Technology News & Innovation in Higher Education

eCN

eCampus News

eCampusNews.com

Vol. 8 No. 4

June 2015

Containing the costs of a higher education degree

What role does technology have to reduce the costs of post-secondary education?

Who is behind today's booming community colleges?

Community college faculty discuss the topics most pertinent to their institutions.


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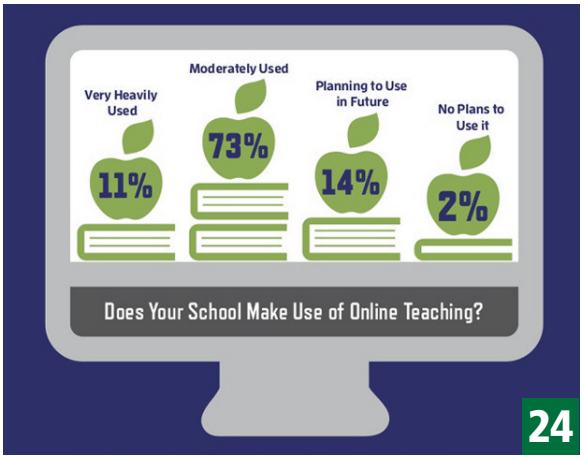

"STEMMING" the outflow

Best practices that institutions of higher education can use to attract, retain, and support students within STEM fields.

By Bridget McCrea

Developing new minds ready to take on careers in science, technology, engineering, and math (STEM) may be a national priority in the U.S., but if the current trends in higher education continue, that goal could be pretty difficult to achieve. According to ***National Center for Education Statistics' (NCES) STEM Attrition: College Students' Paths Into and Out of STEM Fields Statistical Analysis Report***, about 28 percent of bachelor's degree students and 20 percent of associate's degree students entered a STEM field (i.e., they chose a STEM-related major) at some point within six years of entering postsecondary education in 2003–04.

"Many of these STEM entrants left STEM several years later by either changing majors or leaving college without completing a degree or certificate," the NCES reports. "A total of 48 percent of bachelor's degree students and 69 percent of associate's degree students who entered STEM fields between 2003 and 2009 had left these fields by spring 2009. Roughly one-half of these leavers switched their majors to non-STEM fields, and the rest of them left STEM fields by exiting college before earning a degree or certificate."

The fact that nearly half of the nation's STEM career candidates either switch majors or leave school entirely before graduation is alarming, particularly since many of those students have the "highest SAT scores, highest AP science scores, and go to the most prestigious colleges and universities," stated Dr. Freeman Hrabowski, president of the University of Maryland, Baltimore County (UMBC), in a recent ***eCampusNews* article**. In the piece, Hrabowski points to the typical lineup of "weed-out" classes as one of the primary drivers of the mass exodus from STEM majors. In other words, survival of the fittest may not actually be the best educational approach in fields where even the brightest, most industrious students are challenged to their very cores.

"Students come into college interested in STEM, but [schools] do a lot of things to push them away," asserts Bill LaCourse, **UMBC**'s dean of the College of Natural and Mathematical Sciences. "Traditional classroom lectures, for instance, are uninspiring – particularly for brighter students who have to sit in a lecture hall of 400 students trying to stay engaged and on point with subjects that can be especially challenging."

Stemming the flow

With an eye on future workforce needs and the massive Baby Boomer retirement wave that's already in full swing, the nation needs students to not only be interested in STEM, but also to follow through on their dreams of becoming the next scientist, doctor, or engineer. According to Glassdoor's recent list of 25 *Highest Paying Jobs In Demand*, for example, at least 15 of the 25 jobs that pay the most and are in high demand by employers nationwide require STEM skills. Physicians, pharmacy managers, and software architects sit at the top of that list and demand annual salaries ranging from $130,000 to $212,000.

So while the path to potential success in the STEM fields is clear, the question becomes, how can institutions of higher ed not only attract more students to these fields – many of which are associated with difficult and complex classes – but also keep them engaged for 4+ years? LaCourse says at least some of it comes down to teaching students in a more inspiring manner. "Instead of acting as 'weeders,' and looking at the [exit] of some students from STEM as a mark of success," LaCourse states, "we have to help all

of the pupils coming through our programs to be as successful as possible."

A good first step in that direction, LaCourse continues, is to make STEM student retention a campus-wide effort that starts at the registration and orientation level and extends right through to graduation. "Depending on the size of the school, some students turn into numbers, with no one really knowing if that pupil has run into trouble or challenges with his or her coursework," says LaCourse. "What colleges don't always see is the investment that's required on *both* sides of the equation, and how to effectively take care of their side of that equation."

To do its part in bridging "both sides" of the STEM equation, UMBC recently launched a holistic students support initiative that's being funded through an $18 million National Institutes of Health (NIH) grant. The funds are being used to create "a national model of comprehensive support to expand and increase the success of students seeking degrees in STEM," says LaCourse. Known as STEM BUILD@UMBC, the initiative incorporates a number of different efforts, including the use of professional advisors that focus closely on student achievement, progress, and (when needed) intervention; building community to better support students in their educational endeavors; and collaborating with five community colleges, Gallaudet University, and the University of Maryland School of Medicine.

As part of its effort to keep STEM students engaged, UMBC is also "pushing innovation" at the professor level, says LaCourse, and in a largely "blameless" manner. "If someone helps students achieve success, great. But if it didn't work, then that's fine too," he explains. "The important point is that the professor tried something out and we're here to support that and honor him or her for it, whether it worked or not. We see this is a great way to push innovation through the educational system."

The virtual challenge

The obstacles to keeping students engaged in STEM while on a physical campus are high enough, but what happens when those individuals never set foot on campus or meet face-to-face with professors, advisors, and administrators? That's exactly what the folks at Salt Lake City-based **Western Governors University** (WGU), a non-profit, online institution, have been grappling with over the last few years. Throw in the fact that 75 percent of those students are adult learners with full-time jobs, says David Leasure, provost, and the hurdles to STEM success rise even higher.

"The important point is that the professor tried something out and we're here to support that and honor him or her for it, whether it worked or not. We see this is a great way to push innovation through the educational system."

"Our students have busy lives and range in age from 17 to 77," says Leasure, "yet we're the number-one ranked education program, especially covering secondary areas in STEM fields. We've been able to be the number one producer of STEM teachers in the country." Leasure says. To maintain that status, he says the college focuses on "personalizing education for everyone." All students are paired up with mentors when they start their programs, for example, with the relationship continuing straight through to graduation. The college also uses a competency-based program that measures learning progress and allows students to "speed things up when they are learning it quickly and finish the courses early," says Leasure. "Or, they can slow down when they get into more difficult material."

