than the technology.
- Adopt an IT funding framework. An ECAR working group has developed a framework that "builds agility into institutional IT services, allowing modest expenditures in new and innovative services for rapid deployment and a pathway for growth into becoming a core service." It creates different funding models for three kinds of services: core, flexible, and experimental.[20]

To optimize:

- Use the trust and influence developed in earlier phases of this work to move the conversation to a new and higher level.
- Assess IT investments and services in light of effectiveness in meeting objectives, needs, demand, and costs. Understand the value that each service and investment is actually providing. Find services that can be discontinued so that funding can be allocated to new technology priorities. Some investments deliver on their original objective and additionally generate new, unanticipated demands. For example, faculty who learn how useful basic classroom technology is might start asking for help and support to integrate technology even more deeply into their teaching and courses.

Issue #6: Data Management and Governance

Improving the management of institutional data through data standards, integration, protection, and governance

Gerard W. Au, Timothy M. Chester, Victoria Duggan, and Dwight Fischer

Data abounds throughout our institutions. Colleges and universities have a great desire to apply that data to greater degrees to improve institutional and constituent outcomes, service quality, efficiency, and more. Data has context and has (to date) been created and defined within each narrow context. Because of that, similar and related data currently resides in different offices, formats, standards, and systems. It is optimized for each context and uncoordinated at large. If our data is to be used at an institutional level for, say, student success, an institutional approach is needed.

Data management and governance is not an IT issue. It requires a broad, top-down approach because all departments need to buy in and agree. All stakeholders (data owners as well as IR, IT, and institutional leaders) must collaboratively develop a common set of data definitions and a common understanding of what data is needed, in what format, and for what purposes. This coordination, or governance, will enable constituents to communicate with confidence about the data (e.g., "the single version of truth") and the standards (e.g., APLU, IPEDS, CDS) under which it is collected.

Institutions often choose to approach data management from three perspectives: (1) accuracy, (2) usability, and (3) privacy. The IT organization has a role to play in creating and maintaining data warehouses, integrating systems to facilitate data exchange, and maintaining standards for data privacy and security. Data owners and institutional leaders set requirements and standards and help assess and ensure data accuracy.

Who Outside the IT Department Should Care Most about This Issue?

- Institutional leadership, to recognize the importance of the institution's data assets and to champion the need to manage data to better meet the institutional mission and goals
- Institutional researchers, to convene conversations and planning around data
- Institutional executives and professionals with strategic data needs

The Misconceptions

- The IT organization owns all the data and knows what to do with it. (The IT organization cannot govern data or implement analytics without institutional leadership and the active involvement of all stakeholders.)
- The same data elements are defined and used consistently across the institution. (The standards, definitions, and expectations about data can vary from department to department. Data elements and data reports all have contexts, and those contexts can vary dramatically based on who creates the report: admissions vs. registrar vs. institutional research. A lack of understanding of the context creates confusion in determining "the truth" of the data.)
- The efficacy of application vendors' analytics solutions is clear, and institutional departments' investments in analytics solutions are coordinated. (In some cases, individual departments are investing in solutions that will actually impede institutional analytics and decision making. In other cases, institutions are buying solutions without fully understanding the algorithms and data definitions.)

The Risks

- Ignoring data management and governance. This is the biggest risk, and it will go unnoticed a few years. The postsecondary education environment is very competitive. Institutions that master this now and establish a foundation to leverage data will have an extraordinary advantage. Institutions that don't do so will be incredibly inefficient with decision making. Decisions will take too long, or leaders will miss opportunities they can't see because they have only anecdotal evidence. Institutions could receive less performance-based funding.

- Failing to involve all stakeholders, both data owners and data users, in data governance. Too often students are not involved in initiatives that involve their data, their identities, their money, and their outcomes.
- Ignoring data security and privacy. As data is used for increasingly consequential purposes, security and privacy become more important than ever.
- Failing to create explicit data retention and disposal policies. These

> "Being good at data management and governance creates bottom-line opportunities."
>
> —Timothy M. Chester, Vice President for Information Technology, University of Georgia

policies are a crucial part of any data governance and management program. Data retention policies state what data must be retained, for what purpose (usually regulatory), and for how long. The complementary disposal policy specifies how data should be destroyed when it reaches the end of its useful life. Following these policies helps an institution minimize legal risk (e.g., data that is improperly retained past its lifecycle could be subject to discovery in a potential lawsuit).

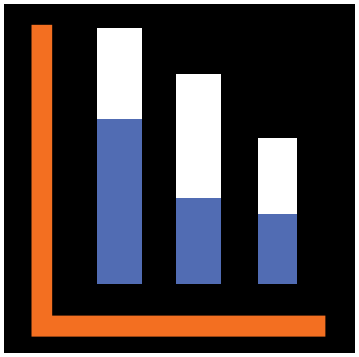
The Opportunity

Data management and governance provides the foundation for effective use of data, which can be applied to improve student outcomes and experiences (e.g., recruitment and enrollment, completion, student services), business operations (e.g., understanding operational expenses and revenue), and many other areas.

Advice

To get started:

- Help leadership make the case for data governance.[21] IT leaders may need to help institutional leaders understand the benefits and resource requirements, because they aren't necessarily obvious. But institutional leadership must make the case, because the solution involves the entire institution.
- Establish a data governance group with responsibility to identify institutional data sources and to determine the institution's data needs.
- Recognize that data management is a people problem, not a tools problem. Identify the major producers and owners and the consumers of the data. Work with stakeholders to develop a data governance framework for decision-making rights and data classifications.
- Find the data. Engage data producers and owners in inventorying data systems and data.
- Establish a Chief Data Officer position.[22]

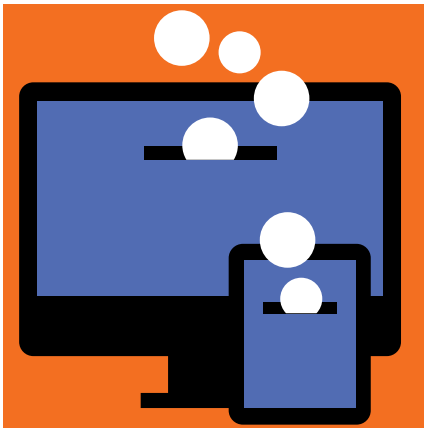


To develop further:

- Aim for a definitive source and definition of each data element. Develop a data dictionary with plain-English, concrete, institution-wide definitions and privacy and security classifications (e.g., public, private, restricted, internal, sensitive, highly sensitive) to appropriately safeguard each data element.
- With data standards and data governance established, develop a technical architecture.

To optimize:

- Recognize that data governance and management is a process, not a project. It needs ongoing attention and regular review.



Issue #7: Higher Education Affordability

Prioritizing IT investments and resources in the context of increasing demand and limited resources

Ellen F. Falduto, Patricia Patria, and Marden Paul

The affordability question is driven by the slow recovery from the economic downturn, radically changing demographics and both the perceptions and the realities about the cost and financing of higher education. Information technology can contribute to affordability in several ways.

Institutions can introduce efficiencies by leveraging capabilities in existing applications to make it easier for people to do things on their own and, as people leave the institution, by not reflexively replacing them one for one.

IT costs can also be examined. Just as higher education leaders are now asking whether every campus needs its own version of Psychology 101 (or Biology or Economics or . . .), they might similarly

> "We need to give priority to those investments that help our institutions actually address the questions around affordability."
>
> **—Ellen F. Falduto, Chief Information and Planning Officer, the College of Wooster**

question why so many institutions (and units within institutions) are building graduate student application systems or grants management systems, or why each individual college and university has numerous email services, local Higher Performance Computing (HPC) clusters, massive big data storage arrays, or site licenses for the same software. Uncoordinated, redundant expenditures supplant other needed investments, such as consistent classroom technology or dedicated information security staff. Planning needs to occur at the institutional or departmental level, but it also needs a place to coalesce and be assessed regionally, nationally, and in some cases, globally, because there isn't enough money to do everything that institutional leaders, faculty, and others want or even need to do. Public systems are making some headway in sharing services, but for the most part, local optimization supersedes collaboration and compromise.

Affordability is not just about reducing costs. Resources are finite everywhere. But at many institutions, such as small privates, resources are particularly limited. These institutions must carefully prioritize investments and initiatives and look to optimally leveraging their IT investments.

Information technology can also contribute to achieving institutional outcomes that can make higher education more affordable. Helping students attain and transfer credentials easily and quickly is a challenge that technology can help solve. Stemming student attrition also both increases annual revenues and reduces the costs of each degree granted.

Who Outside the IT Department Should Care Most about This Issue?

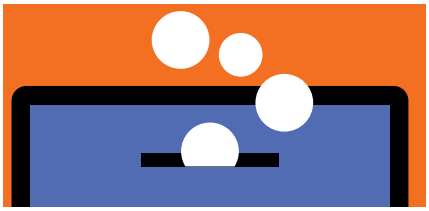
- The president and senior leaders, because they will need to set institutional strategy around the issue of "affordability" including IT priorities and investment
- Faculty and staff, because they will be the ones who bring ideas to the table, often the ones who implement the ideas, and ultimately the ones who have to live with the changes

The Misconceptions

- Initial costs and long-term investment requirements will be minimal. (New solutions are chosen to try to solve problems and reduce cost, but they require the correct infrastructure, expertise, and staffing levels to work properly. Both initial and ongoing costs are often overlooked or underestimated, as is the impact on the workforce as roles and positions are phased out or replaced.)
- Problems can be solved by deploying technologies. (When technology is part of the solution to a business problem, it too often becomes the first action taken, before the problem and requirements are well understood, and the primary goal of the initiative, rather than the initial business objective.)
- Affordability can be addressed with a low-hanging-fruit approach. (Affordability means making tough choices about institutional priorities and aligning resources accordingly. This may entail reallocations that move resources from one area or program to another—which, among other complications, can generate resentments.)
- Technology budgets can remain flat. (IT costs will continue to increase because information technology is now embedded in pedagogy, research, campus life, and administrative functions. Every technology investment generates downstream costs that need to be funded and offset somewhere else.)

The Risks

- Moving too quickly to implement initiatives without adequate consultation, dialogue, and reporting. This can destroy trust and curtail savings and leave the institution worse off as departments elect to pursue their own paths rather than work collaboratively.
- Making rash or excessive reductions or consolidations. This can make good services bad and lead to increased work or shadow systems to accommodate the lost functionality. Changing services without adapting business processes is like squeezing a balloon: the work will remain, but it will move elsewhere. The project may prejudice constituents against future efforts, no matter how better managed those efforts may be.
- Being unable to improve affordability. If higher education cannot improve affordability through its own initiatives, it is highly likely that the issue will be addressed through public policy and regulation.
- Ignoring strategic priorities. Doing so will diminish the distinctiveness and quality of the institution. Students won't understand what's special about the institution and why it is worth the investment. They will choose to enroll elsewhere.



The Opportunity

Institutions that can effectively prioritize IT investments and resources can improve the institution's bottom line and lower costs for students. Unnecessary IT costs and risks will be greatly reduced. The IT organization's services, service levels, and initiatives will be aligned with institutional needs. IT service provision will be streamlined. Information technology is not inexpensive; when institutions are able to rightsize their IT spending to target their strategic priorities, they can be assured that their IT investment is optimized.

Advice

To get started:

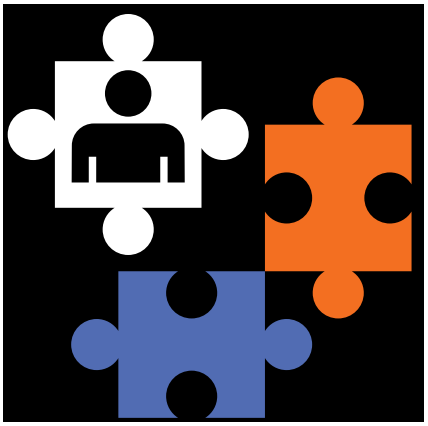
- Start simple. Identify opportunities for the IT organization to align with institutional priorities. Inventory capital needs, and determine the costs and resource requirements.
- Work with the leadership team to iteratively identify, negotiate, and finalize priorities to support the institution's strategy or needs. In those conversations, try to describe the difference in impact between not making an investment and making an effective investment.
- Right-source internal services. Redundant local services may optimize service locally but can cannibalize funding for adequate centralized versions of the same services and impede institutional affordability. Get clarity from leadership on the core services and service levels the community needs, forecast the initial and ongoing costs, build or buy the services, and ensure that institutional leadership is willing to require constituents to use central IT services provided the services meet negotiated service levels. The IT organization should be advised and supported by a representative group of stakeholders who can help establish service level requirements, monitor performance, and reconfirm or renegotiate service levels over time.

To develop further:

- Apply continuous improvement to maintain the service management foundations advised in the previous section. Regularly reevaluate the service catalog and each core service. Ensure that stakeholders have a serious voice and impact on service levels and service improvement plans.
- Recognize that cost reductions might be better put toward new critical needs (e.g., data management and analytics) and risks (e.g., data privacy and security) than savings. Prioritize critical areas for the future.

To optimize:

- Take an even deeper and harder look at the costs of providing IT services. Engage in service-based costing across the entire IT organization to ensure that all IT costs are allocated to all services.
- Compare internal and external sourcing options for delivering similar service levels at lower costs, and ensure that any estimated cost savings can actually be harvested (e.g., by reducing headcount, eliminating software or hardware costs, closing a data center). Initial estimates of savings often erode to nothing after fully accounting for constraints such as loss of functionality (which must be replaced elsewhere) or inability to reduce headcount (when 3 FTE of effort is distributed among 7 staff with very different skill sets).
- Refocus resources on how to broker external services and how to contract, deploy, and manage them.
- The affordability question is not just an IT question. Understand whether the entire institution is emphasizing affordability. The IT organization often gets asked to partner with other areas that are trying to address affordability issues. Advocate to collaborate on affordability with academics, student development, admissions, grants management, and other areas.



Issue #8: Sustainable Staffing

Ensuring adequate staffing capacity and staff retention as budgets shrink or remain flat and as external competition grows

Kirk Kelly, John P. Landers, Stuart D. Lee, and William R. Senter

As institutions become more dependent on their IT organizations, IT organizations are more dependent on the expertise and quality of their workforce. New hires need to be great hires, and great staff need to want to stay. Each new hire can change the culture and effectiveness of the IT organizations—and, by extension, the institution—for the better or for the worse.

External competition for IT talent is a major threat. Recruitment and retention of IT staff is proving to be increasingly volatile as the external job market goes through dips and troughs. Businesses are hiring more staff, particularly IT

> "Some people consider the cloud to be a panacea that will allow us to massively reduce costs, notably in staff, but what we are now seeing instead is the emergence of core skills needed internally (security, integration, cloud architecture, and so on). These do not come cheap."
>
> **—Stuart D. Lee, Deputy CIO, IT Services, University of Oxford**

staff. Higher education cannot generally compete with commercial salaries and benefits, and many institutions no longer provide offsetting intangible advantages like less stressful workloads or feeling embedded in academic life.

Challenges include losing talent, especially younger talent, after just a few years. The loss of institutional knowledge when staff leave compounds the loss of FTE effort. Smaller institutions and those in rural areas are particularly at risk. Talent loss can also occur with *in situ* staff if they cannot continually reskill as the technologies develop at a rapid rate.

IT leaders are struggling to influence institutional leaders—in human resources (HR), finance, and elsewhere—to conceive of and create a more "sticky" organization to retain staff. Solutions include market-competitive salaries, relevant job descriptions, flexible workplaces and work hours, and ongoing rewards and career advancement.

Who Outside the IT Department Should Care Most about This Issue?

- The HR organization staff, to provide their expertise and advocacy
- CBOs and CFOs, to understand and help make the case for the true costs and benefits of an effective IT workforce
- HR, IT, and finance leaders, to work together to determine realistic salaries for new hires in strategic or competitive areas

The Misconceptions

- IT professionals are fungible: staff hired for one role can easily be used for another. (A web developer is not a database administrator is not a data scientist is not a project manager. The IT profession is increasingly differentiated, and not everyone can be retrained for a different role.)
- When a lot of IT professionals are looking for work, it should be easy to find qualified employees. (It is very hard to find the right person.)
- The salary the institution decides it can afford is the salary an IT professional will accept. (Institutions need to be flexible about salaries, job descriptions, and working conditions. Getting the best staff—or even qualified staff—can require negotiation and accommodation.)
- A contractor is always a good solution to special needs or workload spikes. (Contractors are effective in plugging generic gaps, but when institutional knowledge is part of the work, contractors can impede work and alienate constituents.)

The Risks

- Overpromising and underdelivering. IT leaders and managers have to focus on the work as well as the workforce, which can distract them from job and workplace improvements. Creating an expectation that employees and staffing matter, but not following through, can be worse than making no commitments at all.
- Massively underresourcing in key areas and depending too heavily on contractors
- Not balancing staff optimization with workforce optimization. Every opportunity or promotion offered to one staff member is evident to all staff members. Sometimes the best solution for an individual will take the organization out of balance or be impossible to scale.
- Trying to lead a 21st-century IT organization with support from a 20th-century HR organization. All parts of the institution need to adapt to new business practices and job markets.
- Keeping on keeping on. Ignoring workforce challenges risks lowering staff engagement and increasing burnout. People have to live with their work environment on a daily basis. Each day that passes without addressing challenges like overwork, bad management, insufficient training, or lack of advancement increases the likelihood that the best will leave and everyone will be less committed and effective.

The Opportunity

Institutions with sustainable IT staffing will have IT workforce stability and a more effective, predictable IT organization, which can achieve higher-quality IT services and initiatives. These institutions will be a more attractive workplace for existing and prospective staff, making it easier to attract and retain professionals who are highly talented and have skills sets that are in the highest demand.

Advice

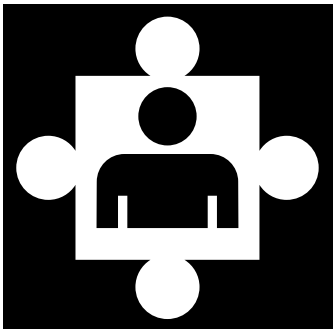
To get started:

- Be proactive. Ensure that institutional management is aware of hiring and retention risks before they become active problems. Draft a

staffing strategy and communicate the institutional impact of failing. Identify the greatest retention risks (staff or roles), and create plans to respond to retention issues before they happen.
- Solidify the partnership with HR. Educate HR leaders about the problem, help them understand what's needed from them, and continually reinforce the importance and value of their help.
- Review, update, and consider restructuring IT job families and job descriptions to accommodate current and future workforce needs. Identify technical and nontechnical roles and skill sets needed to manage external suppliers as well as run internal IT services.
- Change the focus of the value of the IT organization from technology to talent. Organizations can spend more time and care creating the best environment for servers than for staff.
- Play an active role in hiring. The easiest way to change culture is through hiring, and leaders need to be engaged in that process.