In addition, WGU uses tutoring, flipped class-

room sessions (i.e., where faculty lead problem solving sessions for groups of students in difficult subject areas), and a proprietary analytics platform to track progress. "Across all courses, we have rich and detailed information on what students are supposed to be learning and just how well they're learning it," says Leasure. A student that fails a competency exam, for example, is referred to his or her mentor for assistance. From there, a specialized course mentor may get involved or a flipped group session scheduled. "In many cases," says Leasure, "helping students through these obstacles comes down to one-on-one support and tutoring."

Analytics and measurement are also high priority at Indianapolis-based Butler University, where professors like Robert A. Pribush, are using **Pearson's Mastering Chemistry** to identify at-risk students and improve engagement. As a chemistry professor, Pribush estimates that 99 percent of his students are preparing for health-related careers in pharmacy, medicine, and dentistry. Pribush says the analytics platform works well because it aligns with the textbooks he uses in the classroom, where the period usually kicks off with students viewing a specific chapter and/or section via an overhead projector.

On a daily basis, Pribush uses the diagnostic tools to see which students are struggling. Using a color-coded grade book, for example, he can quickly view the progress of 70-90 students (his typical class size) and quickly pick out the red flags. "When someone is struggling, the first thing I do is look at the more detailed diagnostics, which include every answer that the student has submitted for homework, quizzes, and so forth," says Pribush. "Usually looking at their answers I can tell where they're going wrong." He can also see what time students started and stopped working, yet another indication of potential challenges and/or poor study habits. When it comes time to intervene, Pribush offers "virtual" office hours (even at night, when students are in the throes of doing homework) and/or suggests an in-person meeting to discuss the issue.

The process appears to be working: the university's Chemistry II students' average American Chemical Society example percentiles have increased by 4.5 percent since Mastering Chemistry was rolled out.

"We raised the average performance on this exam substantially," says Pribush, who adds that students have responded well to the analytical tool. "On surveys, our students choose [the platform] as the major reason why they performed as well as they did (second only to the professor himself or herself)."

Through the looking glass

Based on the national focus of cultivating STEM professionals and the nearly 50-percent attrition rates of good prospects, the opportunity to improve such programs – and the related student engagement – at the higher ed level is both real and necessary. "The bottom line is that these classes are really hard," says Jessica Gilmartin, vice president of marketing for online STEM engagement platform Piazza in Palo Alto, Calif. "For the young person who dreams his or her entire life about being a scientist, doctor, or developer, the difficult college courses can present quite a shock."

Despite that and other challenges associated with STEM, LaCourse feels institutions are well positioned to right the ship and begin chipping away at the high levels of attrition. "This country needs more scientists, more medical professionals, and more technology gurus," says LaCourse. "We also need millions of more people in our workforce to stay competitive in today's world, and achieving that goal starts with active, interesting learning that keeps students engaged throughout their educational careers and beyond." eCN

Bridget McCrea is a freelance writer for eCampus News.

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Who is behind today's booming community colleges?

Community college faculty discuss the topics most pertinent to their institutions.

According to a recent **Cengage Learning survey** of more than 4,250 community college students, almost 100 percent say community colleges are an integral part of the U.S. education system.

And from the White House's **American Graduation** initiative to other large-scale **community college initiatives** gaining the national spotlight, it seems that these local colleges are quickly becoming an essential cornerstone of American higher education.

"Community colleges are the heartbeat, the backbone of the education system, and we now have the content and technology to make the experience even more effective for today's students," said Cengage Learning CEO Michael Hansen. "We need to make sure we have an educated workforce, fit for purpose, and ready to compete in an increasingly global environment. With the majority of new jobs requiring some postsecondary education, community colleges are the often affordable and effective answer for a large percentage of the student population."

As community colleges increasingly bolster learning for today's students, it's never been more important to understand the current issues facing these institutions; specifically, innovations in teaching, learning, and administration.

That's why *eCampus News* started the**Community College Roundtable**—a blog run by community college educators on their thoughts, challenges, and successes involving their community.

Here, you'll find a sample of our current bloggers' posts. For those interested in contributing to the blog, either as a guest, or as a more permanent writer, contact eCampus News Editor Meris Stansbury at **mstansbury@ecampusnews.com.**

The essay—an endangered species?

By Ed Cuoco, adjunct faculty member at Bunker Hill Community College and Wentworth Institute of Technology

Technology is at the gate! A recent opinion piece in the **New York Times** describes advances in computer-generated articles and what's called "automated narrative generation." Soon, computers will generate "human-sounding stories in whatever voice—from staid to sassy—befits the intended audience." Indeed, many of the news services we read on the Web today are synthesized from databases, news feeds, and underlying advertising requirements. Behind the scenes, keywords and clicks are tracked, counted and eventually "monetized" as the advertising you see is tailored to your interests.

Imagine this: Some crafty education entrepreneur develops a suite of tools, distributed by a leading edu publisher or MOOC as add-on services for courseware. It's not too far off; in fact, it's already happening in rudimentary form. Several companies sell products and services today, and **Phoenix University** has been offering a primitive thesis generator for a few years.

I sometimes ask my students to test drive the Phoenix service as they develop their argumentative essays. Varying results. Most students find it clumsy but useful in helping to zero in on their theses. Although this generator is not quite ready

for prime time, it offers a view into the future.

In a few years, our students will not be writing essays so much as *designing* them. No need to buy a canned essay, just generate a completely novel one tuned to your intentions!

So, what's a writing instructor to do? One obvious approach is to ban computers and smartphones—in the style of an often recounted (some say misinterpreted) attempt by King Canute to stop the tides. But would we really want to deprive students of skills that most professions require today, offer them competitive workplace advantages, and enrich, for better or worse, their lives?

I think we should embrace these new capabilities and provide students with the context and conceptual underpinnings to exploit them. Ultimately, it'll be their choice to adopt these innovations for creative or professional purposes, and if we turn

them off or inhibit them from learning these skills and tools, we deprive them of an important future path to follow. Our students need to find their places in this emerging digital world.

After all, only a few years ago, computer-assisted spell checkers were verboten in many English classes! One approach to consider is celebrating the adoption of automated writing tools and exploring their positive aspects as well as drawbacks. If you have used EasyBib or any of the other automated reference and citation tools, you know their utility and limitations. We should ask: Do their benefits outweigh their shortcomings? The arc of disruptive innovation has been well described by Clayton Christensen in *The Innovator's Dilemma*—small incremental changes inevitably topple traditional practices if the new solution has compelling benefits—even if the changes are inferior to the status quo.

Today's academic highly structured essay enables instructors to evaluate student insights, reasoning skills and communication competencies. An essay is a perfect structure for computer modelling—essays have a distinct schema that is easy to clone and "populate" with semantics and familiar grammar patterns. With access to mountains of data and powerful cloud computers, our handheld, networked devices will soon be better (that is, more conformant and information rich) at this game than what we humans can do. Is the essay, as an academic genre, soon to be eclipsed by robo-writers? Technology and digital information trends suggest a new wave of automation will hit our shores soon, and we'll have to see if the student essay can withstand the digital onslaught.

So the next time you're reading an exceptional student essay, staid or sassy, ask yourself: How can this essay be humanly better?

Digitizing education for the good ol' days

By Brian Goedde, a lecturer at Naugatuck Valley Community College in Waterbury, CT.

All of my classes are paperless. It's not because I'm a tech-wiz. In fact, I'm "all thumbs" when it comes to learning new technology—and not the quick-moving thumbs of text messaging, either. Just thumbs.

I tell my students that making them do all of our classwork on Blackboard increases their com-

puter literacy and equips them for the 21st century workforce, and I really do believe this, but I have another reason: digitizing my classroom has let me be a more old-fashioned.

For example, we writing teachers pine for the good ol' days when students actually had to learn spelling and grammar, rather than spill out thoughts onto the screen and let the computer clean up the mess. Spell-check, grammar-check, and especially "auto correct" functions are great for writers, but the scourge of us writing teachers.

There is "spell-check" on Blackboard, but the assignment submission text boxes do not have "auto-correct" proofreading. When a student writes "im" on a Blackboard blog post, Blackboard does not change it to "I'm." It's great. As a teacher I see all the little faults (and the not-so-little-faults), and I take off points for them. My students tell me that this has made them actually re-read what they've written before they click "submit." They proofread the old-fashioned way.

In the larger picture, digitizing my classroom has returned me to the good ol' days of student accountability when it comes to grading. We teachers take pains to articulate grading calculations and policies in our syllabi, and this is all but entirely ignored by students. Students rarely know how much their assignments are worth, and at midterm, many students who have done little work are shocked to learn that they are failing. In the good ol' days, students were responsible for earning—and knowing—their grades.

With the Blackboard Grade Center, students can click on "My Grades" and watch their overall grade go up or down with each assignment. They see how their grade is not something I "give" when the semester ends, but something that they earn over time. I never again have to answer the question, "How am I doing in your class?" This knowledge—and with it, this accountability—is in the student's domain.

Digitizing education is a clear benefit to me, but does it suit my students? I took an informal poll in my classes last semester, asking how easy or difficult it was to have the entire class on Blackboard. These are developmental English students, by the way, students who, it is commonly assumed, are not self-driven or self-reliant enough to succeed with digital technology. "On a scale of one to ten," I asked, "with one being 'as easy as falling out of a tree' to ten being 'so difficult I should change my class back to hard copies of everything, how hard is Blackboard to use?'" A few said "two" or "three": Blackboard can be hard to navigate sometimes, they said. Everyone else said "one."

I have to agree that Blackboard can be difficult to navigate. If I were to answer my own question, I'd say "three" too; on some days, when I'm learning something new, I'd be at least a "five." But still I have become a Blackboard enthusiast, not as a tech-wiz but as a fuddy-duddy. Because of features like the Grade Center and the lack of "auto-correct," what makes students equipped for a 21st century workforce returns us to time-honored pedagogical principles of the past.

Differentiating technology instruction in the community college classroom

By Daniel Downs, Adjunct Professor in the CIT & Web Development programs at Bunker Hill Community College.

Approaching new semesters, community college's teachers are confronted with a variety of levels of technology skills and fluency of their students. At first it can be difficult to ascertain what level the students are across the spectrum. It may not be until you assign a writing assignment or one which requires internet research that you can identify large gaps of skills in using web applications, software or current operating systems effectively. I would like to recommend a few of the tools and

strategies that I use to better understand my students and differentiate my instruction to meet their needs. Addressing student skills early can help find common ground with the use of technology and enable them to feel connected and part of a team.

Start group work with technology sooner than later in the semester

Engage students in group projects so that they can share skills while working together and engage more quickly with the technology needed in your course for projects. This is the perfect opportunity to help them learn a new tech skill together such as an online presentation with Google Presentations or even just develop a PowerPoint together. Some of the essential fluency skills such as creating, saving and uploading files is part of the collaboration of the group.

Provide a skill assessment of your new students

Identifying the essential skills students need to be successful with technology will help you focus on what you need to teach. Whether it is formal or informal, assess student technology skills based on your expectations for the course early. Create an online form/survey for students to take to identify high need areas such as knowledge of browsers, software, saving or how to navigate the web. Identify high need areas quickly and efficiently and address them with your instruction.

Use Google Docs for collaboration

Create and share work using Google Docs. Collaborate and share ideas around central topics and even if your course does not require technology you can integrate a valuable technology tool into your course. Google Apps technology, which enables students work in the cloud, also assists in commenting, editing, sharing ideas and projects efficiently.

Make screen-cast tutorial videos of often-used content materials

Presentations you use often or online documents you discuss or share can be short informational videos you host and narrate online. Provide access to students at home and school with your ideas and content. The additional time engaging with the videos can address high need learning areas and increase efficiency of using class time for more meaning full engagement. Providing learning resources outside the classroom which can be revisited anytime can be the first step to "flipping your classroom".

Show students the value of collaborating online & building their brand

Show students the value of their online identity and improve their LinkedIn profiles for job prospecting. Sit down with small groups of students and discuss the valuable skills they are acquiring. Highlight profiles of professionals in their field of study and discuss related skills.

Teach them to be efficient with Web 2.0 & 3.0 tools

Teach students to shorten and personalize links with tools like Bitly.com and organize commonly used links with sites like Diggo or Pinterest. Efficiency with the resources they collect online will help them stay organized and improve how they share resources and work. Show students the value of taking the resources they collect beyond your course.

Model technology-fluent behavior yourself

Provide a syllabus or assignment document conveniently at one web link for easy access; model ways other than email that the class can meet and collaborate (Webex, Google Hangouts) online. In the Northeast right now classes have missed several hours due to inclement weather, use this as an opportunity to find an effective way to share the weeks work.

The variety of backgrounds that students within community colleges are coming from makes it a challenge to always teach all students with technology. I hope this list has provided you with a starting point for better connecting with your students and improving their skills and

supporting their learning at home and in the classroom.

2015 e-learning resolutions

By Brandy Brooks, adjunct professor for the Department of History and Social Sciences at Bunker Hill Community College.

At the start of every year **nearly half** of Americans resolve to change. Pay off student loans. Quit smoking. Learn HTML code. Lose ten pounds. The devil, however, is in the details. Resolutions are easy to make, the challenge is sustaining them throughout the year. According to a **study** conducted by the University of Scranton only 8 percent of people achieve their New Year's goals. With this in mind I've composed a list of simple, specific, tangible (and hopefully obtainable) e-learning resolutions.

What the Email? I am guilty of unconscious emailing. More than once I have sent one word email responses of 'Thanks' or 'Okay.' Even worse, I have sent emails with lengthy subject lines to colleagues and students. 'I received your campaign video but couldn't open it due to the privacy settings' being one example. I also need to refrain from sending emails that combine multiple requests and more than one large attachment. No one wants to read a dissertation disguised as an email. Before hitting send, I need to stop and ask – is it necessary for this email to be part of my digital footprint. Am I consciously emailing?