To develop further:
- Continually reskill IT staff and instill in them an ability to adapt to a fast-changing sector. No job is for life, and no technology can sustain an entire career.
- Develop a continuous-improvement process to know how engaged staff are and why (or why not). Use the results to make meaningful and lasting changes, or don't bother with a survey. Staff will be watching, and failing to candidly communicate results and to respond will backfire by reducing engagement.
- Consider whether the entire workforce is reflecting and reinforcing the expected culture. Culture is difficult to change and uphold. Leaders should continually specify behaviors and actions that support organizational values and give managers and professionals timely feedback.
- Don't let a crisis go to waste. Regulations can provide an opportunity to improve working conditions and job descriptions. Retirements and resignations can offer the latitude to restructure jobs and the organization.
- Ensure that the workforce is diverse. For example, it is not uncommon for IT departments to have a staff base with 75 percent over the age of thirty, so imaginative use of graduate recruitment, internships, and apprenticeships is needed.[23]

To optimize:
- Constantly reskill IT leaders to ensure succession planning and to create digital leaders who understand the business, the emerging technologies, and the current internal capabilities in order to identify opportunities.
- Invest in managers. Supervisors have the most impact on staff engagement and retention. Good managers will have high-performing, happy, and long-term staff. Bad managers run through talent and damage the entire organization. Caring about the management team means that the management team will care about their direct employees.
- Look beyond higher education to learn more about high-performing organizations and exemplary IT workforce management in other industries.
- Share successes with peers and the entire field. Teaching is the best way to learn.
- Encourage resource management so that you know who you have, what skills they have, and what they are available to work on.



Issue #9: Next-Gen Enterprise IT

Developing and implementing enterprise IT applications, architectures, and sourcing strategies to achieve agility, scalability, cost-effectiveness, and effective analytics

Gerard W. Au and Kirk Kelly

Buildings should outlive alumni; technology shouldn't. Today's higher education enterprise systems are often older than today's college students. About four in ten ERPs were part of a technology baby boom influenced by Y2K remediation. Another 20 percent or so are even older. Enterprise applications based on design principles from the 1980s and 1990s are commonplace.[24] Those systems are not keeping pace with institutions' and constituents' demands—for data, data integration, and mobile access. Because those solutions don't offer modern interfaces and processes,

institutions are bolting on many, many other solutions to fill the gaps and meet needs. And because those solutions were highly customized to support higher education's idiosyncratic ways of working, they have created an ongoing maintenance drag on IT staff and budgets—along with dread over the prospect of replacing them. Every year, their shortcomings become more apparent. In particular, the gaps and overcustomization of student systems are hindering institutions.

IT leaders are examining core enterprise applications, including ERPs (traditionally, suites of financial, HR, and student information systems) and LMSs, for their ability to meet current and future needs. Although the needs and problems are clear, the solutions are not necessarily obvious or easy.

Who Outside the IT Department Should Care Most about This Issue?

- The academic community, because student success efforts depend on (1) student systems that are easy to use and full-featured and (2) data from core enterprise systems

The Misconceptions

- The size of the challenge is easily managed. (Changing core enterprise applications, or even taking current systems back to baseline or moving them to the cloud, will be disruptive, time-consuming, and expensive.)
- The IT environment is not overly complex. (Adding new "bolt-on" solutions and integrating applications is not like assembling Lego bricks. Cloud architecture adds additional complications, because it also entails interfaces with network topography.)

The Risks

- Participating in a cultural pushback to the perception that standardizations are "changing higher education operations into a business," when the aspiration is to help higher education find efficiency.
- Overemphasizing privacy and security and losing the opportunity to use personal information to improve student experiences, productivity, and outcomes. Privacy and security are important, but so is student success. A balance must be achieved.
- Moving institutional data to the cloud. Original core ERP solutions used to be the source of most institutional data. But business intelligence initiatives weren't mature enough to support effective analytics algorithms and interfaces. Although today's analytics and initiatives are mature enough, institutional data has dispersed, including to the cloud. Institutions are struggling to get data back from the cloud.
- Moving forward in a changing marketplace. Big ERP vendors are trying to modernize, new vendors are entering the market, and institutions' choices are based as much on solution provider roadmaps as on existing products. The outcomes and best choices are still uncertain. This uncertainty and flux introduces enormous risk related to functionality, cost, and timelines.
- Standing still. Not doing anything puts an institution further behind. Institutions need to act, and they need to recognize that modernizing the enterprise application architecture, experience, and portfolio will likely take years.

The Opportunity

An institution that can develop a next-gen enterprise IT environment will be able to boil some administrative costs out of the institution with a standard system that works well. Newer systems offer the opportunity to reengineer and simplify work, rather than reengineer systems and keep the work unchanged. The savings can be applied to systems that make it easy for students to succeed and that emulate today's commercial digital interfaces, which use AI (artificial intelligence) to advise and guide consumers.

Advice

To get started:

- Ensure shared leadership between IT and business areas and make

(continued on page 48)

> "We spend a lot of time modifying, and I would move heaven and earth to get back to baseline. We don't need to distinguish ourselves because of our HR system."
>
> **—Kirk Kelly, Associate Vice President and CIO, Portland State University**

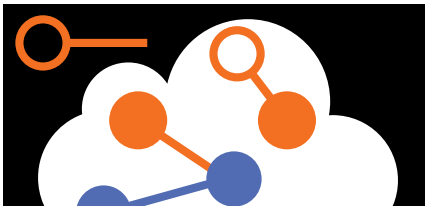
(continued from page 45)

the IT organization a key partner throughout the process. Whether you select a new solution or move to the cloud, all implementations entail significant business process change. Help stakeholders understand the risks and costs entailed in customizations so that they will support the project when they get pushback from staff whose work will change.

- Avoid application and system modifications: They create a permanent burden and an ongoing risk.
- Know your own data, including the needed flows and integrations.
- Know the total cost of running applications on-premise so that it can be compared to the cost of cloud-based solutions. Be clear about both the total cost of ownership and the actual savings that a move to the cloud will deliver. The ECAR total cost of ownership (TCO) framework is a useful tool.[25]

To develop further:

- Concentrate on improving the student experience and on achieving institutional strategic priorities.
- Carefully think through the technical impact of moving to the cloud, to avoid underestimating the effort and costs.



- Find collaborators. The majority of higher education institutions are facing this challenge. This might be an ideal time to consider collaborations that could save time and money and even generate better solutions.

To optimize:

- Share your story as a leading innovator to help advance the field. Higher education is still in the thick of this journey, and it's not clear institutions have reached this stage yet.

Issue #10: Digital Transformation of Learning

Collaborating with faculty and academic leadership to apply technology to teaching and learning in ways that reflect innovations in pedagogy and the institutional mission

Rebecca Frost Davis, Deborah Keyek-Franssen, Eric Sakai, David Starrett, and Aimee Whiteside

Our world has been transformed by technology. The emerging digital ecosystem makes creation and publication easy, is characterized by networks that are largely social, and is providing ready access to data driven by algorithms that personalize information for users and that inform human judgment. What would higher education look like if we were building it from scratch in the context of digital culture?

The digital transformation of learning is moving beyond using online replacements for traditional face-to-face teaching toward applying existing and emergent tools for extraordinary results.[26] Colleges and universities are at a particularly good point in time to improve teaching and learning across the board—from face-to-face to hybrid to online—because the new technologies are making us ask questions about the best ways for students to learn.

Personalized learning "provides a unique, highly focused learning path for each student." It uses "IT systems and tools to tailor learning experiences based on student strengths, weaknesses, and pace of learning. Technologies including analytics, adaptive learning, digital courseware, and others underlie personalized learning, which builds a 'profile' of each student and makes continual adjustments to learning paths based on student performance. It also provides information to help instructors better target their teaching to individual students."[27] According to Michael Feldstein and Phil Hill, personalized learning applies technology to three processes: content (moving content delivery out of the classroom and allowing students to set their pace of learning); tutoring (allowing interactive feedback to both students and faculty); and contact time (enabling faculty to observe students' work and coach them more).[28]

The digital transformation of learning begins with faculty: helping them understand the ways students benefit from technology-enhanced teaching; and partnering innovative faculty members with IT staff, educational technology staff, teaching and learning centers, and other key units to create and then share and apply success stories.

Who Outside the IT Department Should Care Most about This Issue?

- Faculty, because they may have to rethink how they teach and design courses/curricula
- The chief academic officer, to lead the academic community and advocate for appropriate resource allocation
- Department chairs, curriculum directors, and the curriculum committee, to help think through curricular implications and changes

> "I recently attended a campus technology session and learned about a tool called Hypothes.is. Afterwards, I immediately redesigned one of my own lessons. As a result, the students were engaged in a meaningful, interactive digital activity that reinforced key concepts and learning outcomes in a fun, memorable way."
>
> **—Aimee Whiteside, Assistant Professor, the University of Tampa**

- Teaching and learning center (or related faculty development) staff, to provide the expertise and support needed

The Misconceptions

- The digital transformation of learning can be achieved at a course level with a few innovative instructors and is optional for others. (Transformative initiatives will entail integrating technology into the curriculum through repeated assignments, building to signature work where students integrate and apply their learning to complex problems.)
- Teaching and learning will proceed the same as always, just with some technology added. (New and scalable technologies are not simply porting the institution into a new technology environment; they are transforming the curriculum and the institution itself.)
- Technology provides a different, but not really better, way of teaching and learning. (Evidence of the impact of technology on teaching and learning can be difficult to demonstrate unless the faculty member has the time and expertise to conduct a comparative study. Yet research demonstrates a multitude of benefits.[29] Ultimately, faculty members need to know that their institutional leadership is willing to invest in them, so that they can invest in innovative student learning.)
- The IT organization is trying to foist doo-dads on faculty and students simply for technology's sake.

The Risks

- Not getting sufficient buy-in upfront and failing to maintain ongoing communication with all stakeholders. Faculty, in particular, need extensive outreach to accept and influence the initiative, because it will fail without their active support.
- Underscoping the initiative. If it is scoped as online content delivery only, for example, or in some other way as an adjunct to the "real" teaching and learning activities, the investment will fail and will impede true digital transformation.
- Failing to realize the unintended consequences for higher education. There is no doubt that transforming the core mission of higher education will change things in unpredictable ways. Some concerns today are very dark, including concerns about needing far fewer faculty, curtailing faculty autonomy, and promoting alternative credentials that will render colleges and universities less important and numerous. Higher education is changing, and that is partly due to technology. Some faculty, institutions, students, and innovators will benefit enormously, while others will not.
- Not changing. A few, particularly elite, institutions may be able to afford to selectively integrate technology into their existing teaching and learning programs. For the majority of colleges and universities, failing to act is a risk. The risks include lower student digital literacy and the loss of innovative faculty and uninspired or undersupported students to other institutions, which could ultimately lower the institution's reputation and enrollment. Technology can facilitate active learning, and we know active learning benefits students. It's been said that if research comparing active learning with traditional lectures were a drug trial, it "may have been stopped for benefit—meaning that enrolling patients in the control condition might be discontinued because the treatment being tested was clearly more beneficial."[30]
- Failing to keep pace. The world is changing and is adopting technologies. Higher education needs to keep up, or alternatives will marginalize higher education.

The Opportunity

Institutions that excel will become role models for transformative learning and will be more attractive to prospective students and faculty. Faculty and student engagement and retention will increase. Students and faculty will be more engaged and intrinsically motivated. Their pride in and identification with the institution will increase, which could also create more dedicated alumni. Improving technology-enhanced pedagogy should increase students' digital competence and improve their ability to further integrate technology into their postgraduate lives. More students will achieve credentials, but just as important, they will be attaining the right learning outcomes. Students may be more likely to return to higher education for postgraduate degrees and certificates because they both enjoy and value their higher education experiences more.

Advice

To get started:

- Ensure that this is an active and major priority for the Chief Academic Officer. Without engaged leadership, this initiative's impact and success will be limited.
- Build consensus and competence around this goal. Involve all relevant stakeholders (faculty teaching excellence center, academic support services, student support services, library, business office, registrar), because they will have the credibility and the capability to envision opportunities and identify requirements and risks.
- Inventory and identify the learning ecosystem and consider how it might be made available universally. This goes beyond the traditional classroom, whether it is face-to-face or online and beyond the traditional learning management system.
- Focus on faculty buy-in. Find prospective exemplars and advocates among the faculty, such as early adopters or excellent teachers. Offer them the ability to join a fellowship program, and support their ideas with time, training, and professional development. Encourage faculty engagement by finding incentives that fit the faculty rewards system. Peer mentoring—opportunities for faculty to work with colleagues one-on-one—is an effective approach for promoting and supporting technology innovations.

To develop further:

- Don't lose sight of the goal. Even with a sense of urgency, digital transformation of learning entails changing the very heart of academic culture. That takes time.
- If you haven't already done so, don't forget to include students as stakeholders and strategic partners. They have great ideas, know what works for them, and can help influence the faculty.
- Formalize faculty involvement through a teaching and learning

Teaching, Learning, and IT Issues:

Veronica Diaz and Malcolm Brown

As this year's EDUCAUSE Top 10 IT Issues list makes clear, student success has become a strategic focal point for many higher education institutions. The concept of student success is itself multidimensional: it includes success not only in academic coursework but also in degree planning, constructing next-generation digital learning environments and resources, and supporting a range of what the National Survey of Student Engagement (NSSE) calls high-impact practices. Increasing student success requires institutional attention to all of these areas. Although challenging, improvements made in these areas, if done in tandem, can result in academic transformation: innovation and change that is multidimensional and strategic and that addresses campus culture.

The results of the Key Issues surveys from the EDUCAUSE Learning Initiative (ELI)[1] over the past two years clearly indicate that the teaching and learning community is focused on this idea of *academic transformation:* it was the #2 issue in 2015 and the #1 issue in 2016.[2] Below we will identify some of the important intersections between the EDUCAUSE Top 10 IT Issues and the ELI Key Issues for 2016. This side-by-side comparison makes it clear that with these concepts of student success and academic transformation, the IT community and the teaching and learning community share a common agenda.

The EDUCAUSE Top 10 IT Issue #2 (*Student Success and Completion*) closely aligns with several of the ELI Key Issues. Through the 2016 Key Issues survey, teaching and learning community members identified several building blocks supporting student success: assessment of learning (Key Issue #3), adaptive learning (Key Issue #12), learning analytics (Key Issue #5), and academic transformation (Key Issue #1). Taken together, these are all necessary components that speak to the increased collaboration needed across campus units and stakeholders to make progress on student success. At many institutions, campus organizations are working to develop and deploy a student success technology ecosystem that creates shared ownership for educational progress by providing students, faculty, and staff with holistic information and services that contribute to the completion of a degree or other credential. As an example, Integrated Planning and Advising for Student Success (iPASS) initiatives are designed to coordinate the efforts to monitor, understand, and act on these factors to promote higher rates of student achievement and success. This illustrates the point that in order to make progress on these particularly challenging issues, we must establish cross-organizational collaborations, involving key stakeholders who support learners all along their experience.

Many of the ELI Key Issues intersect squarely with the EDUCAUSE Top 10 IT Issue #3 (*Data-Informed Decision Making*) and Issue #6 (*Data Management and Governance*). While data-informed decision making and the related data governance issues are becoming more common in all facets of higher education, perhaps the most important intersection is with the ELI Key Issue #3 (assessment of learning). The importance of learning assessment to student success is intuitively clear. One domain where this is becoming evident is instructional design. As applications begin to deliver near-real-time learning data back to the instructor and the instructional designer, they both are increasingly enabled to introduce improvements in the course design, even as the course unfolds. Both ELI Key Issue #5 (learning analytics) and #10 (next-gen digital learning environments and services) provide further points of intersection. For example, on the management side, new open standards for learning data (e.g., the Caliper Analytics standard from IMS Global) provide a kind of Esperanto for learning data, enabling all learning

Priorities and Intersections

applications to contribute to an institutional learning record "store," which in turn provides the basis for richer and more thorough analyses. For this idea to succeed, all technologies associated with these services are highly dependent on effective data practices.

Strategic Leadership—repositioning or reinforcing the role of IT leadership as a strategic partner with institutional leadership—is #4 on the EDUCAUSE Top 10 IT Issues list. The teaching and learning community identified several Key Issues that support institutional strategic leadership but point as well to several organizational units beyond the IT department. Academic transformation (Key Issue #1) describes a reorientation around learner success through new course models (online and blended learning, Key Issue #4), learning space design (Key Issue #6), and assessment of learning (Key Issue #3). As we've stressed, many factors are involved in leading academic transformation, including a focus on stakeholder-centered design, relevance of credentials, and the strategic use of technology. Teaching and learning is central to academic transformation. Faculty development (Key Issue #2) supports faculty as they explore new modes of instructional delivery and experiment with technology-enabled enhancements. Faculty development programs are becoming more adept at demonstrating return on investments and offering recognition to faculty, sometimes in the form of digital credentials, as they expand their ability to create successful learning engagements enabled by the strategic use and development of technology.

Digital Transformation of Learning (EDUCAUSE Top 10 IT Issue #10) strongly echoes ELI Key Issue #1, academic transformation. This common use of the term *transformation* makes explicit just how aligned the results of these two surveys are. We've already sketched out points at which the ELI Key Issues intersect with the EDUCAUSE Top 10 IT Issues on the theme of transformation. Additional examples include accessibility and universal design for learning (Key Issue #7), which moves away from the more piecemeal approach of focusing on accessible content and aspires to create learning designs that work for all. Similarly, the goal of the next-gen digital learning environments and services (Key Issues #10) is to replace sole reliance on the LMS and instead introduce a component-based architecture for learning technology, enabled by adherence to open standards.

challenges will require the integration of an ever-wider range of resources and skills. These points of contact between the key teaching and learning issues and the top IT issues can provide the basis for strategic and tactical discussions between the IT organization and a cohort of campus organizations supporting teaching and learning. Each serves to illuminate the other, providing a better sense of direction as we move forward in support of student success.

An institution must be pursuing innovation in all of these individual dimensions so that, when orchestrated together, they result in transformation that is strategic and institutional in scope and impact.

As important as each of these issues are, not one of them can, by itself, accomplish true academic transformation. An institution must be pursuing innovation in all of these individual dimensions so that, when orchestrated together, they result in transformation that is strategic and institutional in scope and impact. Such transformation also entails cultural change, requiring both IT and academic leaders to work together to realize these institutional aspirations. This is why EDUCAUSE has collaborated with teaching and learning leaders to establish a community of practice—Leading Academic Transformation—for campus leaders engaged in such transformative work on the academic side.