Demystifying "the Cloud." I have a storage device problem. The problem is not that I fail to properly save documents for posterity. The problem is that over the last fifteen years I have accumulated too many storage devices. I have 10 USB flash drives of varying storage capacities, three Google Doc accounts, hundreds of Outlook archived folders, a Dropbox account, floppy and zip disks circa 2000. Jurassic technology aside, I vow to spend 2015 organizing my files and syncing my mobile devices and laptop in one place – a la the cloud.

Disconnecting to Reconnect. On my first day as an adjunct professor I remember walking into the classroom energized and ready to teach a section of *State and Local Politics*. Though I did not expect to be greeted by a standing ovation I did anticipate that students would at the very least acknowledge my presence with a passing glance or 'hello.' Instead what greeted me were the tops of 22 heads as it appeared that every student was plugged in to their mobile devices, e-readers, laptops, and tablets. Since that first day to now, digital technology has been a curse and a blessing in the classroom. At the same time that I have developed a **course website** and Facebook **page** and integrated YouTube, Poll Everywhere, and learning management systems (LMS) into assignments and discussion; I've also had to include statements on electronic usage during scheduled class time on my *Government in the United States* **syllabus**. Digital consumption is **widespread**. From the 2 year old tapping away on an iPad, to the teen that averages 3,500 text messages a month to the adult that spends hours trying to understand 'Deflategate,' our time spent plugging in means unplugging from **work, sleep and academics**. And even when we do sleep our devices are normally within arm's reach. Instead of simply unplugging my digital device I will spend an hour researching **"text neck"** and other **mental and health impacts** of excessive digital consumption. I need to **digitally detox** and revert back to the good ole days of living and working in digital free zones. Starting with an hour and working my way up to a day I plan to turn my devices off and resist the urge to log-in to social media sites. Of my New Year's resolutions this one will probably be the hardest but disconnecting to reconnect may be the most worthwhile. eCN

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Containing the costs of a higher

Many higher-ed institutions are turning to online models to more cheaply deliver certain kinds of co or sustainable strategy? What role does technology have to reduce the costs of delivering post-seco Symposium to discuss how technology-enabled online learning and competency-based models have sustainability of education. Taking a student's perspective, Michelle Weise of Southern New Hampsh argues that the benefits of online competency-based education can provide a more affordable and higher education options are out of reach. From an institutional, and global, perspective, Dan O'Ne play in helping higher-ed control costs through online sustainability initiatives. Both writers believe t students and institutions can reap the benefits of a more accessible education. These essays, as wel can also be read at **ecampusnews.com/symposium**. There we also welcome your thoughts on th

The disruptive innovation that will skill up America

Scale and modularization through CBE will provide significant opportunities for learners.

By Michelle R. Weise

Disruption is probably one of the most overused buzzwords in education, yet few seem to know what it means. In higher education especially, there's a tendency to take an exciting technological advancement, call it a disruptive innovation, cram it into the classroom experience, and then hope that efficiencies will magically appear. But a disruptive innovation doesn't necessarily entail a technological breakthrough. In fact, in our most recent work in higher education called ***Hire Education***, Clayton Christensen and I underscore that there is true disruptive potential in online competency-based education (CBE) aligned to workforce needs even though the parts of this whole are not at all new.

We've all heard of workforce training, competencies, and online learning. They're not new phenomena, but online competency-based education is revolutionary because it marks the critical convergence of multiple vectors: the right learning model, the right technologies, the right customers, and the right business model.

The theory of disruptive innovation helps illustrate how the inertia of academia inevitably makes way for upstart disruptors, such as online, competency-based educational programs, to seize a market of untapped connections between learning and work.

Most institutions get locked into the complex orchestration of resources, priorities, and processes of not just one but three very different, costly, and conflicting value propositions that center on teach-

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education degree

urses and assess student learning. Is this, in fact, a good
ndary education? Two researchers join this month's
e the potential to improve the overall affordability and
ire University and the Clayton Christensen Institute
accessible education for those who feel traditional
ll from Arizona State University discusses the role ICT can
hat thanks to the capabilities of technology done right,
l as a response from the American College of Education,
is important topic. **– Meris Stansbury, Editor**

Affordability and sustainability through ICT-enabled education

Why it's critical to understand the potential of technology to not only improve student learning, but improve the planet.

By Dan O'Neill

The affordability of college education, conjoined with the discussion of the public and/or private value generated by that education, has never been a more important topic. If we believe that society must educate the global population in order to create a better world for present and future generations, then it is critical for those of us in higher education to understand the role that technology has to play in enabling post-secondary learning for all.

A recent **case study** of Arizona State University's online campus, ASU Online, conducted by the ASU Walton Sustainability Solutions Initiatives and its Global Sustainability Solutions Services, determined that online education not only provides greater access to higher education offerings but also has become a cornerstone element of the institution's sustainability plan generating socio-economic value and benefits for the degree-earner, the institution and the greater economy.

The case study began when Dell approached ASU in mid-2014 with a request to analyze the sustainability impacts of information and communication technology, or ICT, in online education as part of its **Dell 2020 Legacy of Good Plan**. Dell wanted to understand the role of ICT in generating net positive progress in a variety of industries, including higher education (work that is also currently underway in conjunction with Business for Social Responsibility [BSR] through its **Center for Technology and Sustainability**).

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ing, research, and facilitating a social community of students. In this complex orchestration, it becomes impossible to parse the exact costs of producing these interdependent lines of business. And there's no way that technology will somehow magically disentangle these locked business models to create a newly efficient model of higher education.

Meanwhile, there are a growing number of students who are finding themselves over-served by these augmented, bundled services. Nearly **71 percent** of U.S. "college" students do not participate in the residential college experience that we tend to glorify; most of them commute, work part-time, have family commitments, or do not have the luxury of majoring in a field that has no direct relevance to their future employment goals. These students are often looking for flexible, cost-effective, and streamlined programs that move them ahead in their working lives.

Linking students to employers through online CBE

Online CBE providers plant themselves squarely in the midst of these nontraditional students and center on a single, simpler value proposition: to serve as the critical missing link between higher education and the workforce. It turns out that employers cannot gauge what students can actually do from a list of courses and letter grades. Diplomas serve more as a sorting mechanism for general proxies for potential talent.

Competencies, on the other hand, are clear about students' precise skill sets, dispositions, and capabilities. There are explicit learning objectives that, for instance, delineate that a student can evaluate the credibility of online resources, or apply financial principles to solve business problems, or create and explain big data results using data-mining skills and advanced modeling techniques.

For students, competency-based education is hard. They're not able to get away with a merely average understanding of the material; they must demonstrate mastery—and therefore apply dedicated work toward gaining mastery—in any competency.

Online CBE providers take this rigorous learning experience and marry it with ever-improving online technologies. The resulting ability to scale and modularize learning enables online CBE to narrow the skills gap in ways that traditional forms of postsecondary education cannot duplicate.

Why scale and modularization matter

Scale is important for various reasons. There are already various offline CBE providers as well as community colleges that create on-demand learning pathways to mitigate workforce shortages, but they lack the ability to replicate those programs in a cost-effective manner. Online CBE, however, is already comparable to or lower than the cost of community colleges for students, in large part due to a new kind of architecture of learning.

Technology in this case sets into motion **modularization**. When learning is broken down into competencies—rather than by courses or by subject matter—modules of learning can be easily arranged, combined, and scaled online into different programs for very different industries.

Although most of the current development of CBE programs is occurring in traditional degree programs, online CBE is almost more powerful in the way that it can be used to skill up students for new and emergent fields that don't necessarily end in a specific credential or a degree. This will be vital for the millions of nontraditional students looking for more direct and cost-effective pathways to and within the workforce.

Imagine a future in which students and working adults will be able to take a mere handful of modules—as opposed to a degree or certificate program—to skill up and move up the employment chain. Traditional institutions will have a

tough time competing for student tuition dollars, not only because these modules will be tailor-made programs for positions that are in demand, but also because these will be engaging, mastery-based learning experiences at a fraction of the price.

The idea of scaling a one-on-one in mastery learning experience had been unfathomable to Benjamin Bloom in 1984 when he introduced his work on the **2 Sigma Problem**. It was clear to him that students tutored individually in a mastery-based format were able to perform at two standard deviations above the average of the control class, with obvious advantages in their abilities to problem-solve, apply principles, analyze, and be creative; however, Bloom simply could not imagine a way of scaling such a tutorial. Only the wealthiest might be able to take advantage of this kind of learning.

But now, technology in the form of smart learning platforms and data analytics equip instructors with clearer profiles of their students. It is as though each student has a personalized tutor, but in this case, one tutor can serve many more students at a time because she can efficiently gauge the students' level of understanding and intervene only when necessary. These data-driven interactions between teachers and students actually become tailored, richer teaching moments and more cost-effective interventions.

Critics nevertheless insist on denigrating such routes aligned to labor market needs as narrow, vocational training for single dead-end jobs—not careers. This is an oft-repeated and false dichotomy: job training in no way prevents students from learning how to learn for a lifetime. And in a knowledge economy, attaining a first job is a major inroad to other, life-changing opportunities as well as increased wage earnings premiums. It is unlikely that from here on out, four years of college will last anyone a lifetime. All of us will have to continually retool—some of us for jobs that don't even exist yet.

The number of alternative learning providers singularly focused on a simple value proposition such as creating pathways to jobs in demand will only grow. Agile and adaptable online CBE workforce solutions have the power to produce a separate and possibly even more powerful set of industry-validated learning experiences that could supersede the traditional degree. Now that would be truly disruptive. eCN

At the time of this writing, Dr. Michelle Weise was a senior research fellow with the Clayton Christensen Institute for Disruptive Innovation. She is now Executive Director of the Innovation Lab at Southern New Hampshire University.

eCN Symposium

eCampus News announces *Symposium*, discourse from higher education professionals on topics of urgency and controversy, with commentary and response from the field published on our web site, ecampusnews.com. We are actively soliciting submissions and response to topics for the rest of the year:

June: Containing the Costs of a Higher Education Degree
We are seeking responses starting immediately at www.ecampusnews.com/symposium

August/September: New Models for Funding Technology: Critics say that traditional models for funding technology (capital vs. operational) have handcuffed higher ed leaders into using non-innovative technologies. How can funding models be improved so that they support, rather than thwart, innovation?
Participant query: 5/1 • Submissions deadline: 6/1 • Responses start: 8/17

October/November: Suggestions for our last Symposium topic are being accepted. Deadline: 7/1
For more information on each topic and/or to submit a 100-word submission query, contact Meris Stansbury:
mstansbury@ecampusnews.com

ICT-enabled

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Our study resulted in several significant conclusions: the online and "immersion" (traditional, campus-based, face-to-face) models are rapidly merging; most online and immersion courses will utilize the exact same technology base; the ICT intensity varies little between the two modes; and the socio-economic benefits of online education dwarf its environmental benefits, however important they are.

We conducted this study from the perspective of a public research university, in our case the largest in the nation under a single administration, which comprises four campuses, 83,000 students (13,000 online) and more than 3,000 faculty. To determine the net positive value, our research team estimated the environmental costs and benefits of online education, with a primary focus on net carbon benefits as well as near and long-term socio-economic benefits, using the acquisition of an undergraduate degree as the baseline unit of analysis.

From an environmental benefits point of view, a student choosing a fully online degree saves 30 to 70 metric tons of carbon dioxide equivalent (the standard measure of greenhouse gas emissions and a primary concern of the ICT industry) over immersion students. These savings are largely driven by eliminating transportation to and from class and, most important, through a significant **avoidance** in classroom construction. It should be noted that classroom space represents less than three percent of total building space on ASU campuses. Unless the research university itself becomes virtual, most of the other 97 percent is still required.

Accessibility and net worth

On the socio-economic side of things, we found that benefits accrue from accessibility. Most students choosing the online route simply would not get a campus-based degree. Using existing research on the economic upside of a post-secondary degree, we estimated as much as $550,000 worth of lifetime benefits for each student that earns an online degree. That half million dollars covers increased life-time income, greater net worth at retirement, avoidance of costly social services, and contribution of positive social services on the part of the better educated citizen.

ASU Online was originally created six years ago to increase access while providing a new revenue stream, and with the reduction of state and federal funding, the importance of new revenue sources cannot be understated. There was some concern that ASU Online might "cannibalize" its typical 18 to 25-year old student base. Instead, ASU Online accessed a large, growing, global market, enrolling students who tend to be older, working, married parents who tried college before, stopped, want to start again, and must work asynchronously. Over six years, ASU Online has developed a profitable, new revenue stream that helps support the overall operations of the enterprise with an envisioned future student population of 200,000 students annually by 2030, 100,000 each through immersion and online modes.

Accessibility also means equality. A key, driving principle of the ASU model is that an online degree should be indistinguishable from an immersion degree. Nowhere on the degree or transcript is it specified whether the degree was attained through immersion or online mode. The curricular content of immersion and online degrees are identical. The courses are designed, developed, and delivered by the same top-notch research faculty. The intent is to ensure that an online degree is of the same high quality and rigor as an immersion degree, anchored in advanced research and delivered by qualified expert faculty.

Affordability and the impact on the institution and faculty

The education system has many stakeholders: students, parents, faculty, university administra-

tion, technology providers, public and private employers, and the greater society in which the university is embedded, including the metro area, state, country, and planet. All of these stakeholders incur costs and accrue benefits from higher education. The prevalent concern about ICT, and the online learning modes enabled by ICT, has been on its impact on the affordability of higher education for the student and, often, the parent(s) of the student. But, the impact on affordability for the faculty, institution, employers, and greater society are also interesting questions.