Clearly, the most significant teaching and learning innovations necessitate cross-organizational collaborations, cohort-based leadership, and institutional community building. This evolution of the academy, along with the evolution of the profession (Key Issue #15), has the potential to transform our cultures, from the classroom to senior leadership. The interests and mission of the IT organization and of the teaching and learning community converge, since making progress on core organizational

Notes

1. ELI (http://www.educause.edu/eli) is a community of higher education institutions and organizations committed to the advancement of learning through the innovative application of technology. The program has three pillars: learners, learning principles and practices, and learning technologies.
2. Since 2011, ELI has surveyed the higher education teaching and learning community to identify its key issues. The community is wide in scope: we solicit input from all those participating in the support of the teaching and learning mission, including professionals from the IT organization, the center for teaching and learning, the library, and the dean's and provost's offices.

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Malcolm Brown is Director of ELI for EDUCAUSE.

technologists group of faculty who are adopting and advocating.

To optimize:

- Review support, incentives, and disincentives (implicit as well as explicit) for faculty, and adjust them to help create a campus culture of innovation and to cultivate a love of teaching and learning for faculty and students alike.
- Ensure that processes are in place to constantly monitor and adapt to the changing ecosystem.
- If it isn't in place already, define and institute metrics to measure progress and success. Create processes to monitor the metrics, publicize them to stakeholders, and act on them.
- Share expertise and experiences online and at meetings and events to connect with other innovators and to help the entire sector grow.

Conclusions

The EDUCAUSE community selected the Top 10 IT Issues from a slate of 18 issues identified by the IT Issues Panel members. The following is the list of 8 issues that did not make the overall Top 10, in order of priority:

- *Next-Gen IT Workforce:* Creating an adaptive IT organizational structure, staff roles, and staff-development strategy to support innovation and accommodate ongoing changes in higher education, IT service delivery, technology, analytics, and so forth
- *Change Leadership:* Partnering with institutional stakeholders to address the velocity of change while minimizing change fatigue across the institution
- *Faculty Adoption of Technology:* Promoting faculty adoption of technology in teaching through training, advice, incentives, and other support
- *IT Partnerships:* Developing partnerships for sharing IT services, platforms, and resources across a campus or with multiple institutions
- *Identity Management:* Adopting system-wide identity management systems
- *IT Service Management:* Adopting an IT service management (ITSM) approach to improve the IT organization's efficiency and effectiveness
- *Online Education:* Providing scalable and well-resourced services, facilities, and staff to support online education
- *Digital Transformation of Scholarship and Research:* Providing scalable and well-supported services, resources, and staff to accommodate advances in digital scholarship and research

In addition to the overall Top 10 list, the EDUCAUSE Top 10 IT Issues website publishes Top 10 lists for three institutional subgroups:

1. *Carnegie classification:* Associates; Bachelors; Private Masters; Public Masters; Private Doctoral; Public Doctoral; and non-U.S.
2. *Institutional size:* less than 2,000 FTEs; 2,000–3,999; 4,000–7,999; 8,000–14,999; and 15,000+
3. *Institutional approach to technology adoption:* early; mainstream; and late adopter

Of the 8 issues that did not make the overall list, 5 appeared on the Top 10 lists for various types of institutions: *Next-Gen IT Workforce; Change Leadership; Faculty Adoption of Technology; Identity Management;* and *Online Education*.

International Differences

Student success appeared on each group's Top 10 list except that of non-U.S. institutions. The forces driving student success initiatives are particular to the United States. Although students' higher education expenses are increasing in other countries as well, more than 40 countries do not charge tuition at all. And student debt in the United States is higher than in other countries. That is due to decreased support and subsidies for higher education in both private and public institutions, raising the costs for students and parents. The U.S. graduation rate ranking among OECD member countries has slipped as well. Although 39 percent of American students graduated in 2012, compared with only 33 percent in 1995, the graduation rates in other countries have grown faster. The U.S. graduation rate rank dropped from 1 to 19 (of 28 countries) in the same time frame.[31]

Although non-U.S. institutions did not rank student success among their top IT issues, they rated the other academic IT issues higher than U.S. institutions. Non-U.S. institutions rated *Digital Transformation of Learning, Online Education, Faculty Adoption of Technology,* and *Digital Transformation of Scholarship and Research* at least 0.5 points higher (on a 10-point scale) than did U.S. institutions. Particularly noteworthy, they rated *Digital Transformation of Scholarship and Research*—at the bottom of the U.S. list of all 18 issues—1.3 points higher.

Limited resources is a global challenge. The issues that U.S. and non-U.S. institutions rated most similarly were *Sustainable Funding* (issue #5), *Higher Education Affordability* (issue #7), and *Next-Gen IT Workforce* (issue #11).

IT Staff or the IT Organization?

Of the 18 IT issues selected by the EDUCAUSE IT Issues Panel, 2 pertain to the IT workforce: *Sustainable Staffing* (issue #8) and *Next-Gen IT Workforce* (issue #11).

Sustainable Staffing concerns the challenges of sufficient staff levels, and *Next-Gen IT Workforce* emphasizes the organizational structure and roles needed to address today's challenges. Some types of institutions (doctorals and institutions that tend to be early adopters of technology) were more concerned with optimizing the IT organization, so *the Next-Gen IT Workforce* issue appeared in their group's Top 10 list. Late adopters, the smallest institutions (less than 2,000 FTEs), and medium-sized institutions (4,000–7,999 FTEs) prioritized attaining sufficient staffing levels *(Sustainable Staffing)* over optimizing the IT organization. Neither IT workforce issue appeared on the Top 10 list for the largest institutions

(15,000+ FTEs). Size can be a buffer and lessen the impact of the loss of an IT professional. Larger IT organizations also have more leeway for structuring the organization and for creating specialized roles than do smaller organizations, where staff must play multiple roles.

An institution's approach to technology adoption might mitigate the effect of institutional size. Early, mainstream, and late adopters are found among all types and sizes of institutions. So although most small institutions are more focused on *Sustainable Staffing* than on the *Next-Gen IT Workforce,* perhaps the early adopters among them have been able to achieve sufficient staffing levels through more institutional support or a more exciting workplace for IT staff.

Road Bump Ahead for Student Success?

Today's student success initiatives are largely powered by analytics. The use of analytics and algorithms to trigger actions and decisions is still emergent in our ecosystem. The promise is great, and the number of success stories is increasing. Moving from anecdote and intuition to data is a powerful change and could help reduce bias, inconsistency, and uncertainty as well as ensure that attention is paid to all students and learners in the ways and at the times they need.

Yet there is evidence that we are slipping into the so-called Trough of Disillusionment.[32] It turns out that analytics is hard, time-consuming, and expensive. Institutions are facing trade-offs between highly flexible and comprehensive solutions that require significant time and expertise and dedicated solutions that are easier to implement but have narrow benefits. Some institutions find themselves caught in what feels like an analytics arms war, in which they continue to invest in more tools but still don't have the answers and outcomes they need. Data integrations require considerable effort and stakeholder negotiations. This can be a surprise to those who had never thought that getting all the right data in one place would be so difficult. Will this generation of analytics implementations come to resemble the turn-of-the-century ERPs, from which we learned a great deal at great cost?

Even more concerning is research showing how biased algorithms can be, in subtle and profound ways.[33] Colleges and universities are adopting analytics tools with proprietary and hidden algorithms. As those algorithms begin to be put to consequential use—to advise students and others on majors or courses or their likelihood of success—possibilities arise of Type I (false positive) and Type II (false negative) errors that could worsen outcomes for some students. Even if many more students benefit from an algorithm, that won't lessen the impact for those who are on the wrong side of the algorithm, and publicity tends to emphasize the edge cases. If institutions are applying algorithms they don't fully understand, their exposure to these risks could go undetected until the damage has been done.

TABLE 1. Mapping of EDUCAUSE and AGB Top Issues

EDUCAUSE Top 10 IT Issues	AGB Top Strategic Issues for Boards
Information Security	Campus Safety
Student Success and Completion Data Management and Governance	Student Success and Completion
Higher Education Affordability Sustainable Funding	The Value Proposition
Digital Transformation of Learning Strategic Leadership	The Academic Workplace The Changing Environment for Higher Education
Next-Gen Enterprise IT	The Partnership Imperative
Data-Informed Decision Making	The Business Model
Sustainable Staffing	Diversity and Inclusivity

We're All in This Together . . .

For each of the Top 10 IT Issues, panelists were asked: "Who outside the IT department should care most?" Their consistent initial response was, "Everyone needs to care!" And indeed, most of the 2017 Top 10 IT Issues involve numerous constituents. Panelists found it relatively easy to identify the most important stakeholders but harder to determine who was *not* affected by each issue.

The IT function could be described as a microcosm of the entire institution, touching all areas, all constituents, all concerns. Yet the IT department can achieve very little on its own. Whether as co-designers, funders, partners, or contributors of data and good security practices, all members of the institution can affect the IT organization's successes and failures. EDUCAUSE members understand and have embraced this connection.

The distinction between the priorities of the IT organization and those of the institution is blurring, and panelists were very conscious of that. Frequently they remarked: "This is not an IT issue . . . yet it's one of the Top 10 IT issues." Over the years, the EDUCAUSE Top 10 IT Issues have become centered more on the institution's priorities and needs and less on the requirements for running the IT organization. Consider the Association of Governing Boards top strategic issues for college and university boards in 2016–2017.[34] The EDUCAUSE Top 10 IT Issues can translate to or support each of the AGB strategic issues (see table 1). IT strategy and institutional strategy are tightly coupled.

. . . Yet It's Not One-Size-Fits-All

Every college and university is considering or addressing the same kinds of technologies (e.g., cloud, analytics, and

TABLE 2. The Top 10 IT Issues and Student Success

IT Issue	What Does the Future Look Like If We Get This Right?
1. Information Security	Constituents will be able to use their information assets unimpaired to fulfill the missions of the institution.
2. Student Success and Completion	We're **helping more students achieve the dream of graduation, which hopefully translates into success in their careers.**
3. Data-Informed Decision Making	Our campuses will be efficient, and **we will have more student success.** All of this will be better for our institutions and for society. Higher education suffers from a bad public image about college completion, so effectively using our data could help combat this.
4. Strategic Leadership	Higher education has major challenges: affordability, effectiveness, even relevance. If IT leadership is contributing positively and continuously to institutional strategy, higher education's ability to address those challenges will improve. Ultimately, **higher education will be helping prepare the next generation affordably,** which will make a positive impact everywhere.
5. Sustainable Funding	IT and institutional leadership will be able to engage in other discussions about using information technology to improve value, competitiveness, and innovation rather than continuing to talk about sustainable funding.
6. Data Management and Governance	We might be able to bring the cost curve down for higher education if we're able to apply data effectively to taking better advantage of the resources that we have. At the end of the day, **this has to be about reducing the cost and burden that we put on our students, and if we get this issue right, we have a better chance of doing that.**
7. Higher Education Affordability	Institutions will be able to continually make investments, innovate, improve service, and **lower costs for students.**
8. Sustainable Staffing	Institutions will be able to do more with less.
9. Next-Gen Enterprise IT	Higher education will have modernized its enterprise application infrastructure, offering students and faculty a platform to manage their entire lifecycle—from prospects to graduates to alumni, from grant application to funding to publication. Campus experiences like residential life and parking will be similarly improved. Interactions with the institution will be easier and, advised by analytics, more fruitful. End users will have access to more and better data, which will facilitate better decision making. **Enterprise IT sounds geeky and dull, but it can and should contribute to student success.**
10. Digital Transformation of Learning	Designing education to improve critical thinking analytical skills in terms of today's digital learning culture will better prepare students for their personal, professional, and civic lives. At the same time, higher education will be modeling the competencies students need and the world they are entering. **More students will achieve credentials, but just as important, they will be attaining the right learning outcomes.**

NOTE: Student Success connections are in bolded text.

information security) and the same general applications of technology (e.g., education, student success, and efficiency). Yet their approaches vary. Small private colleges do not have the same resources and scale to apply to a cloud or analytics strategy as do larger public universities. Liberal arts colleges have their own philosophy about the use of technology in teaching and learning. Public institutions are accountable to state and county governments and often have the opportunity (and sometimes imperative) to share services. Doctoral institutions have numerous stakeholders and often highly distributed IT functions. Institutions with an aggressive approach to technology adoption will be more willing to take more risks, invest more heavily in technology, and innovate early. General recommendations, resources, and role models are broadly helpful as a starting point, but every IT issue on the Top 10 list plays out differently at each institution, depending on resources, priorities, mission, and culture. Each institution needs to find its own communities to learn from and grow with. Although the large community of EDUCAUSE may at first seem too broad and too general to be relevant, a second, deeper look rewards any institution with opportunities to find peers and exemplars and to achieve a more pertinent cut of the data.

Building the Future

During our interviews with the members of the EDUCAUSE IT Issues Panel, they consistently highlighted student success as their endgame. For each issue, we asked: "What does the future look like if we get this right?" The panelists spontaneously made a direct connection to student success or, for three issues, an indirect connection via value, affordability, and security (see table 2).

EDUCAUSE members understand their challenge: use information technology to address their institutions' most pressing priorities. Student success is the most universally important of those priorities. The 2017 Top 10 IT Issues list

identifies the four focus areas for higher education information technology:

- Develop the IT foundations
- Develop the data foundations
- Ensure effective leadership
- Enable successful students

The 2017 Top 10 IT Issues are not just about today. Higher education information technology is very clearly building foundations for student success to last into the future.

Acknowledgments

This article embodies what is special about EDUCAUSE: members coming together to create new knowledge and insights, supported by EDUCAUSE staff. We are deeply grateful to the EDUCAUSE IT Issues Panel members who shared their thoughts and experiences throughout the year, participated in the interviews that were the basis of each issue description, and then reviewed the article in its entirety. Over 300 members took the time to respond to the IT Issues survey. Without their support, there would be no "Top 10," and we encourage all eligible readers to participate in future EDUCAUSE surveys.

EDUCAUSE staff collaborate to create this article. Teddy Diggs is a meticulous and simply excellent editor, who improves every article she touches. Pam Arroway and others on our data team ensure that the EDUCAUSE research and data in this article are accurate. Most of all, Joanna Lyn Grama not only oversees the IT Issues logistics, she makes crucial substantive contributions and, quite simply, makes this work easy and fun.

Notes

1. Once a year, members of the EDUCAUSE IT Issues Panel select a slate of 15–20 topics they believe will be the most important IT-related issues facing higher education institutions. EDUCAUSE members receive a survey with those issues and are asked to prioritize them. The 10 issues with the highest-priority scores become the Top 10 IT Issues. This methodology also enables EDUCAUSE to determine the Top 10 IT Issues among various types of institutions. For 2017, of the 10,256 EDUCAUSE member representatives who received an e-mail invitation to complete the survey, 318 (3%) responded.
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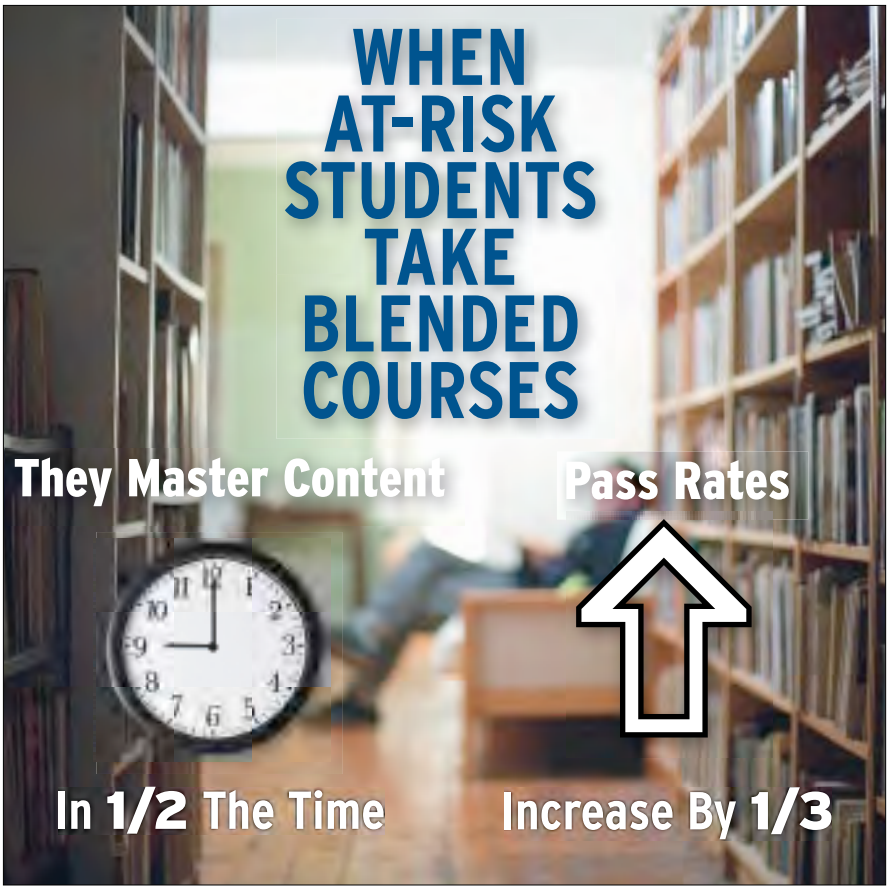
HOW PERSONALIZED LEARNING Unlocks Student Success

By Nazeema Alli, Rahim Rajan, and Greg Ratliff

Over the past few decades, the profile of the typical college/university student has changed dramatically. Higher education needs to evolve as well. Members of today's new student majority—including students from low-income backgrounds, first-generation college-goers, students over the age of twenty-five, and students of color—demand a learning environment that is more personalized. That is, they require learning that is more specific to their individual needs and goals.

Fortunately, technology provides educators and administrators with tools that can tailor the learning experience to the individual, help at-risk students master core skills, and develop guided pathways that assess students' progress toward graduation and suggest interventions if challenges arise along the way. Although much must be done in order to implement the needed changes for personalized learning, the vision and evidence for unlocking student success drives us forward.



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Why College?

Completing a postsecondary program has never been more important—both to whether a student will thrive or struggle and to whether the U.S. economy will grow or stagnate. Students with a postsecondary credential or degree are more likely to be healthy, employed, and civically engaged. With each step of the educational ladder they complete, their average earnings also increase.[1]

By 2020, 65 percent of all jobs in the United States will require a postsecondary credential. Yet in 2013, only about 40 percent of working-age Americans had one.[2] Consequently, colleges and universities are under intense pressure to increase retention and completion rates.