For example, at what point do the diminishing costs (to the student) of an online degree negatively impact faculty? At $480 per credit hour, a degree through ASU Online costs roughly the same price as in-state tuition, certainly making a degree more affordable for out-of-state students. While it is not necessarily more affordable to the in-state student, it is still a good value in today's market. If the price were reduced due to market forces to $120 per credit hour, the education would be more affordable to students, wherever they might be. But, as one ASU executive noted recently, it is doubtful that ASU could afford such a change. It would be difficult to incent faculty to design and deliver courses, resulting in further degradation of quality of the education. The value of the degree earned would not likely bear up under the scrutiny of accrediting institutions, eroding ASU's position as a provider of high-quality online degree education.

Higher-ed's ICT-enabled future

Higher education is undergoing radical, disruptive innovation, due to a wide variety of factors: the scale of the global challenge; the cost of an education; its changing cost/benefit ratio; the silly assertion that education is strictly a private good; the corresponding abandonment by the public sector of its historic social contract to provide an affordable public education; and the emergence of new business and pedagogical models enabled by new ICT technologies.

The future we see at 2030 or 2050 is a world that will continue to be characterized by increasing complexity and diversity. The higher education market will grow radically and expand globally. ICT-enabled models will make education available to all citizens of the world. The higher education market will segment into a wide variety of niches and business models differentiated along dimensions of discipline, competencies, degree focus, price, and quality. The higher end might continue to be the Ivy League and its imitators. The lower end might be rapid, MOOC-style courses available from not always trusted sources. Quality degrees from public research institutions such as ASU that are of high value are likely to occupy a significant niche, delivering the same quality education it does today in immersion, online, and hybrid modes.

As this evolution takes place, it is incumbent on the leaders of our universities to experiment aggressively with online education in order to maintain our public institutions relevance in a new age.

Quality higher education has long been recognized as a significant contributor to a life well lived. Broad, global access to it is necessary to enable nine billion people to live well on our planet, within its resources, by 2050 (a commonly cited benchmark year for global sustainability goals). ICT will play a critical role in making post-secondary learning affordable and accessible to all. eCN

Dan O'Neill is a Senior Sustainability Scientist and General Manager for the ***Global Sustainability Solutions Services*** *at Arizona State University. In this role, he connects the sustainability needs of local and global stakeholders to the knowledge and delivery capabilities of ASU and its global network of partners through the delivery of real, practical, effective sustainability solutions.*

8 open source platforms for IT consideration

From mobile-specific to enterprise resource planning, these open source platforms could help streamline campus IT.

By Meris Stansbury, Editor

Usually, the higher-ed industry has a reputation as being one of the slowest adopters of new technology. But when it comes to open source software (OSS), campus IT departments are ahead of other industry and consumer tech adoption curves, **says Scott Wilson**, service manager of OSS Watch at the University of Oxford.

"On the face of it, higher education has been relatively quick to realize the benefits, notes Wilson. "Over 50 percent of higher education institutions use open source, both on the server and on the desktop. And one of the great open source success stories in higher education is the **Moodle Virtual Learning Environment** (VLE)."

According to Gartner, by 2016 the vast majority of mainstream IT organizations will leverage nontrivial elements of open-source software (directly or indirectly) in mission-critical IT solutions.

Reasons for the high adoption rate of OSS in higher education, specifically—outside of the fact that the Open Source **Movement itself** grew in part out of U.S. academic institutions in the 1970s and 80s—include reducing overall operation costs, tailoring software for unique needs, and improving the quality of STEM education.

"OSS also provides faculty members the ability to dissect source code and prepare students for low-level software development," **explains Maurice Dawson**, assistant professor of Information Services at the University of Missouri-St. Louis. "OSS could enhance the STEM environment by infusing multiple applications that can be developed, analyzed, and used as part of the curriculum."

However, Gartner also noted that most mainstream IT organizations "will fail to effectively manage these [OSS] assets in a manner that minimizes risk and maximizes ROI," making it critical that OSS-interested IT departments start by evaluating OSS solutions currently used, and trusted by, other colleges and universities.

These OSS solutions include [listed in alphabetical order]:

For learning management:

Sakai Project: A community-source software (CSS) project, Sakai is used for learning management in over 350 colleges and universities around the world. According to Dr. Stuart Lee, deputy CIO at the University of Oxford, "Sakai provides the flexibility we need to offer a LMS to support the teaching methodology at Oxford. We can include best-of-breed products from other sources too, to offer a cutting-edge platform for online learning."

For mobile:

Kurogo: At Indiana State University, where open source is used for mobile app development, administrators launched an app with the help of Modo Labs, which offers mobile solutions and support services based on the Kurogo open source mobile platform. The project has gone well, and officials are looking at open source for development of a content management system, as well as creation of "sandboxes" for students who want to develop their own apps. Other institutions currently using Kurogo include Harvard University, Brown University, University of Central Florida, Rochester Institute of Technology, and many others.

For multi-purpose platforms:

Kuali Foundation: Michael Bourque, vice president for ITS at Boston College, **notes that** his school is a member of the Kuali Foundation, which provides open source administrative software solutions for higher education. Leveraging an **international community** of educational institutions and organizations, Kuali aims to provide sustainable software that helps schools keep their money in their mission by significantly reducing administrative costs and promoting administrative best practices. Kuali is home to software systems for **financial management, research administration, student services, human resources/payroll, library management, business continuity,** and **middleware/workflow**. Other members include Brown University, MIT, Lehigh University (Pa.), Cornell University (N.Y.), Colorado State University, and many others. "It feels like we're crafting a vision together for what schools really need," Bourque says. "If you use open source, you don't have to follow one vendor's trajectory. You can work together to create your own path." Boston College created a customized student system they're supporting in-house. That experience will allow them to share insight with the Kuali community, says Bourque, about what it was like to move into open source. As they develop more systems over the next couple years, they'll turn to other Kuali members as development issues crop up, he expects.

Modo Labs: Modo Labs was founded in 2010 by Andrew Yu and a team of mobile developers from MIT. This team created the original MIT Mobile Framework with the vision to enable college students to easily create rich mobile websites and native applications using data and content from university back-end systems and other data repositories. Now, hundreds of universities, as well as hospitals, pharmaceutical companies and financial institutions, use solutions from Modo Labs to deliver mobile websites and native apps for their students, employees, faculty, staff and alumni. "The team here had concerns initially because we're not a very big team," **says Santhana Naidu**, VP of Marketing and Communications, and former web services director, at Indiana State University. "But Modo took care of the hardcore programming and provided support, and we didn't feel at any point like we'd be stuck surfing the online support forums." Andrew Yu, CEO of Modo Labs, is also a firm believer that open source has an edge when it comes to security because the level of transparency allows for more thorough software testing. That's also what's reduced the amount of bugs and flaws in open source platforms and applications over the past couple years. "The open source community makes a huge effort to address bugs and security concerns," he says. "If done correctly and applied correctly, open source becomes more secure."