At the same time, today's students come from diverse backgrounds, face unique challenges, and often juggle numerous responsibilities in addition to their studies:

- 40 percent are over the age of twenty-five.
- Nearly 40 percent are the first in their family to go to college.
- 40 percent of full-time students and 76 percent of part-time students work while going to college.
- 38 percent are part-time students.
- 26 percent are raising dependent children.[3]

This increasingly varied student population makes it more important than ever to ensure that those of us in higher education not only are helping students complete their higher education but also are doing everything we can so that colleges and universities are ready to meet the needs of today's students.

Getting to and through College

Enrollment in postsecondary education has grown by more than 50 percent over the last twenty-five years. However, over the past twenty years, more than 31 million Americans—15 percent of today's working-age population—left college without earning a certificate or degree, and millions more are dropping out every year.[4]

According to ACT, freshman/sophomore-year retention rates range from 55 percent (for two-year colleges) to 64 percent (for non-selective four-year institutions).[5] And according to the National Center for Education Statistics (NCES), the completion rate for first-time, full-time undergraduate students who began their pursuit of a certificate or associate's degree in fall 2010 was just 29 percent. The completion rate for first-time, full-time students who began seeking a bachelor's degree in fall 2007 was 59 percent.[6] These statistics are troubling, and unless they change significantly, the U.S. economy will face a shortage of workers with postsecondary education.

Unfortunately, one of the strongest predictors of whether a student will complete a degree or certificate is not his or her intelligence, test scores, or grit, but family income.[7] The hard truth is that although higher education has unique potential to be a bridge to opportunity and the middle class, it too often serves as a barrier.

The goal of the Bill & Melinda Gates Foundation is to ensure that students complete a postsecondary program that helps them support themselves, engage in their communities, and achieve their dreams. Our partners and grantees are tackling the challenge of how best to adapt to the new student majority. Their research shows that personalized learning can help students, especially underserved students, complete a certificate or degree.

What Is Personalized Learning?

Rather than trying to apply a one-size-fits-all approach to education, personalized learning offers students an individualized approach that is specific to their preexisting knowledge, learning needs, and goals. Students learn best when their education is targeted and

tailored to them.[8] Examples of personalized learning activities that have been demonstrated to improve student outcomes include:

- adapting the scope of instruction based on assessments of students' existing knowledge, skills, and gaps;
- using personalized hints or prompts that support students during learning activities or assessment items;
- prompting learners to generate explanations of how they have approached an activity (e.g., "show work");
- employing algorithms that adapt the presentation of content based on relevance to learners' goals; and
- adapting the complexity or presentation of content based on a student's learning.

Research shows that powerful new teaching, learning, and advising tools can help advisors and educators to be more personalized in how they instruct and advise students.

Research shows that powerful new teaching, learning, and advising tools can help advisors and educators to be more personalized in how they instruct and advise students.[9] A personalized learning approach and environment can engage students and provide timely feedback and robust student supports. This higher-quality teaching and advising can result in greater retention and in higher rates of program completion.

"Good" Personalized Learning

Imagine that students everywhere are able to receive the most effective adaptive instruction at a reasonable price, using technologies and resources that tailor the learning to the individual. What if all of higher education had a strong culture of continuous innovation focused on adaptive learning experiences responsive to individual learners' goals? What if new, innovative tools could make personalized education not only effective in terms of learning outcomes but also economically feasible?

Imagine that remedial and general education programs are personalized to suit the prior knowledge, skills, and personal interests of each student. In place of large, anonymous lecture classes where many first-generation and low-income students struggle, students could instead participate in interactive, blended courses where they would have access to continuously improving content, adaptive simulations, problem sets, and assessments.[10]

Imagine that instead of an emphasis on lectures, the entire higher education system devotes time and attention to helping students achieve fluency and mastery through greater one-on-one tutoring, targeted group instruction, peer support, and other resources. In such an environment, students could take ownership of their learning and achieve mastery at their own pace.

Imagine that compelling personalization tools and advising applications are readily available to all students so that they can track their progress and achieve their individual goals. These tools would serve as personalized maps that motivate and guide students along every juncture of their postsecondary educational experience. Advisors and faculty would also use these tools to see where students are struggling and where they are succeeding, allowing the advisors to make real-time adjustments, deploy critical learning interventions, and apply increased or different supports based on the needs of each student.

Personalized Learning Today

The good news is that this world of innovative personalized learning interventions already exists. The capabilities are out there, and once they are adopted by more higher education institutions, more students will receive a personalized education and be able to reach their full potential. Technologies that boost the development of student-centered pathways, improve student supports with predictive analytics, and improve learning outcomes are emerging at postsecondary institutions around the nation. In addition, a growing body of evidence is demonstrating that new technologies can personalize learning at an unprecedented scale.[11] At the foundation, we are working to accelerate the development of these technologies and to increase an understanding of how they can be used by faculty and advisors to help students achieve greater success on their way to a credential. From our grantees and research, we've learned that when at-risk students take high-quality blended courses (i.e., a combination of in-class and online courses) they can master the same amount of content in half the amount of time. We've also seen pass rates for at-risk students increase by one-third in blended courses.[12]

Digital Courseware

Within personalized learning, digital courseware is a powerful lever to increase accessibility and affordability for students. The foundation partners with learning education technology organizations and colleges/universities to develop and scale the adoption of next generation digital courseware

FIGURE 1. Features Associated with More Positive Effects on Learning

1. Breadth	Effects were greater for projects either designing or redesigning an entire course than for those developing supplemental resources or early alert systems.
2. Field of use	Effect estimates were greater for projects implemented mainly in community colleges than in 4-year colleges.
3. Learners' preparation level	Effects were greater for projects targeting students with weak rather than moderate or advanced preparation.
4. Subject area	Mathematics courses had more positive effect estimates than courses in other subject areas.
5. Student:instructor ratio	Courses of medium enrollment size had more positive effects than the smallest and largest courses.
6. Pacing	Effects were larger for self-paced courses than for classes using cohort pacing or a mix of cohort and individualized pacing.
7. Dominant student role	Courseware in which the student's role was working on problems or answering questions had more positive effects than those where most time online was devoted to reading or listening to a video lecture.
8. Individualized	Courseware individualizing instruction on the basis of student performance on embedded assessments had more positive effects than those offering individualization based on student choice or no individualization.
9. Mastery based	Courseware determining when students are ready for new material by applying a standard of mastery had stronger learning effects than courseware allowing students to choose their own learning paths.
10. Adaptive technology	Learning systems that adapt to the individual learner had large learning impact estimates.
11. Modality	Effects tended to be more positive for courses using a blended learning model with more than half of the instruction occurring online.

Source: Barbara Means, Vanessa Peters, and Ying Zheng, *Lessons from Five Years of Funding Digital Courseware*, exhibit 12. *Reprinted with permission.*

that delivers personalized learning. Through our Next Generation Courseware Challenge,[13] we are funding high-quality courseware solutions to help low-income students succeed in high-enrollment general education courses, where they often struggle.[14]

Adaptive Courseware

While the available evidence shows that adaptive digital courseware can yield better outcomes for learners, it also points to the possibility that these innovations may assist in reducing instructional costs by unlocking the potential of accelerated course completion.[15] Research also has been able to identify where and how adaptive learning can have the biggest impact (see figure 1), so that institutions and policymakers can make the most of their resources for increasing student success.

Integrated Planning and Advising for Student Success

Integrated Planning and Advising for Student Success (iPASS) gives students and administrators the data and information they need to plot a course toward a credential or degree, along with the ongoing assessments and nudges necessary to stay on course toward graduation. iPASS combines advising, degree planning, alerts, and interventions to help students navigate the path to a credential. These tools draw on predictive analytics to help counselors and advisors determine in advance whether a student is at risk of dropping or failing out, and it can help assist students in selecting courses (see figure 2).

Multiple studies have documented the impact that these types of tools can have on student success. "The Effects of Student Coaching in College" report found a 4 percentage point gain in completion from interventions such as iPASS—and often at lower cost than other types of interventions.[16] iPASS has also improved student success at early innovators like Arizona State University, which saw its graduation rate increase by 11.6 percentage points.[17] Furthermore, results from the first round of iPASS programs demonstrate an increase in full-time enrollment, which research finds leads to a greater likelihood of college competition.[18] Finally, the use of iPASS is tied to stronger advisor engagement, higher-quality data to guide and inform student plans, and increased likelihood of student success.[19]

One example of iPASS is Degree Map at Austin Community College (ACC). In 2011, ACC transitioned from an all-paper advising process to an e-advising system, in an effort to better track progress and conversations for its students. With Degree Map, students are engaged and

FIGURE 2. iPASS Taxonomy

CHANGE MANAGEMENT		
STUDENT & INSTITUTION DATA		
ANALYTICS & REPORTING		
STUDENT PLANNING TOOLS	**INSTITUTIONAL TOOLS**	**STUDENT SERVICES**
Degree Audit & Planning	Diagnostics	Academic Tutoring
Transfer Articulation	Alerts	Coaching & Advising
	Tutor & Advisor Management	Resource Connection

Source: Gates Bryant, "Driving Toward a Degree: The Evolution of Planning and Advising in Higher Education," Tyton Partners paper, August 28, 2015, p. 9. *Reprinted with permission.*

FIGURE 3. Norris/Baer Framework: Optimizing Student Success through Analytics

ELEMENTS	DESCRIPTION	EXAMPLES
1. Manage the student pipeline	Scientifically refine strategic enrollment management of the student pipeline.	• Use data mining and predictive analytics to improve the recruitment, admission, and enrollment of entering students (raise numbers) and improve chances of student success; and • Use longitudinal and predictive analytics to craft policies for improving success of *at-risk students*.
2. Eliminate impediments to retention and student success	Eliminate structural, policy, and programmatic impediments to retention and success.	• Use analytics to support *comprehensive* first-year programs; • Eliminate bottlenecks in courses and program progressions; unreasonable pre-requisites and other requirements; and • Use predictive analytics to shape policies and practices to enhance retention in sophomore-senior years.
3. Utilize dynamic, predictive analytics to respond to at-risk behavior	Embed analytics in academic and administrative support processes to enable real-time interventions dealing with at-risk behaviors, both academic and co-curricular.	• Use dynamic, predictive analytics to determine at-risk behavior in courses early in the semester; • Embed predictive analytics in processes; and • Monitor levels of student engagement in academic and co-curricular activities and intervene with students who can be saved.
4. Evolve learner relationship management systems	Build tracking systems that can track and manage the many facets of learner progress and identify and respond to at-risk behavior.	• Create the learner equivalents of customer relationship management functionality, supported by predictive analytics; and • Extend dynamic, predictive analytics to learner relationship management.
5. Create personalized learning environments/ learning analytics	Embed personalized learning analytics into learning management systems and learner relationship management systems.	• Create personalized learning modes with embedded predictive performance analytics; • Use these analytics-rich systems to personalize learning outcomes; and • Create learning experiences reaching beyond formal curricula.
6. Engage in large-scale data mining	Use data mining to illuminate pathways to student success and discover unforeseen insights.	• Leverage data mining to drive predictive modelling in processes; • Use forensic data mining to explore unthought-of correlates of success; and • Engage in cross-institutional comparison and cross-sectoral comparison.
7. Extend student success to include learning, workforce, and life success	Expand the definition of student success to include the entire student lifecycle—cradle to career, including learning, work, learning-to-work transitions, and workforce success.	• Extend into Alumni analytics; • Undertake data mining spanning institutions, industries, and sectors; and • Pioneer pathway-to-success analysis.

Source: Donald Norris, Linda Baer, et al., *A Toolkit for Building Organizational Capacity for Analytics* (Strategic Initiatives, 2012), p. 34. *Reprinted with permission.*

have genuine conversations with their advisors. This advising system provides students with a clean, clear snapshot of their current degree plan; allows advisors and students to get a quick comparison of different degrees; and enables students and advisors to focus their efforts on elevating the advising conversation. ACC found that students who used Degree Map two or more times to plan their courses experienced a 3.3 percentage point increase in persistence over students who did not use Degree Map—rising up to a 7.3 percentage point increase when used five or more times.[20]

Today, the iPASS market includes over 100 vendors offering solutions that include components such as degree audit and planning, analytics and reporting, and alerts.[21] The strongest iPASS programs combine these tools to best support students, advisors, and faculty members. Working together with the Community College Research Center, and in partnership with technology providers and colleges/universities, the foundation supports the development of technologies that improve student retention through iPASS, recently helping to provide grant awards to twenty-four institutions that are transforming advising in higher education.[22]

Essentials for Successful Implementation

The successful implementation of personalized learning usually comes with a strategic shift at higher education institutions—from leaders to those working directly with students. As a result, the institution focuses on allocating resources and implementing business practices in a way that ensures each student's success. This requires that institutions and their leaders build core capabilities in student analytics and change management.

What underpins personalized learning and advising environments, however, is the use of learner analytics to drive institutional improvement around individual student success. This requires moving from the static data traditionally used for accountability purposes to gathering and

using real-time learning and advising data, which can inform decision making for administrators, student supports, and students themselves. This type of data allows important stakeholders to make informed, action-oriented decisions and allocate resources for student success.

faculty, advisors, and other staff to learn to use new technologies and analytics. To be successful, institutions must move forward with administering business practices that better support student success (despite existing environmental constraints) and with fostering

students. However, it had experienced challenges in getting faculty to use the new tools and the network in a proactive way. One of QCC's ongoing challenges in change management will be enabling students to benefit earlier from the support network.

Swift and meaningful changes must be made to the outdated design of the postsecondary system in order to create the flexible and personalized learning environment needed by today's student majority.

The Norris/Baer Framework (see figure 3, p. 18) highlights the interdependence of different dimensions of the college/university when planning to use data for student success. For many institutions, transformation starts with engaging students, then collecting and using predictive data to inform retention, create learning environments, and support students moving into the workforce. Norris and Baer also offer a diagnostics review that institutions can use to determine how they should develop their analytics capabilities.

Change Management and Continuous Improvement

Personalized learning interventions cannot be effectively utilized and deployed without the connective tissue of organizational strategy and change management. This means aligning organizational processes such as strategic planning and capacity building. It also requires providing appropriate time, development, and supports for leaders, a culture of continuous improvement using the newly available tools.

An example is Queensborough Community College (QCC), which used Starfish Early Alert and Connect modules to create a network of student support services across the campus, including the Academic Literacy Center, the Campus Writing Center, the College Discovery Center, the Math Learning Center, and the Student Learning Center.[23] This Student Support Network gathers real-time feedback from faculty and students to guide students to the resources that are most pertinent to their needs at the right time. This has allowed a breakdown of silos between support services, as well as between faculty and students. The redesign also provided a structure that can respond intentionally to student needs with the right intervention resources available on campus. For example, QCC found that academic tutoring was one of the more promising interventions when delivered appropriately to at-risk

The Time Is Now

With more than 40 percent of first-time, full-time bachelor's degree-seeking students at four-year postsecondary institutions dropping out before finishing a certificate or degree within six years, we can't afford to stand by and do nothing.[24] Swift and meaningful changes must be made to the outdated design of the postsecondary system in order to create the flexible and personalized learning environment needed by today's student majority.

Benjamin Franklin is said to have observed: "Tell me and I forget; teach me and I remember; involve me and I learn." Personalized learning involves students in their own growth and encourages them to take ownership of their learning. The structured, individualized, and supported approach helps them see a clear and guided pathway to academic and career success.

Bringing personalized learning solutions to the broader U.S. higher

education system will require major system changes and buy-in from colleges and universities around the nation. We have no time to waste in unlocking student success. Students deserve the environment and supports that will help them reach their full potential and earn their higher education certificate or degree. ■

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Yvonne Belanger, Julia Gray, Jason Palmer, and Tracy Sherman also contributed to this article.

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Photo by Brandon Hill

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Summary of Interviews with Faculty Leaders

EXCERPT: Interviews on digital and personalized learning.

Report for the Bill & Melinda Gates Foundation Postsecondary Success Team.

June 2014

Prepared by Luma Consulting

BARRIERS

During the interviews, we asked respondents to name specific barriers that stand in the way of faculty adopting online/blended courseware and tools. Respondents provided clear responses to our questions, anchored in their experiences as faculty members (sometimes as first-hand users of these tools) as well as in their role as field leaders with deep practice experience and knowledge of these issues. Four main themes emerged as barriers during the interviews, listed in order of how commonly they were cited by respondents:

1. Lack of time and training;
2. Lack of incentives;
3. Lack of quality tools; and
4. Lack of alignment with faculty pedagogy.

Of these barriers, lack of time, training and incentives were the most commonly cited barriers – named by virtually everyone interviewed.

1. **Lack of Time and Training:** While several themes emerged from the interviews, the significant focus was on lack of faculty time to learn and training to effectively implement and adopt these tools. (This barrier aligns closely with earlier concerns about cost efficiency and worries that online tools will be aimed at squeezing more time out of faculty). Comments reflecting this barrier include the following:

   - Time involved in learning and using these tools – the degree to which they are involved in the content creation and redesigning their course to use these tools makes a big difference in terms of the time it takes. Depending on the degree of interactivity that is built into the course can be very time-intensive. If you think about a flipped classroom – this is a little harder, you have to think on your feet.

   - Faculty members have no time. There is never time to do all of things that they want to do. Asking faculty to do one more when they don't have a compelling reason is going nowhere. Especially if they have been teaching for a while and have had success, then you don't really have incentives to encourage them to spend time learning and doing something different and new.

   - The upfront learning costs are too high – give faculty a demonstration of new tools that really make a different; that are compelling to faculty – this might get them to take notice and try these tools.

   - I'm currently teaching a course online. I've looked at some online tutorials and videos. I'm talking to my colleagues. I have a lot of questions: How often do you post to a discussion board? How often do you connect with students via email? I've figured out all of this on my own. It's not the best class – I know there are better ways to do this online. I know they're out there, but I don't know them. The upfront time commitment it would take me – to find the best software, research the literature, do the research – I don't have time for that.

   - Faculty are overstretched in request for their time. Most faculty take the class that they did last semester and simply dust off these notes and deliver the same class over and over. It is freakanomics and incentives. Most faculty are so pulled by the need to do their research, get grants, get published, that teaching falls off their priority place. Many institutions give lip service to the importance of great teaching but they promote bad teachers who are good researchers.

   - Workload of faculty – people don't realize that taking an online or blended course is more work than sitting in a classroom. If you are not a digital native, it is going to be challenging. Faculty are now dealing

with a student population who are much more tech savvy. So if there are not tools in place to support them, faculty are not going to use these tools.

- We really need to teach faculty how to do this. We have done a very poor job of preparing faculty to teach in general – they're experts in their discipline – this is just one element. Teaching is much more dynamic than being an expert. We have been advancing a teacher culture of independence and academic freedom, for better or worse, that leaves each faculty member to their own devices. Faculty are going to do what they're comfortable doing.

- The young faculty who are most eager, and willing and inquisitive to try these things but there is only so much that they can do. And if you are teaching 5 or 6 classes, you just don't have time AND you don't have incentives to take risks.

- I think that if you show people how something will help make their job easier, then of course they are going to use it. But if you have to spend 6 hours uploading courseware and then it still doesn't work, they are not going to use it. We are not training the people who have to use it. You have your young faculty who get it, would be willing to be part of the design teams, etc. – but they will get smacked down because teaching is not seen as an important part of their professional growth and they don't have the time or supports to learn the tools.

- When you are building good online courses – it takes a village – and this takes time and resources. Both of which most faculty don't have. Building a good online course takes a team of educators, a team of learning scientists, a group of students, a team of faculty.

- The amount of effort is immense. I have heard faculty say that making a MOOC course from scratch was more time than writing their book. Making a MOOC is now a very different process. And revising a MOOC – which you need to do to stay relevant, takes more time and resources. There is a little bit of an economic incentive if you need to make a new version of your book – but not so with MOOCs. In MOOCs what is your reward?

- I am now in the 3rd version of making my 3rd iteration of my computer science for my non-computer science majors. It is a LOT of work.

- Universities need to provide a proper support structure for faculty who are new to these approaches and technologies. I don't think that universities are aware of the lack of skills among faculty. There has to be an incentivize model. We use to run a summer institute for faculty. We used the tools as a way for the faculty to think completely differently about how they approach their teaching. How do you incentivize this?

- The amount of work that goes into redesigning the course and using technology is roughly three times what it takes to deliver it they way they are doing now– why would they do it? They don't have the time, the knowledge or the incentives.

2. **Few Institutional Incentives:** Interview respondents lamented the dearth of institutional incentives for faculty to explore and adopt new teaching models and tools. In this regard, faculty feel that quality teaching is not widely appreciated in higher education and that there are few institutionalized supports for pursuing it, especially through the use of online tools or blended approaches:

- Although I believe that teaching is now starting to be more valued than before, it will not get someone promoted. Mostly promotion is based on research so what is going to incent faculty to adopt new ways of teaching?

- How teaching is currently assessed – student evaluations for example. The belief is that students give high ratings to classes that are more entertaining than those that are more rigorous. Assessments by students of blended classes show that outcomes improved or were equal to traditional classes but that students evaluated them less favorably.

- The class that I am using technology and doing a flipped class is mostly a burden in terms of tenure. Comparing teaching this course to getting another top-level publication, there's no comparison.

- There is a real, split personality happening at these institutions -- the presidents want their institutions to be known for their research AND they want to introduce online learning. However, faculty are only recognized and acknowledged for their research.

- For non-tenured faculty members, focusing on excellence in teaching and using every tool available - is a dangerous thing to do. It is the junior faculty who want to innovate but it is dangerous and does NOT help their professional advancement. Teaching, research and service are the three things faculty must do to get tenure. However, research really is the thing that matters. We need to change the path to tenure if we want to change higher Ed.

- There is no coordination, no budget strategy, and no integration that supports faculty use of technology in their instruction in these institutions.

- From the administrative side – there are investments that need to be made (license the delivery platform; to do it right you need to invest in instructional designers, experts in assessments to create the assessment tools, then you need people to purchase content or get copy write materials.) Staffing, equipment, security, etc.

3. **Lack of Quality Tools:** Alongside the lack of structural and cultural supports for the use of online tools is a belief that the field simply lacks quality, easy-to-use tools that can be used to improve teaching and student achievement or that aligns with the way faculty want to teach. The following statements illustrate this theme:

    - I don't know that we have widely available and easy to use software. The technology delivery structure – software and hardware – not sure we have these things in place like they need to be.

    - The biggest barrier to adoption is the technology does not work consistently. If every decision that was made about technology was made after it was certain that the technology would actually work - this might help with adoption. This sounds mundane, but if you are already worried that the world is trying to replace you with a machine, and then every thing depends on student evaluations, then you get in there and the technology does not work –this will flip you back to being a non-believer.

    - Online courseware is predicated on the notion that we all lecture. I don't lecture; I lead discussions. Many liberal arts instructors are like this. What I saw come out the technology that I think is positive is the community perspective. Community dialogs and peer learning aligns with how I teach. I would like to see more of this happen and be profiled in more of the tools. The smaller experience within the larger class.

- We need more interactive discussion tools – we need them in interactive, privacy-protected places. Privacy is a big deal and the technology has a hard time dealing with this.

- Usability – a lot of these platforms suck. I am always saying to my colleagues in computer science, "can't we build a better mousetrap." We don't have enough instructional designers – especially those who are good middle people – someone who can translate between the faculty and the coders. These middle people are what we need.

- Most tools right now limit an instructor to using multiple-choice questions to assess learning – this is the wrong way to go. This changes what counts as knowledge; Knowledge becomes what you can answer in a multiple-choice question. We have to move beyond this. Knowledge is about putting a and b together to come up with a c that you were never taught. There is so much potential, so much potential for personalized learning to help move beyond this – we just need better tools.

4. **Lack of alignment with faculty pedagogy**: Some faculty fear that technology may diminish their role, particularly if they pride themselves on their teaching. They also acknowledge that there are cultural barriers within higher education to the use of technology tools and finally a number of respondents stated that today's current tools do not necessarily align with faculty members preferred method of teaching. Embedded within these comments is deep professional pride in the craft and relational nature of teaching. Many respondents felt that faculty, incorrectly or otherwise, see technology as something that does not support this relational way of teaching.

    - The primary way we were taught informs and inspires the way we teach. This was NOT the way most of us were taught. We were taught to go find information in the stacks, pursuing independently a line of scholarship, then debating and discussing it. Now the Internet replaces this. We are unclear about this new model of learning and instruction.

    - Belief that these tools have a place in some disciplines such as in engineering or statistics but not in others such as the humanities and art.

    - The third comes back to the issue of identity -- there is a belief that there is something fundamentally interactive in a well-run classroom that technology does not support. I believe that there is a fear that online learning technologies cannot accommodate this interactive factor.

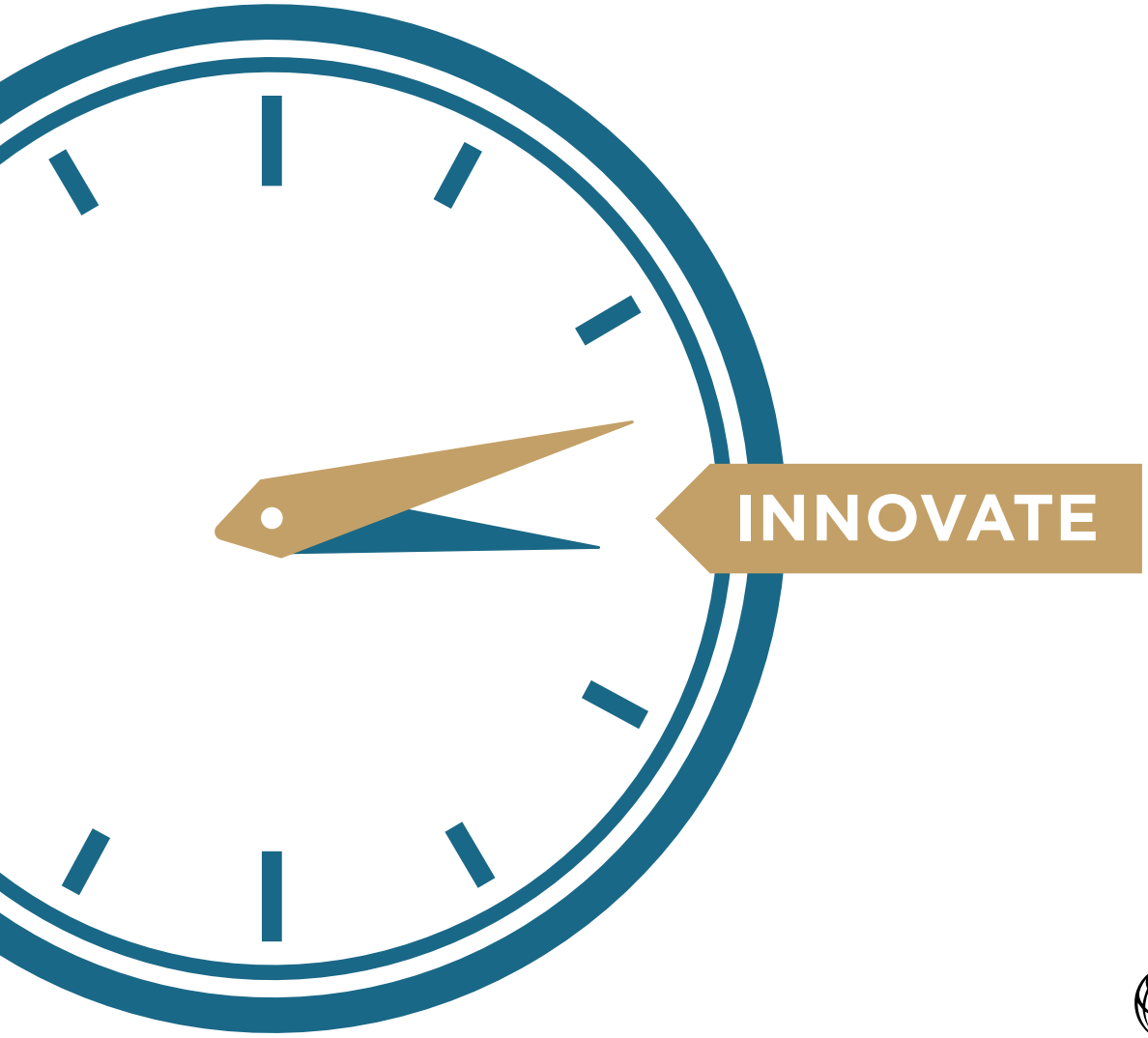
    - Lack of alignment between what the tool does and the faculty member's pedagogical approach. Many faculty do not see the technology tools as being aligned with how they are, and want to, teach. It is then difficult to convince the faculty to use this technology. If the technology aligns with my pedagogy then I will use it (e.g. overhead projector moving to PPT – the approach is the same, PPT just offers a more efficient way to do it.) However, give me technology that threatens my approach to teaching – or calls it into question –e.g. a technology that requires me to use a pedagogical approach that invites peer discussion or is more emergent and student directed in style, then faculty may resist it if they fundamentally are not comfortable with that pedagogy.

Tyton PARTNERS

TIME FOR CLASS:

LESSONS FOR THE FUTURE OF DIGITAL COURSEWARE IN HIGHER EDUCATION

2017 UPDATE



BABSON Survey Research Group

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INTRODUCTION

The Time for Class *series was first published in 2015 to share findings from Tyton Partners' 2014 surveys of over 2,700 postsecondary faculty and administrators on their use and perceptions of digital courseware. This paper is an update to the* Time for Class *series and includes findings from two fall 2016 surveys of a national sample of 3,500 postsecondary faculty and administrators. The purpose of this series is to illuminate the state of digital learning in higher education and to provide recommendations to the field on opportunities to expand digital learning in service of improved student outcomes.*

Since the initial surveys and research that contributed to the 2015 Time for Class *publications, the dynamic digital learning and courseware product landscape has continued its evolution. This evolution impacts not only the way instructional technology is used in teaching and learning but also the lens through which we examine the market. Notable shifts in the product and distribution ecosystem include the following developments:*

- ***The growing modularization of educational technology is expanding options for digital learning delivery.*** *The market is shifting from one-size-fits-all "course-in-a-box" offerings to increasingly flexible courseware options that enable course delivery through the thoughtful integration of different tools and platforms. Learning management systems are playing a larger role as core infrastructure for some courseware, and vendors are deciding whether to replicate functionality or to design their products for integration with existing tools already in use.*
- ***Authoring and customization tools are increasingly enabling "personalized teaching" in digital environments.*** *Going hand in hand with the increased flexibility afforded by today's implementation models, courseware vendors and digital learning platforms are responding to customer demands by expanding authoring toolsets to allow for increased customization of content and the course experience.*
- ***Open content is gaining share.*** *Open educational resources are now embedded in a range of platforms, including large-publisher and proprietary tools, making them easier to find and adopt. This shift is being fueled by the improved quality and availability of open content as well as the growing dialogue around the cost of postsecondary education and learning materials.*
- ***The methods of accessing and disseminating digital content are diversifying and innovating.*** *Content-agnostic delivery platforms are helping to level the distribution playing field for digital content providers by supporting discoverability, price transparency, and delivery to buyers across institutions. At the same time, through membership in organizations like Unizin, institutions are able to gain buying power and reduce the administrative lift of adopting new learning technology, thereby lowering their switching costs and improving their flexibility to adopt the solutions that best fit their needs at a given time.*

The aperture of our research and analysis in 2016 also reflects an evolution since the first Time for Class *publication. The core change is the expansion of the scope of research from a focus on digital courseware – instructional technology solutions that enable digital learning – to digital learning more broadly. A comparison of the 2014 and 2016 research scope, objectives, and key definitions is provided below.*

	2014	2016
Scope of Study	Postsecondary perspectives on and adoption of digital courseware.	Postsecondary implementation of digital learning, inclusive of digital courseware.
Objectives	To better understand the current level of adoption of digital courseware in US postsecondary education, as well as to collect practitioner perspectives on digital courseware use and barriers to further adoption.	To better understand the current degree of implementation of digital learning, including key organizational factors enabling digital learning implementation, and the extent to which courseware has been adopted as part of digital learning strategies.
Key Definitions	**Digital courseware** is curriculum delivered through purpose-built software to support teaching and learning.	**Digital learning** is the use of instructional technologies to support teaching and learning. Under this definition, digital learning can take place in face-to-face, online, and blended/hybrid environments. **Courseware** is instructional content that is scoped and sequenced to support delivery of **an entire course** through software that is built specifically for educational purposes (e.g., YouTube is not considered courseware). Courseware includes assessments to inform personalization of instruction and is equipped for adoption across a range of institutional types and learning environments (face-to-face, online, and blended/hybrid). Courseware is not a learning management system.

Where possible in this paper, data points that are available from both the 2014 and 2016 surveys are highlighted to demonstrate how faculty and administrator perspectives have changed or, in some cases, stayed the same over that period. A complete set of charts comparing 2014 and 2016 data is provided in Appendix C.

In addition to data from the 2014 and 2016 Tyton Partners / Babson Survey Research Group surveys, this paper references data from the Integrated Postsecondary Education Data System (IPEDS), including information on distance education and institutional type. In this paper, distance education is defined as "education that uses one or more technologies to deliver instruction to students who are separated from the instructor and to support regular and substantive interaction between the students and the instructor synchronously or asynchronously."[1] *The types of institutions referenced include two-year institutions (public and private), four-year private institutions (non-profit and for-profit), and four-year public institutions.*

The data on institutional type and the level of distance education offered at the institutions represented by administrator and faculty respondents to the 2016 surveys was used to classify respondents as belonging to the following segments, referenced throughout this paper:

	2-YEAR, LOW DISTANCE	2-YEAR, HIGH DISTANCE	PUBLIC 4-YEAR, LOW DISTANCE	PUBLIC 4-YEAR, HIGH DISTANCE	PRIVATE 4-YEAR, LOW DISTANCE	PRIVATE 4-YEAR, HIGH DISTANCE
% of Administrators in Sample	6%	15%	20%	19%	33%	6%
% of Faculty in Sample	10%	23%	19%	24%	19%	3%

Note: Institutions where the portion of undergraduate students taking at least one course at a distance is under 25% are considered low-distance, institutions where the portion is 25% or greater are considered high-distance.

This research was undertaken in partnership with the Babson Survey Research Group and with funding from the Bill & Melinda Gates Foundation.

1. Integrated Postsecondary Education Data System, "2016-17 Survey Materials: Glossary," August 2016, ***https://surveys.nces.ed.gov/ipeds/Downloads/Forms/IPEDSGlossary.pdf***

EXECUTIVE SUMMARY

The changing face of the US college student presents both new opportunities and new challenges for higher education institutions and a system designed to serve the traditional student of the past. Many institutions are under pressure to provide flexible, affordable, and workforce-relevant educational offerings, with scaffolding to enable all of today's diverse learners to succeed, yet colleges and universities are constrained by regulatory and institutional structures that limit their ability to adapt to this new reality. Furthermore, the perceived and actual costs of change – in regard to finances, time, institutional culture, and reputation – are significant and together present a daunting price tag for an uncertain return in terms of student and institutional benefit.

While a few dozen institutions have developed digital learning programs that have become beacons of success in the uncertain and often troubled waters of educational technology adoption, evidence of the impacts of digital learning across the higher education market more broadly is limited, and many decision-makers remain skeptical. We believe that quality digital learning programs can deliver flexible and personalized education that meets the needs of today's learners and institutions, and this paper provides a few data points to help build the emerging case for expanded implementation of digital learning.

Despite the potential benefits, faculty and administrators report that digital learning has not been implemented consistently at their institutions, and several impediments stand in the way of scaled and effective implementation. From the survey responses of 3,500 faculty and administrators, four market realities emerged that provide insight into the issues slowing or halting scaled digital learning and limiting its benefits from being realized:

1. **The planning and execution of digital learning initiatives is falling short of "strategic" at many institutions.** While institutions generally present their digital learning programs as being a strategic lever to achieve institutional goals, perceptions of the execution and impacts of digital learning vary significantly. This gap presents significant issues for digital learning success in terms of stakeholder buy-in and achieving and measuring impact.

2. **Faculty are a linchpin in digital learning success, yet they are woefully undersupported.** The majority of surveyed administrators agreed that faculty are crucial to the success of digital learning initiatives – serving as both a bolster and a barrier to implementation success. Yet reports from both administrators and faculty suggest that the resources to support faculty to implement digital learning are lacking.

3. **Digital learning decision-making is decentralized.** When administrators and faculty were asked about the influencers of two critical decision points in digital learning implementation, it became apparent that implementation at scale requires engagement with several decision-makers. While not without benefit, the decentralized decision-making structures in place at most institutions today generally slow the adoption of teaching and learning technologies by increasing the "cost of sale" for institutions and vendors.