Red Hat: an enterprise open source solution, Red Hat helps Vanderbilt University, and many others, enable their IT infrastructure. For example, McMaster University in Ontario, Canada, uses Red Hat's open software-defined storage solution to scale to petabytes, preserve existing IT infrastructure investment, and adapt for what the University says is seamless growth. "I showed Red Hat Storage Server to our operations people, who are ultimately the ones who will have to support it, and they were amazed at how intuitive and easy it was to use," explained "Wayde Nie, lead architect for University Technology Services at McMaster University. "We have a heavily virtualized environment; and we wanted software-defined storage, network, and compute to work within that environment. If you export the raw storage that resides in the Red Hat Storage software-defined layer, then you get the flexibility to export it and replicate it however you require. That was absolutely key for us." Red Hat Academy, a service of Red Hat, also provides institutions an open source education program

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that gives hands-on instruction, curriculum, and labs for those interested to become Linux proficient. "Red Hat Academy is, without a doubt, the most demanding and thorough Linux curriculum product on the market," said Robert Guess, a computer science professor at Tidewater Community College.

rSmart OneCampus: OneCampus is a cloud-based platform that aims to simplify finding and accessing campus services and information such as grades, class schedules, email, and more. It connects to a campus-based Shibboleth or CAS authentication to allow for single sign-on to institutional services and applications and features a Google-like search, ratings, and reviews to effectively analyze what services are being used and satisfaction levels. Administrators also have the ability to change or add new tasks to facilitate continuous service improvements with limited IT expertise or involvement, says the company. Colleges and universities using OneCampus to reduce administrative costs and simplify the user experience include Purdue University, the **University of Maryland**, the University of Delaware, and many others. "After completing the Internet2 NET+ service validation process, we recognized that OneCampus provided Pitt with a powerful alternative to our traditional legacy portal that will better serve our user needs going forward," said Dan Menicucci, enterprise architect at the University of Pittsburgh. "During the early adoption phase, we plan to run OneCampus in parallel with our current portal to ensure a smooth transition and we will begin to retire our legacy software later this year."

Ubuntu: Created by the open-source community and Canonical, free-to-use Ubuntu is a Linux-based OSS platform that runs everywhere from the smartphone, tablet and PC to the server and the cloud. Oakland University, a state-supported college in Rochester, Mich., teaches some 18,000 students across its liberal arts, business administration, health sciences, engineering and computer science schools. Ubuntu helped the University to not only provide laptop-toting professors and students with the technology they needed in a uniform set-up to ease maintenance and support, but also preserve the computing muscle of its servers—and the applications they run—and trim the cost of acquiring and running them. "We replaced the proprietary Unix technology [and] pretty much eliminated every last bit of Sun-hardware and Solaris from the server room," said Ken Simon, computer networking administrator for the University. "The 'ordinary PC servers' running Ubuntu cost a fraction of what the old hardware cost."

Unicon: Unicon solutions are based on open-source and community source technologies that aim to increase productivity while keeping development costs low. Many of Unicon's solutions are experiencing solid adoption and growth within the higher education community, it says, due to extensive experience in providing dependable, scalable solutions to higher education institutions, with domain expertise in education and open source. The company applies open source campus solutions for the enterprise in the areas of portals, student success and retention, learning management systems, identity and access management, online video, calendaring, email, and collaboration. Unicon can also build custom solutions. Hundreds of institutions use Unicon, including California Community Colleges, Columbia University, Cornell University, New York University, Duke University, Princeton University, Stanford University, and many more. eCN

How 3 prominent universities are becoming video trailblazers

How three institutions are championing collaboration through interactive and streaming video across the academic world.

http://www.ecampusnews.com/technologies/university-video-internet2-281/

Universities find a collaborative way to measure and obtain success

An Amazon Web Services infrastructure has allowed for a predictive analytics framework to determine college and university at-risk students.

http://www.ecampusnews.com/top-news/par-data-institutions-277/

edX: This is how you do online courses for credit

New ASU, edX program turns to a unique virtual proctoring solution.

http://www.ecampusnews.com/technologies/edx-online-credit-992//

5 core functions of the post-LMS era

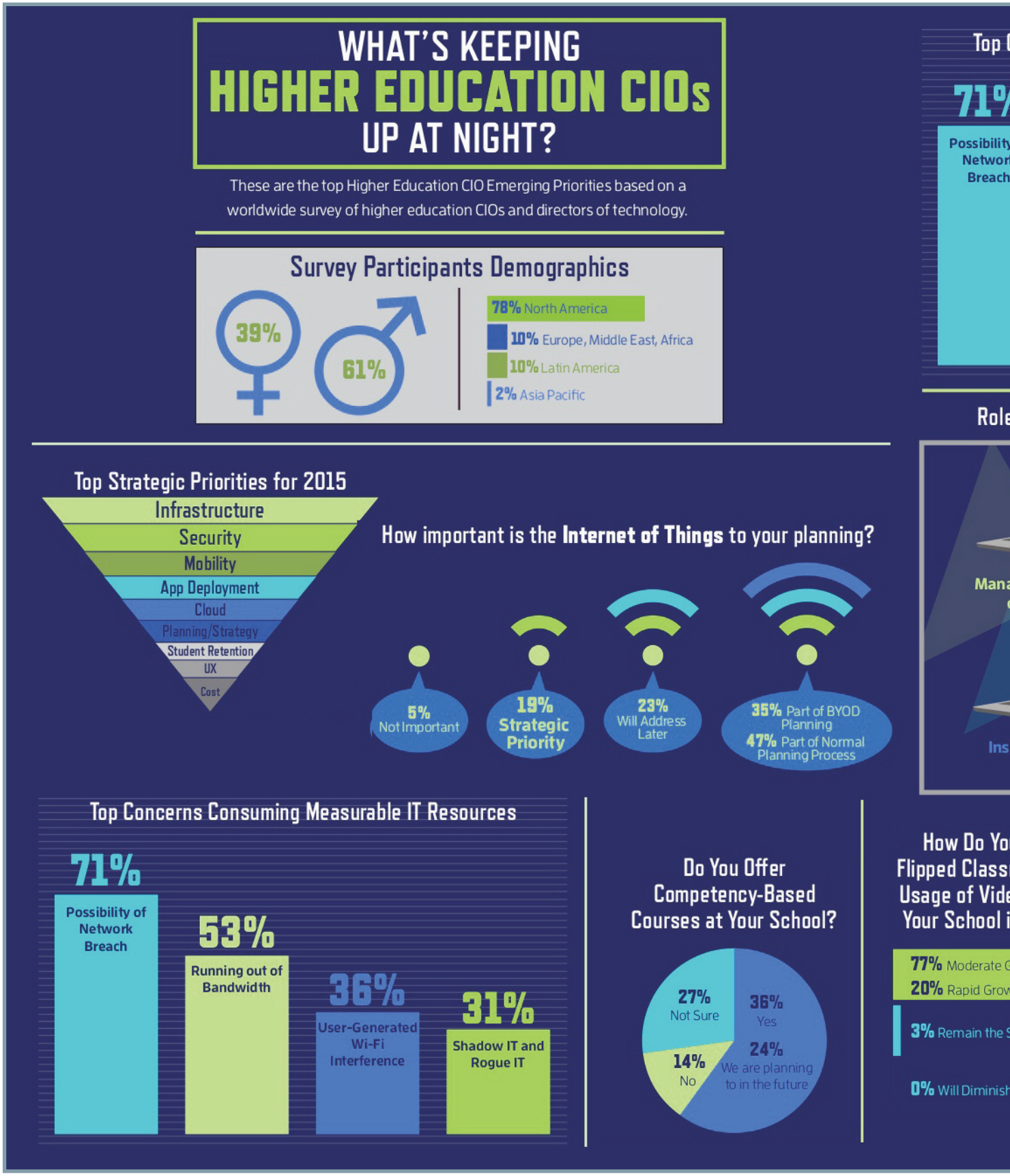
New EDUCAUSE report explored the gaps between current LMS functionality and what's needed for the next-gen digital learning environment.