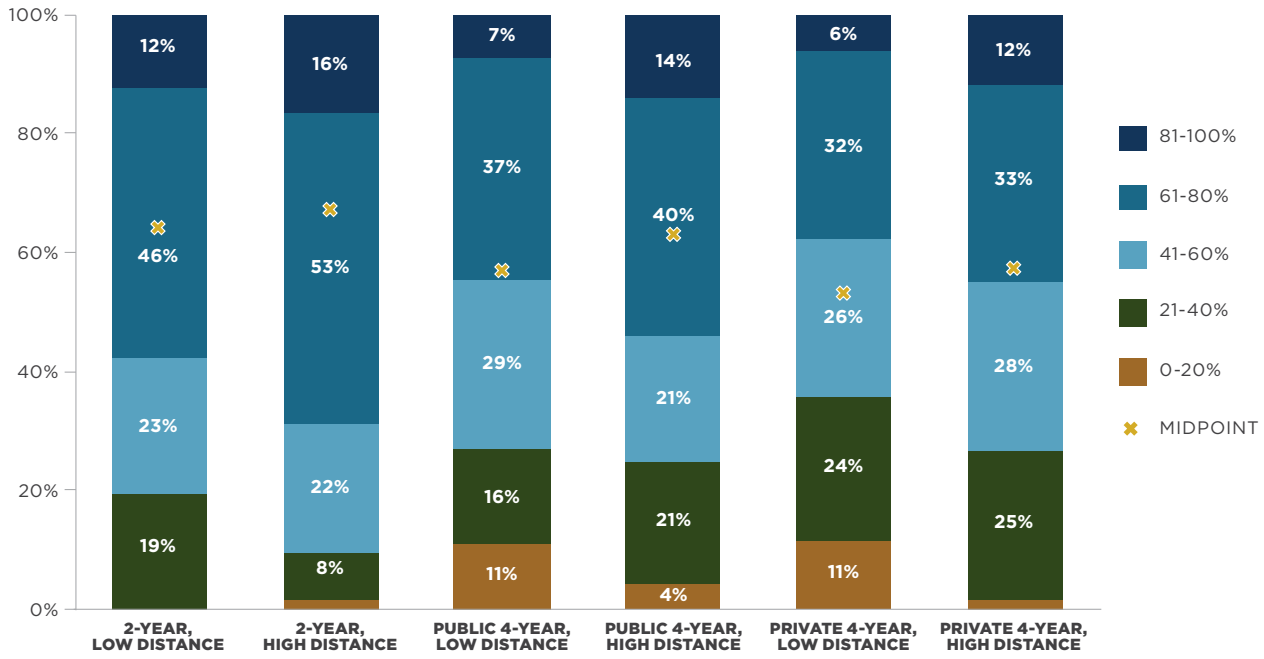
4. **Low courseware product satisfaction inhibits larger-scale adoption.** Peer recommendations are the most frequently cited resource for product discovery among administrators surveyed in 2016. This implies that good products should gain adoption relatively easily through word of mouth and that those products that miss the mark should not expand in use. Unfortunately, faculty and administrator perspectives on the digital courseware products in use at their institutions today reflect dissatisfaction and an unwillingness to recommend to peers.

Opportunities exist for all stakeholders in the postsecondary ecosystem to dismantle the impediments to broader, more effective digital learning adoption and its impacts on student and institutional success. This paper helps to build a case for expanded digital learning and delves into the four market realities, described above, that today slow or prevent scaled implementation. It also provides recommendations for three types of stakeholders – institutions, vendors, and partners – to work toward building the conditions for digital learning success.

BUILDING THE CASE FOR DIGITAL LEARNING

Despite the efforts of vendors, researchers, and many institutions, the evidence articulating the benefits of digital learning is generally considered incomplete, and this lack of broadly available and applicable evidence has implications. One implication is that many decision-makers remain skeptical of the value that digital learning can deliver in higher education, though perceptions have improved since 2014. Another, potentially related, implication is that many institutions are slow to implement and scale digital learning initiatives. Some instead undertake repeated, small-scale pilots and evaluations to establish their own evidence for expanding adoption. Others dabble in digital learning to test the waters, implementing without specific goals or alignment to a strategic vision. In classic chicken-and-egg fashion, the result is that many implementations remain incomplete, lacking the stakeholder alignment and investment in support resources and practice change that would enable successful and impactful implementations.

PROGRESS TOWARD DIGITAL LEARNING IMPLEMENTATION RELATIVE TO STRATEGIC PLAN (ADMINISTRATOR)



Administrator Survey Question: How far along is your institution toward implementing digital learning in relation to its strategic plan? (On a scale of 0-100%)

In 2014, 20% of faculty respondents reported being "skeptical about the efficacy of digital courseware," and another 28% were neutral about its potential for impact. In 2016, 16% of faculty reported being skeptical, and 21% were neutral on courseware's potential for impact. Though progress has been made toward converting skeptics and non-believers, this gap must be closed before key decision-makers are consistently confident in courseware's potential to improve student outcomes.

(Appendix B, Figure 1)

Uncertainty about the impacts of digital learning extend to its financial impacts. In 2014, only 23% of administrators and 27% of faculty agreed that courseware "reduces the cost of instruction." In 2016, 53% of administrators reported that digital learning had been implemented in pursuit of more cost-effective course development and delivery, and 61% reported that digital learning had been implemented to help identify new or alternative revenue streams for their institution. Among those administrators, less than half of each group reported that the impact of their digital learning implementation has met or exceeded their expectations in either of those areas.

Fortunately, a case for digital learning is being built, piece by piece, as institutions share stories of their successes, as researchers publish their analyses, and as individual educators see the impacts of digital learning on their learners and programs. In this section, we seek to contribute to the growing evidence base by sharing a handful of data points that demonstrate where digital learning is having a positive impact in support of select institutional goals.

One area where administrators report seeing the impact of digital learning is in improved access and scheduling flexibility for students. 72% of administrators responding to the 2016 survey selected "improve access and scheduling flexibility for students" as a strategic priority that is being supported by digital learning at their institution. Of those, 65% reported that the impact of digital learning in this area was meeting or exceeding their expectations, while another 10% said it is too early to tell. The impacts were particularly strongly felt at two-year institutions, where 75% of administrators who indicated that digital learning had been implemented in support of improved access and flexibility reported impacts that met or exceeded their expectations. Improved scheduling flexibility and access has meaningful potential to support improved student and institutional success by providing greater potential for learners to take the courses that they need when they need them. This is particularly important to support completion by the over 70% of college students who work while enrolled and the 19% of those working learners who are balancing school, jobs, and children.[2]

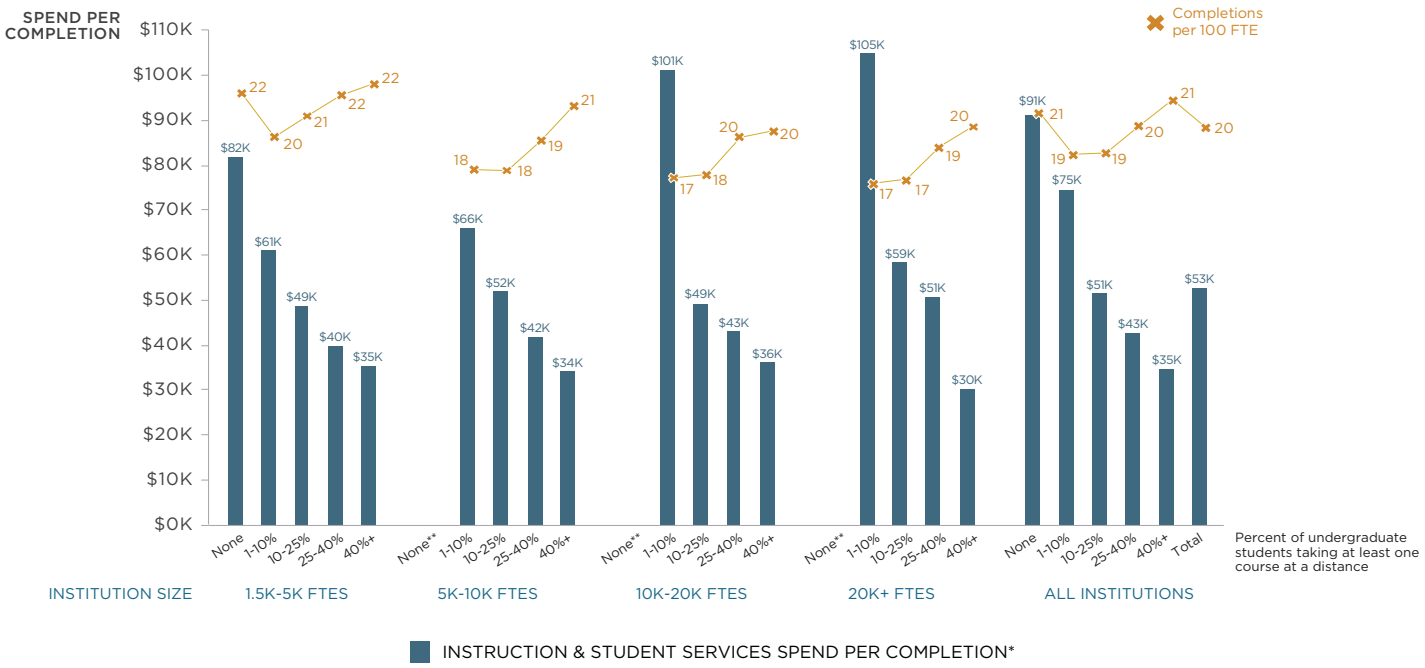
Additionally, 69% of administrators surveyed indicated that digital learning had been implemented at their institutions in pursuit of the goal of encouraging faculty to implement innovative instructional methods. Of those, 59% reported that the progress toward goals in that area met or exceeded their expectations, and again, the impacts were felt most strongly at two-year institutions. While encouraging innovation in instruction does not necessarily result in better outcomes for students or institutions, the progress reported toward goals in this area is another indication of the potential positive impacts of digital learning implementation.

In addition to the survey data, analysis of IPEDS data on US degree-granting institutions, though imperfect, is valuable to help identify impacts and trends in digital learning that may not be perceived at the individual or institutional level. Using the most recent data available on distance learning, institutional spending, and completion, we found that

2. Anthony P. Carnevale, Nicole Smith, Michelle Melton, and Eric W. Price, "Learning While Earning: The New Normal," Georgetown Center on Education and the Workforce, 2015, ***https://cew.georgetown.edu/cew-reports/workinglearners***

institutions where a greater proportion of undergraduate students take at least one course at a distance spend less on instruction and student support and at the same time show comparable or greater completion rates relative to institutions with a lower proportion of distance learners.[3] Though distance learning is not the same as digital learning, we believe that looking at the percentage of students taking at least one course at a distance provides a valuable proxy for the scale of digital learning implementation at an institution. The takeaway from this analysis is that greater scale in digital learning is associated with lower costs and consistent or improved rates of completion, as measured by IPEDS data across US institutions.

AVERAGE INSTRUCTION AND STUDENT SERVICES SPENDING PER COMPLETION; AND AVERAGE COMPLETIONS PER 100 FTES, BY INSTITUTION SIZE AND PERCENT TAKING COURSES AT A DISTANCE (UNDERGRADUATE)



* Completions included in analysis are associates degrees, bachelors degrees, and certificates of at least one year

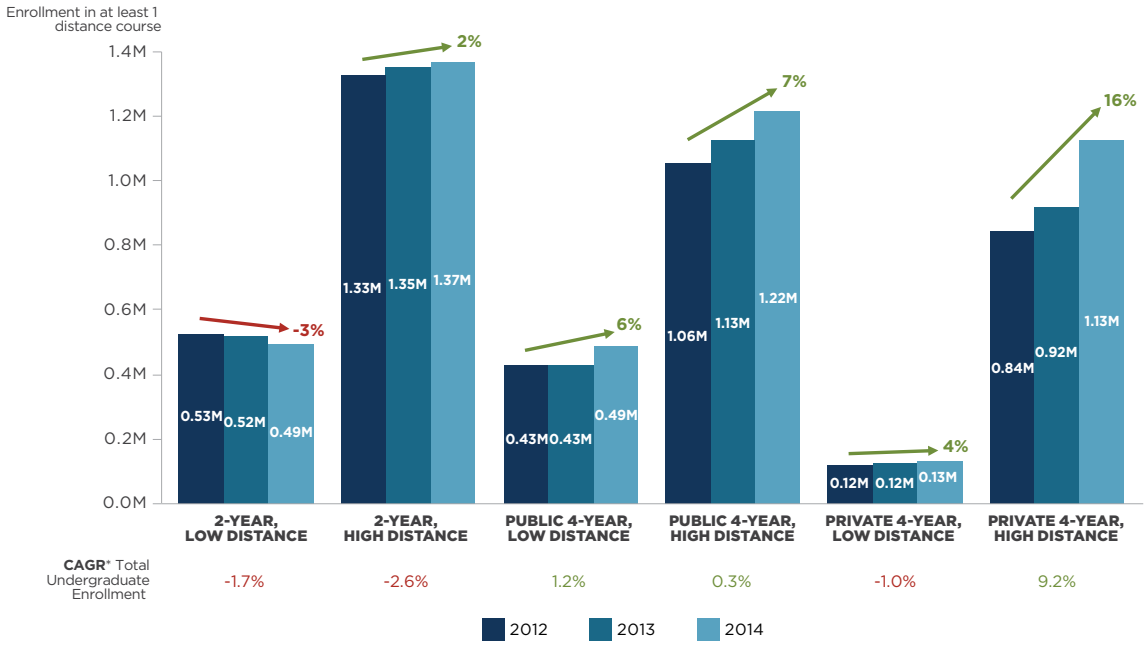
** Excluded, low n

Sources: Babson Survey Research Group, IPEDS, Tyton Partners analysis

3. Analysis includes degree-granting institutions with at least 1,500 undergraduate full-time enrollment equivalents as of fall 2014 and includes the following IPEDS and calculated variables: completions; instructional and student support costs; and FTEs (estimated undergraduate full-time enrollment equivalents) for fall 2014.

IPEDS data on enrollment also shows that distance learning growth outpaced enrollment growth overall from 2012 to 2014. This data is particularly relevant for institutions that have enrollment or revenue growth goals and are considering starting or expanding digital learning programs.

UNDERGRADUATE DISTANCE LEARNING OVER TIME



Sources: IPEDS, Tyton Partners analysis

* CAGR stands for compound annual growth rate

While work remains to further validate the impacts of digital learning, the case for digital learning is beginning to be built, and its potential benefits should not be ignored.

In summary, scaling digital learning enables institutions to accomplish the following:

1. **Improved access and scheduling flexibility, benefiting students who are older and working while in school in particular.**
2. **Faculty engagement and experimentation with innovative teaching practices.**
3. **Higher rates of degree completion at lower instructional costs.**
4. **Enrollment growth at a time when the market overall is flat or declining.**

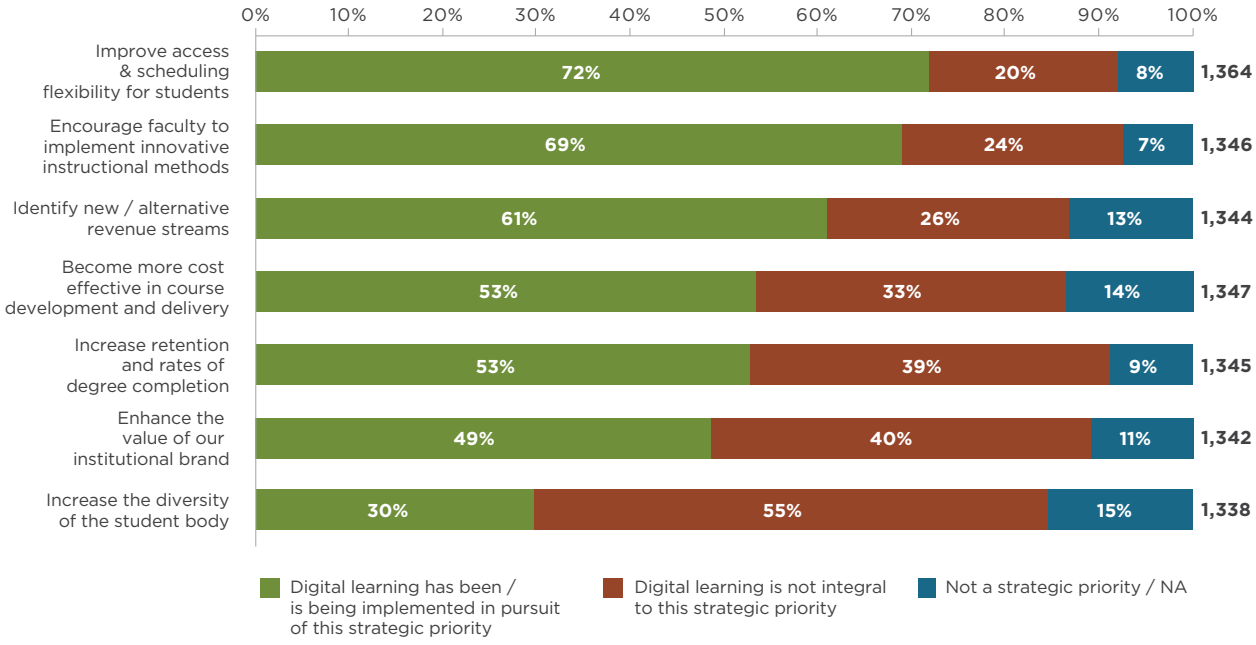
THE STATE OF THE FIELD: FACING HEADWINDS

Enabling effective digital learning and the benefits it can deliver requires understanding the impediments that stand in its way today. The 2016 administrator and faculty surveys included questions on organizational factors influencing digital learning implementation, extent of use, the goals for digital learning, and barriers that stand in the way of success. Through the surveys, we also sought to collect faculty and administrator attitudes toward digital learning and perspectives on digital learning products, including courseware. Through analysis of the survey data, four institutional and market realities emerged that shine light on the issues hindering effective implementation of digital learning at many institutions today.

THE PLANNING AND EXECUTION OF DIGITAL LEARNING INITIATIVES IS FALLING SHORT OF "STRATEGIC" AT MANY INSTITUTIONS

Strong strategic vision and execution is crucial to the success of potentially transformative digital learning initiatives at a postsecondary institution. At first glance, it appears that most institutions are thinking and acting strategically with regard to digital learning: the majority of administrators across institutional segments reported that digital learning is included in their institution's strategic plan, and 25% said that it is a core component of the plan. Furthermore, digital learning initiatives are being implemented in pursuit of a range of strategic priorities, including institutional and student-focused goals. *(Appendix B, Figures 2, 3, and 4)*. When asked whether their institution's digital learning initiatives were implemented in support of any of seven strategic priorities, administrators on average indicated that digital learning at their institution was implemented in pursuit of three or four of the priorities listed.