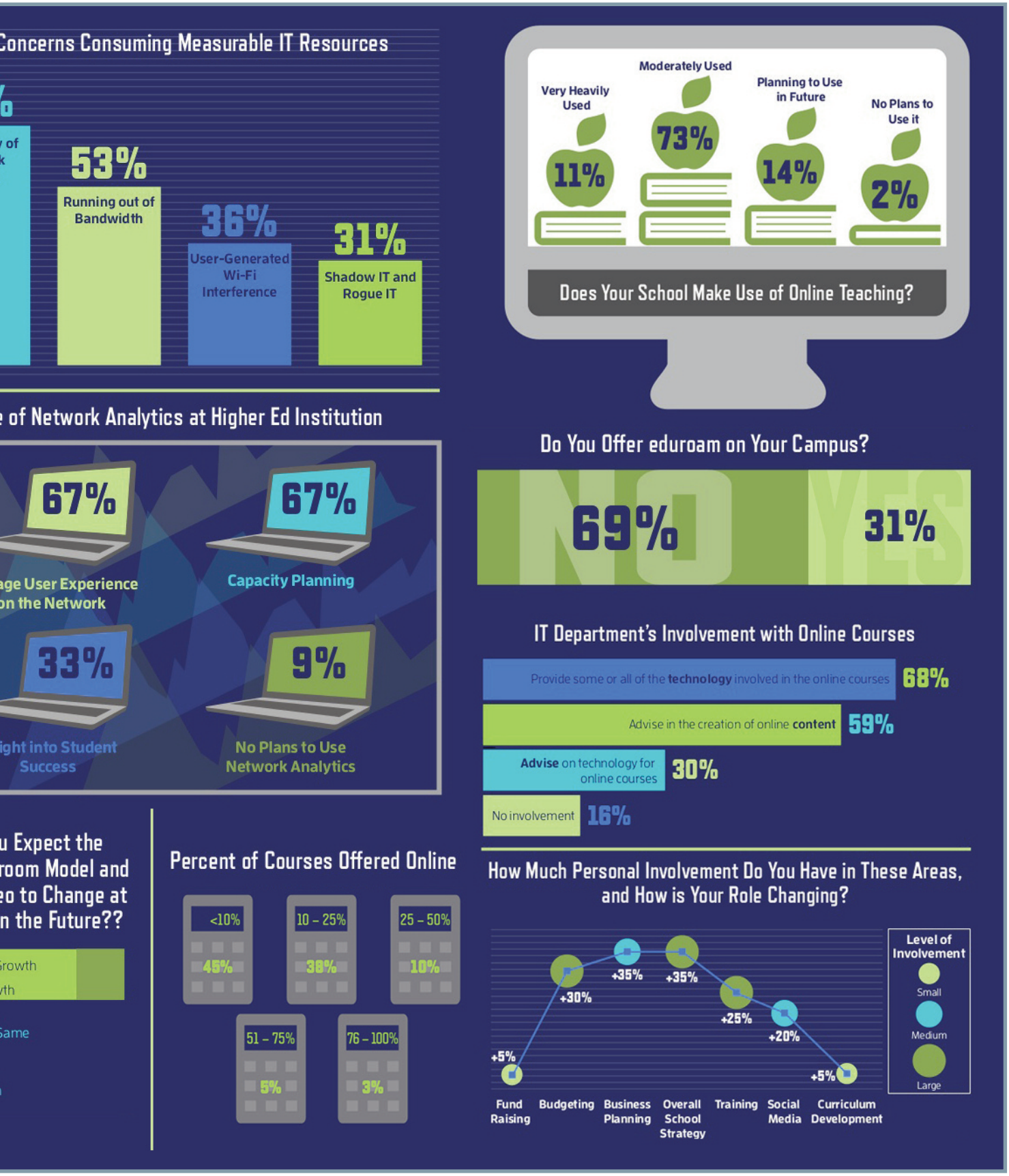
http://www.ecampusnews.com/technologies/lms-digital-learning-271/

Why students are saying community colleges are the future of learning

A new survey presents student perceptions about community colleges.

http://www.ecampusnews.com/top-news/survey-community-colleges-333/


WHAT'S KEEPING
HIGHER EDUCATION CIOs
UP AT NIGHT?
These are the top Higher Education CIO Emerging Priorities based on a worldwide survey of higher education CIOs and directors of technology.
Survey Participants Demographics
39%
61%
78% North America
10% Europe, Middle East, Africa
10% Latin America
2% Asia Pacific
Top Strategic Priorities for 2015
Infrastructure
Security
Mobility
App Deployment
Cloud
Planning/Strategy
Student Retention
UX
Cost
How important is the Internet of Things to your planning?
5% Not Important
19% Strategic Priority
23% Will Address Later
35% Part of BYOD Planning
47% Part of Normal Planning Process
Top Concerns Consuming Measurable IT Resources
71% Possibility of Network Breach
53% Running out of Bandwidth
36% User-Generated Wi-Fi Interference
31% Shadow IT and Rogue IT
Do You Offer Competency-Based Courses at Your School?
27% Not Sure
36% Yes
14% No
24% We are planning to in the future
Top
71%
Possibility
Networ
Breach
Role
Mana
Ins
How Do Yo
Flipped Class
Usage of Vide
Your School i
77% Moderate
20% Rapid Grow
3% Remain the
0% Will Diminish



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