EXTENT OF DIGITAL LEARNING IMPLEMENTATION IN SUPPORT OF INSTITUTIONAL STRATEGIC PRIORITIES (ADMINISTRATOR)



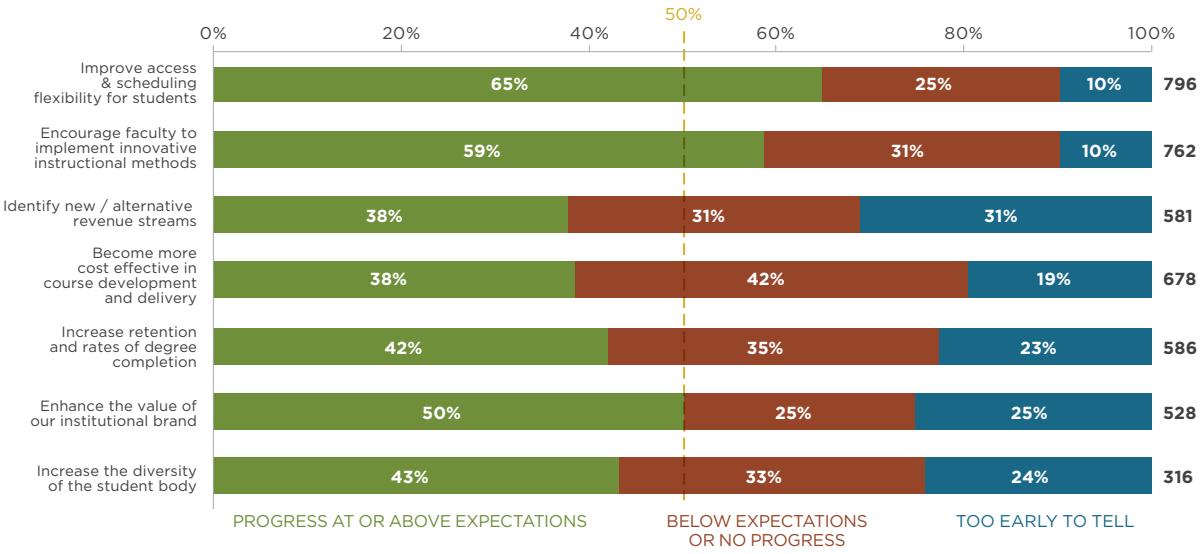
n=1,338-1,347

Administrator Survey Question: Is the use of digital learning at your institution important to helping achieve any of the following strategic priorities?

Better articulation of how digital learning supports institutional goals improves perceived success, according to administrator responses; the greater the number of strategic priorities that an administrator indicated are supported by their institution's digital learning initiatives, the more ideal they perceived the digital learning environment to be at their institution. (Appendix B, Figure 5)

And yet, though two-thirds of administrators agreed that digital learning is viewed as a strategic lever to achieve institutional goals, the perceived impacts of digital learning initiatives on strategic priorities are quite mixed. Particularly in areas like cost reduction and revenue generation, many administrators reported that digital learning has not met their expectations for impact.

PROGRESS TOWARD GOALS AS A RESULT OF DIGITAL LEARNING IMPLEMENTATION (ADMINISTRATOR)



n=316-796

Note: Respondents for each strategic priority above include only those who indicated that digital learning has been / is being implemented in pursuit of this strategic priority in a prior question

Administrator survey question: has your institution demonstrated progress toward its goals In your strategic priority area as a result of implementing digital learning technology?

Compared to the IPEDS data analysis suggesting that higher levels of distance education are associated with lower instructional delivery costs[4] and equal or improved rates of completion, administrator responses suggest a disconnect between the impacts that many administrators perceive and the reality of how digital learning is changing the market. Open-ended responses from administrators and faculty provide greater insight into this disconnect, highlighting a few likely causes:

- Expectations for digital learning impacts are set too high
- Sufficient resources are not being allocated to support strategy execution
- The impacts of digital learning initiatives are not being measured or communicated well

4. Instructional delivery costs represent two IPEDS spending categories—instructional support and student support—and are calculated per undergraduate credential granted (bachelor's degree, associate degree, and certificates of one year or more).

"My experience across two institutions with digital learning is that there is substantial expectation for its use with very little real support, and absolutely no extra time allotted for faculty to learn, develop, and become comfortable with this modality. It is all very much up to the individual faculty member to figure that out, figure out whom to ask for help, and find the time to do so. I have found this difficult and quite stressful, especially in the first few runs of an online course, where significantly more time is required for development, but this is not accounted for in any ways by which faculty are assessed. I also think there is lots of misunderstanding on the part of administrators (associate deans, deans, and higher) about what good digital learning takes. More than once I have been told that I didn't need more time to implement a change to a more digital learning course because 'you just put the materials there and it runs itself.' Anyone who has done any reading at all on digital learning knows this is not the case, and yet these same people are often the ones making the decisions about digital learning."

– Full-Time Faculty Member

"We do not have a center for teaching and learning, although there was some talk of starting one. Without real support for learning and measuring the usefulness of new pedagogies, faculty cannot be expected to make headway in successfully integrating technology in their courses. Some individual faculty members really like technology and end up as standouts in its use, but the university has a tendency to promote the achievements of this small group and to ignore the fact that there is no systematic support for transforming to effective digital pedagogies."

– Department Chair, Four-Year Public High-Distance Institution

"Fully online is what is resisted, under-developed, under-supported, under-appreciated. We have technical capacity, not attitudinal support by faculty, administrators, and, importantly, students."

– Department Chair, Four-Year Public High-Distance Institution

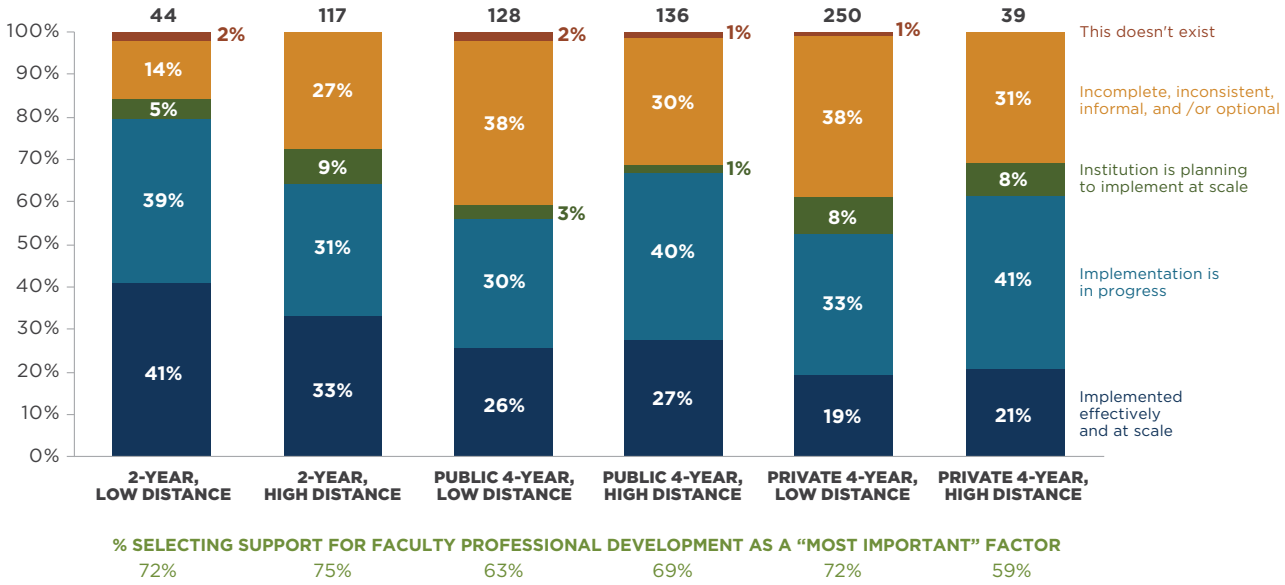
Ineffective strategic planning reduces an institution's ability to track progress toward digital learning goals and assess the return on the large investment required to implement digital learning. At the same time, execution without adequate support negatively impacts buy-in and the potential for successful implementation.

FACULTY ARE A LINCHPIN IN DIGITAL LEARNING SUCCESS, YET THEY ARE WOEFULLY UNDERSUPPORTED

When asked to select the top three most important factors contributing to a successful implementation of digital learning, 69% of administrators selected "support for faculty professional development," the top choice from a list of nine factors. Similarly, when asked about the most significant barriers to the implementation of digital learning at their institution, 74% of administrators selected "faculty time/effort required," the most frequently selected option from a list of 10 barriers. Together, these points confirm that across institutions, faculty are crucial to the success of digital learning initiatives. *(Appendix B, Figures 6 and 7)*

As such, it would follow that faculty training, extra time, and incentives would be among the first supports installed to effectively implement digital learning. Unfortunately, administrators and faculty reported that support for faculty to adopt digital learning is not scaled at many institutions. Of those administrators who selected "support for faculty professional development" as an important factor for digital learning implementation, only 25% reported that support for faculty professional development is implemented effectively and at scale at their institution. Another 35% said that implementation is in progress, but a full third (33%) indicated that support for faculty professional development "is incomplete, inconsistent, informal and/or optional" at their institution.

SCALE OF PROFESSIONAL DEVELOPMENT SUPPORT FOR DIGITAL LEARNING IMPLEMENTATION (ADMINISTRATOR)

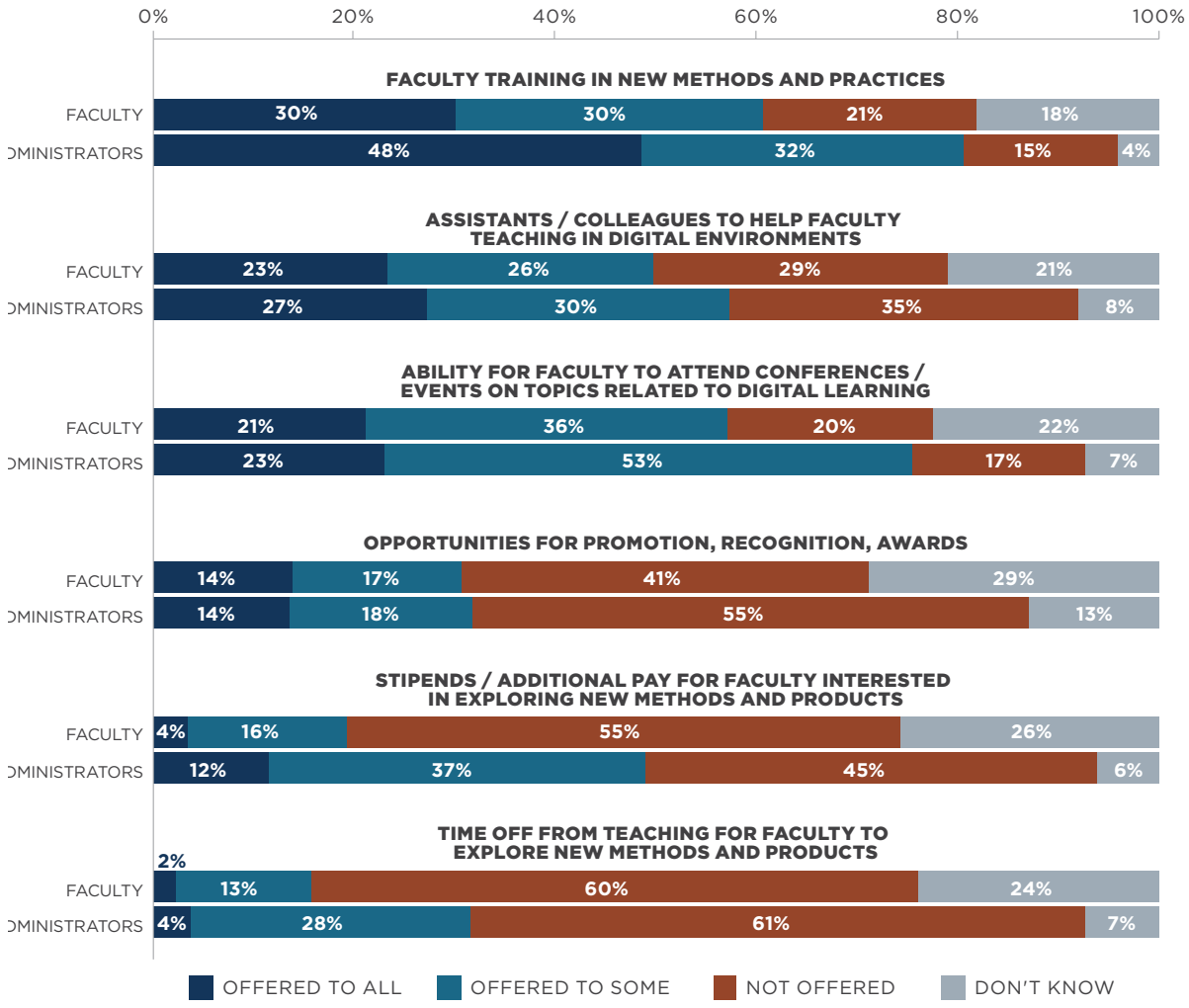


Note: Respondents to this question include only those who indicated that "support for faculty professional development" is among the top three most important factors contributing to a successful implementation of digital learning in a prior question.

Administrator Survey Question: To the best of your knowledge, how broadly does "support for faculty professional development" exist at your institution? Please rank your institution as it relates to digital learning.

The disconnect between institutional strategy and supports for execution is exemplified in the case of courseware adoption: 30% of faculty respondents agreed that they are encouraged to use courseware, yet only 18% believe that they are trained to use it effectively and only 8% are incentivized to do so. *(Appendix B, Figure 8)* When it comes to resources available to faculty to begin exploring courseware, faculty and administrator responses also point to deficits.

AVAILABILITY OF FACULTY RESOURCES FOR COURSEWARE EXPLORATION (ADMINISTRATOR & FACULTY)



Administrator & Faculty Survey Question: Please indicate the extent to which your institution offers the following for faculty beginning to explore digital courseware.

"Our institution sees online courses as a cash cow but invests almost no resources in quality control. It advocates digital learning but provides limited resources, support, and time for faculty to develop such approaches. Some of our faculty have developed excellent digital components to their courses, but at the cost of time they need for research."

– Department Chair, Four-Year Public Low-Distance Institution

*"We are a 2-year community college caught in the bind of fulltime faculty being reduced in numbers but being asked to do more, particularly with advising, grant projects, success initiatives, etc. A common lament even among our most progressive bleeding-edge fulltimers is 'I *know* there is all this stuff to do more with BUT I just don't have the time to implement/do it'"*

– Learning Technology Administrator, Two-Year Low-Distance Institution

"The vast majority of faculty incentives (>90%) at my institution are for research…and I don't mean research that is in any way related to teaching… Basically, people who focus their effort on improving their own teaching and student learning outcomes are second-class citizens here. We are paid much less, given far, far fewer institutional resources, and routinely I've been told explicitly that it is a 'two-tier system': the real faculty and the teaching faculty."

– Full-Time Physical Sciences Faculty Member

With faculty as a cornerstone for digital learning success, it is imperative that they are adequately resourced and supported. Responses of administrators and faculty alike indicate that too few institutions are investing sufficiently in faculty supports (like training and additional time) for the adoption of digital learning. Further complicating adoption is the fact that institutional incentives like tenure and recognition generally do not promote innovation or time investment in adopting new tools, materials, or pedagogies. Without resources available and structures in place to equip faculty to adopt digital learning successfully and without damage to their careers, implementation will continue to be slow and tenuous at many institutions.

DIGITAL LEARNING DECISION-MAKING IS DECENTRALIZED

To understand the institutional factors that enable digital learning use, it is important to identify how key decisions impacting digital learning initiatives are made, including who influences those decisions. Our inquiry into this issue revealed that in most institutions, there are multiple influencers and that decision-making power is decentralized across different institutional stakeholders, including faculty.

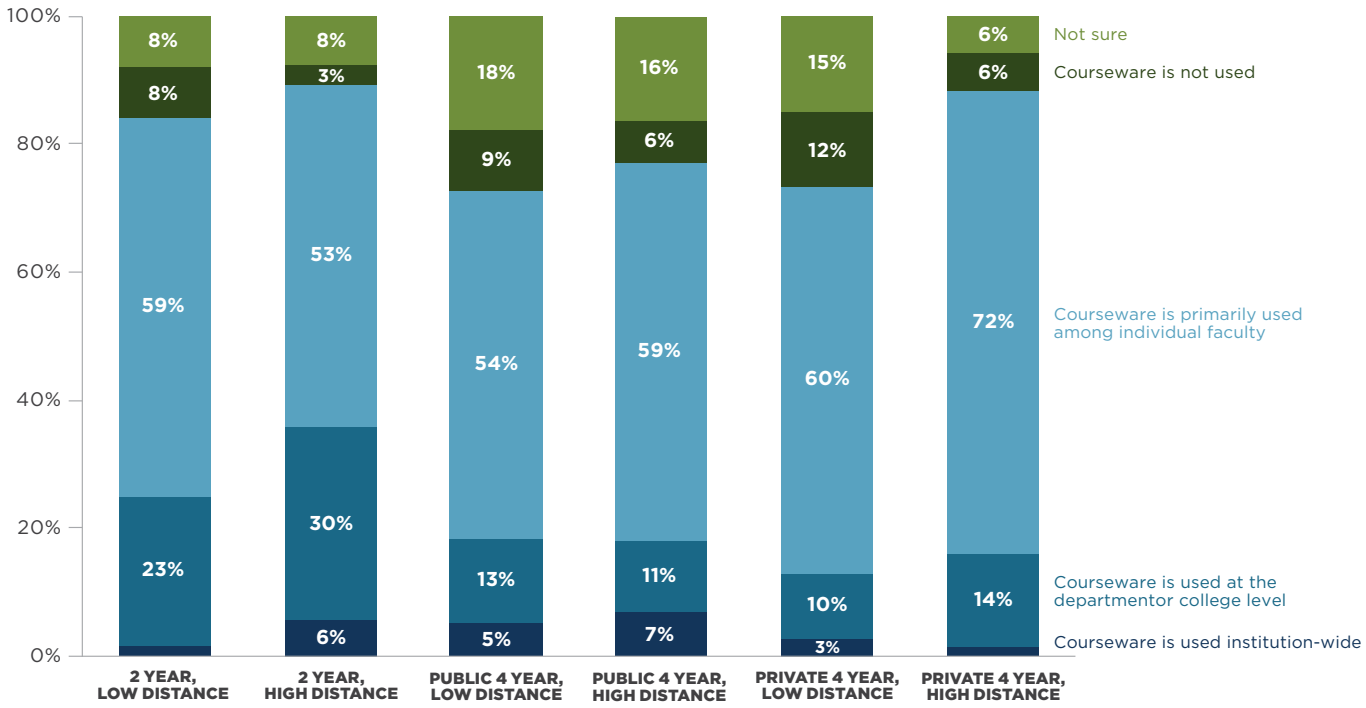
When asked to select who influences online or blended program development, 52% of administrators selected three or more of the five stakeholder groups listed. The most common response was "college / institutional leadership," with 71% of administrators selecting this group. Of those who selected "college / institutional leadership," 83% paired that selection with at least one other group on campus, indicating multiple influencers. *(Appendix B, Figures 9 and 10)*

Administrator responses to the question "Who influences digital material selection?" confirmed that faculty remain the key drivers of selecting which materials to use in the classroom. 91% of administrators reported that individual faculty members are influencers in this decision at their institution, and of those administrators, 55% reported that individual faculty members are the only influencers in this decision on their campus. *(Appendix B, Figures 11 and 12)*

Also important to understand is the frequency of these decision points. 82% of faculty reported having either substantially modified an existing course or created a new course in the past three years, and for 46% of those faculty, the decision to embark on the design or re-design of the course was their own. Only 25% of the faculty who substantially modified or created a new course in the past three years did so without influence on the decision; in those cases, the decision was made at the department, division, or institutional level. *(Appendix B, Figures 13 and 14)*

Given the dispersed decision-making authority in postsecondary institutions, it is unsurprising that in the case of courseware, scaled use remains limited. Only 4% of administrators reported that courseware is used institution-wide, and another 15% reported use at the department or college level. The vast majority of courseware adoptions take place at the level of individual faculty, according to administrators.

EXTENT OF COURSEWARE USE (ADMINISTRATOR)



Administrator Survey Question: Which description below best describes the use of courseware at your institution?

Decisions to expand digital learning programs or digital material use require buy-in from across the institution. Decentralized decision-making results in slower and more costly adoption for vendors and institutions. For smaller digital learning technology providers, each conversion of a new user is costly and small scale, limiting growth. For institutions, maintenance of full academic freedom in terms of digital material selection

is costly in that students, faculty, administrators, and support staff must come up to speed on each new material or platform selected and must maintain fluency as the different platforms evolve.

LOW COURSEWARE PRODUCT SATISFACTION INHIBITS LARGER-SCALE ADOPTION

"Frequently, faculty do not use, or do not use effectively, the available digital resources and / or courseware because the courseware is poorly designed. I spend a huge amount of time dealing with emails having to do with registration, access and billing instead of learning. Students may benefit a small amount from online quizzes, for instance, but I spend a ridiculous amount of time dealing with non-functional and partially functional homework systems. The hassle factor oftentimes is greater than any student benefit."

– Full-Time Life Sciences Faculty Member

"The most important point of any software is usability, clarity and match with people's intuition. Software developers today completely fail to understand the mind of many users, particularly those who were educated before the digital age. What seems clear to the IT nerds is often incomprehensible to others. This is the main barrier – no – it is the only barrier to digital learning."

– Department Chair, Four-Year Private Low-Distance Institution

"There needs to be a focus on simplification of course software and Learning Management Systems. Also, there needs to be some industry standards and 'integrated platforms."

– Department Chair, Four-Year Private High-Distance Institution

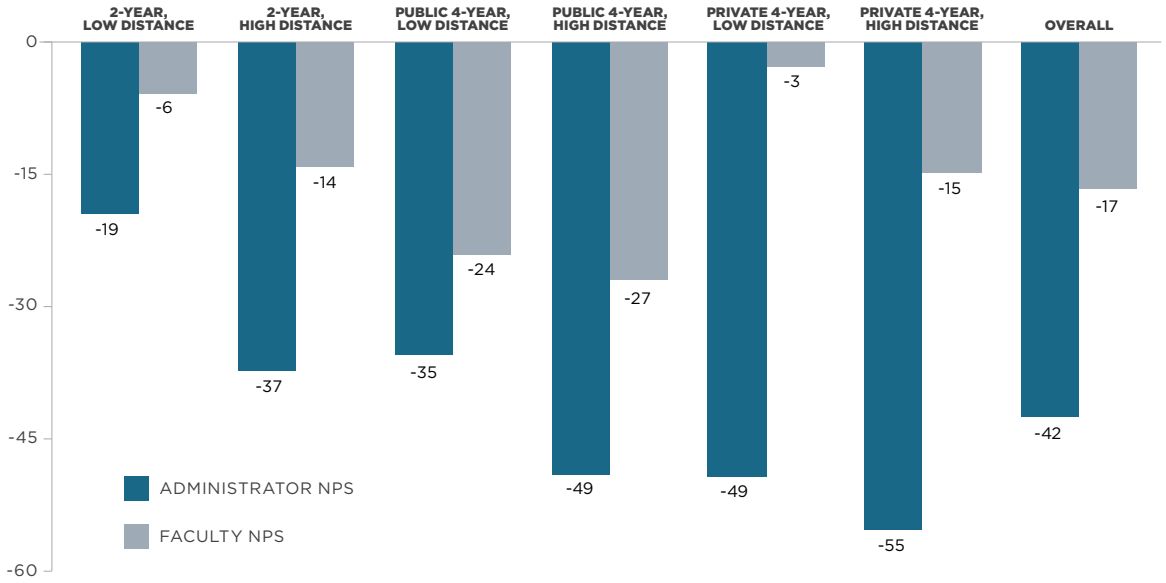
"The greatest, most learner-centered and agile instructional technology is useless if it is not (1) absolutely reliable (no significant downtime), (2) not a system or horsepower hog (can run reliably and nimbly on less-than-optimal machines), and (3) ADA compliant. Too many technologies and resources depend upon individual faculty to have to make [them] ADA compliant."

– Department Chair, Four-Year Public High-Distance Institution

Among the key takeaways from the original *Time for Class* series was the level of dissatisfaction that many faculty reported with their courseware products. In 2016, sentiments improved slightly; however, most faculty and administrators continued to express dissatisfaction, as measured by a Net Promoter Score (NPS). An NPS is evaluated by asking, "How likely are you to recommend this [product, service, or company] to a friend or colleague?" with 10 being "very likely" and 0 being "not at all likely." People responding 9 or 10 are considered to be promoters of the product, those who select 7 or 8 are neutral, and respondents indicating 6 or below are considered to be detractors. The NPS is calculated by subtracting the portion of respondents that are detractors from the portion that are promoters, and it is a metric used by companies across industries as

an indication of customer satisfaction. When asked whether they would recommend a courseware product that they are familiar with to a friend or colleague, only 24% of faculty and 12% of administrators indicated that they would be highly likely to recommend. NPS scores from both faculty and administrators remained negative in 2016.

COURSEWARE NET PROMOTER SCORE (ADMINISTRATOR & FACULTY)



Unwillingness to recommend a courseware product should be particularly troubling for courseware vendors. According to administrators with influence over digital material selection, recommendations reign supreme as the most valuable resource for product discovery and selection. 57% of that group selected "recommendations from colleagues / peers at your institution" as the top source, and 57% selected "recommendations from colleagues / peers at other institutions." Recommendations from peers are followed distantly by "conference / events," which was selected by 40% of administrators with influence over digital material selection. *(Appendix B, Figure 15)*

Adoption growth will be slow as long as products do not meet the needs of users and as long as users do not have adequate time to invest in learning about their courseware products. Vendors need to listen to their constituents to develop products that are easy to use, customizable, and meet accessibility and integration requirements. At the same time, the onus is on faculty and institutions to understand their goals and needs for courseware, evaluate courseware products effectively, and select the best courseware to help them achieve their goals and meet their needs.

NAVIGATING TOWARD DIGITAL LEARNING SUCCESS

The market realities described in this paper are not insurmountable barriers to expanded and effective implementation of digital learning. We believe that there are actionable steps that can be taken to resolve or adapt to these issues in order to improve and expand digital learning adoption. Institutions are at the core of our recommendations, but they will not be successful without aligned efforts from digital learning product vendors. Institutional partner organizations, such as funders, associations, and advocacy groups, also have a role to play in accelerating change. *Opportunities for institutional partners to intervene are highlighted in the Institution and Vendor sections below.*

It is important to note that different institutions have different goals for digital learning adoption, different barriers, and different success factors. All institutions are not the same, and interventions to advance digital learning should be customized to meet the needs of a specific institution. We recommend reviewing the data in Appendix B to learn more about the needs of a specific institutional segment represented in the survey sample, and using that information to customize interventions.

INSTITUTIONS

Effective strategic planning can help an institution to build stakeholder support for a transformative effort through the articulation of important and attainable goals and the allocation of sufficient resources to achieve those goals. Planning should be informed by market and institutional knowledge and should support ongoing learning by incorporating evaluation and communication of findings to stakeholders. In the case of higher education, we believe that "stakeholders" is best interpreted broadly, because by sharing findings beyond the boundaries of a leadership team or campus, many institutions and learners will benefit. Effective stakeholder alignment to institutional strategy should be the backbone of a successful digital learning implementation. By these measures, the typical institutional planning process is inadequate. To move beyond the status quo and toward effective alignment of strategy and execution, institutions looking to implement and scale digital learning should:

- **Articulate how digital learning supports their strategic priorities and set realistic expectations for digital learning's impacts.** Institutions should consider their strategic plan and determine which goals or priorities digital learning can help the institution to achieve. The data suggests that digital learning can improve scheduling flexibility and access, encourage faculty innovation, drive cost efficiency, and support improved rates of completion. Institutions should identify which of these or other goals the institution seeks to achieve, and clearly articulate how and to what extent its digital learning programs are expected to help. To avoid unrealistic expectations, it is also important to consider which of the institution's goals or priorities will *not* be affected by the implementation of digital learning.

- **Measure, evaluate, and share their learnings.** Once expected impacts are identified, institutions must structure implementation to enable measurement of the impacts. This includes providing sufficient timeframes and channels for feedback collection and review, and ensuring institutional capacity for data collection and analysis. Frequently, evaluation begins with a pilot, but we believe that making informed decisions based on the impacts of a digital learning pilot requires a re-envisioning of how pilots are completed at many institutions today; often, implementation takes place in a small-scale and piecemeal fashion to enable multiple pilots to run with limited investment in any one initiative. To adequately measure and evaluate the impacts of digital learning implementation, a pilot should be structured with support not only for the adoption of new technology but also for the shifts in practice that frequently and necessarily accompany effective technology use. Furthermore, pilots should be completed at a scale that has the potential to demonstrate impact across different student populations. And finally, institutions should be positioned to capture and review data quickly to allow for rapid scaling or shifts. Findings from evaluations should be shared internally and with other institutions to contribute to the development of a set of foundational data about the impacts of digital learning that all institutions can leverage.

- **Become informed consumers of instructional technology.** Better digital learning selection and implementation will result from empowering adopters with the resources needed to make good decisions. These resources include an understanding of institutional goals for digital learning, knowledge about instructional technology functionality, and time to evaluate options. By understanding and selecting the right products, institutions and their stakeholders will improve user experiences and increase the likelihood of implementation success.

- **Use their buying power to improve the market.** As large consumers of instructional technology, informed institutions can influence product development and distribution for the better. Creating opportunities to connect vendors with faculty for education, product discovery, and feedback will result in better-informed faculty and drive the creation of better products. Rather than lament integration or accessibility challenges, institutions are positioned to demand products that are accessible, integrable, and user friendly, and they should advocate for and support the development of standards for core features and functionality. Over time, as more products adhere to standards and usability improves, these steps will simplify evaluation and integration processes across instructional technologies.

- **Equip faculty for success.** Institutions should take stock of the resources and incentives currently available to faculty and assess whether they are aligned to institutional strategy. If meeting institutional goals hinges on the successful and scaled implementation of digital learning, faculty must buy in to the strategy and be equipped to execute the implementation with a clear line of sight into goals, sufficient training, and incentives (or a lack of disincentives) for change.

Opportunities for partner organizations to accelerate change:

- *Funders:*
  - *Embed faculty training and capacity building, particularly in areas like strategic planning and evaluation, into your institutional investment requirements.*
  - *Support efforts to build market knowledge around topics like digital learning impacts and digital learning product design by funding research and dissemination.*
- *Associations and Advocacy Groups:*
  - *Develop resources to help institutional leaders identify hidden barriers, like disincentives for change or innovation, that prevent successful digital learning implementation.*
  - *Start conversations with your membership about the current incentives or disincentives for faculty to innovate in teaching and learning. If you haven't already, consider covering digital pedagogy in your discipline journals and events and creating ways to recognize individuals who are doing exceptional work in digital learning in your area of interest.*
  - *Host resource-sharing hubs or events to facilitate easy information transfer and access among institutions.*
  - *Fund rapid and scaled pilots of new solutions and practices.*

VENDORS

Courseware product satisfaction concerns should fuel vendors' quests for products that are effective and easy to adopt and customize. In particular, faculty and administrator feedback raises a handful of common usability concerns that must be addressed:

- **Time-consuming adoption and customization:** Faculty members continue to voice that digital learning takes too much time to set up and use and that customization is often difficult or time intensive. While institutions must do their part to give faculty the time to learn about and adopt new products, vendors should also strive to design products that fit into faculty workflows and should offer training for faculty to implement products effectively.
- **Designs that limit use by all learners and faculty:** Digital learning products must be accessible, measured not only against legal accessibility standards but also against design principles that support adoption by all learners and faculty. CAST offers a framework for Universal Design for Learning that can help vendors and educators learn about and apply design principles that support accessibility for all.
- **Product and service downtime:** After years of using books, which work every time, learning technology products that are plagued by product or service problems that generate downtime are not acceptable alternatives for most faculty. Investment in systems and support infrastructure, including human support infrastructure, can help to reduce downtime and the frustration it brings users.

While improving product satisfaction should be the number one task on vendors' to-do lists to expand adoption and improve outcomes, it should not be the only item on the list. Vendors can also help to accelerate institutional efforts to implement digital learning by contributing to greater transparency in the learning technology market. Improved transparency will enable institutions to become better-informed consumers and support more efficient and effective decision-making and implementation. A few steps that vendors can take to promote market transparency are:

- Collaborate with platforms like those from EdSurge and Lea(R)n to broadly share information on a product's pricing, availability, and functionality with digital learning decision-makers.
- Publish data on the impacts realized from implementation of the product.
- Learn about institutional or course goals before a sales conversation and present a data-based case for how the product or a particular functionality can help achieve those goals.

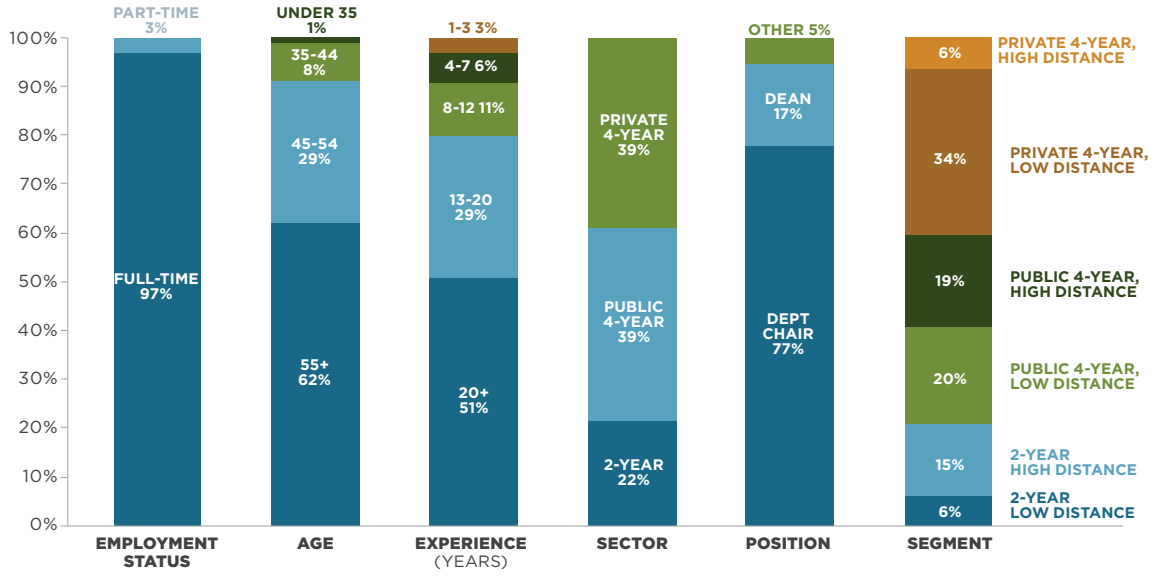
Opportunities for partner organizations to accelerate change:

- *Fund product design that seeks to alleviate current pain points.*
- *Build or support content-agnostic platforms for the distribution of digital content and knowledge.*
- *Advance efforts to standardize product specifications in important and evolving areas like accessibility, data security, and integration.*

APPENDIX A
OVERVIEW OF SURVEY RESPONDENTS

Our fall 2016 surveys received over 3,500 responses from postsecondary faculty (2,381) and administrators (1,126). The faculty sample was designed to collect perspectives from teaching faculty in high-enrollment disciplines. The administrator sample was designed to collect perspectives from a range of roles, and targeted department chairs in high-enrollment disciplines.

OVERVIEW OF 2016 ADMINISTRATOR SURVEY RESPONDENTS



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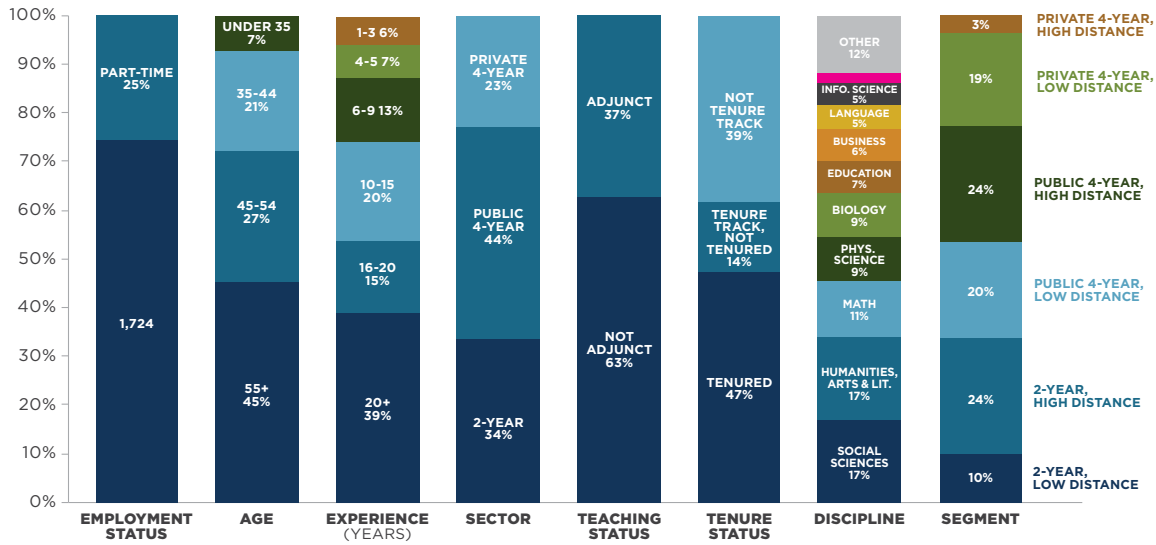
OVERVIEW OF 2016 FACULTY SURVEY RESPONDENTS



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