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# **Five Keys to 21st Century Learning**





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## **Leadership Insights on Issues in Educational Technology**

### **MEET THE CONTRIBUTORS**



**John Campbell**, associate vice president for academic technologies, Purdue University

The latest trends in data analytics, learning infrastructure, and the drive for student success present new challenges for campus administrators and technologists. What practices and technologies should campuses implement to support 21st century learning? *Campus Technology* spoke with two higher education leaders to gain their insight.



**Phil Ice**, vice president of research and development, American Public University System

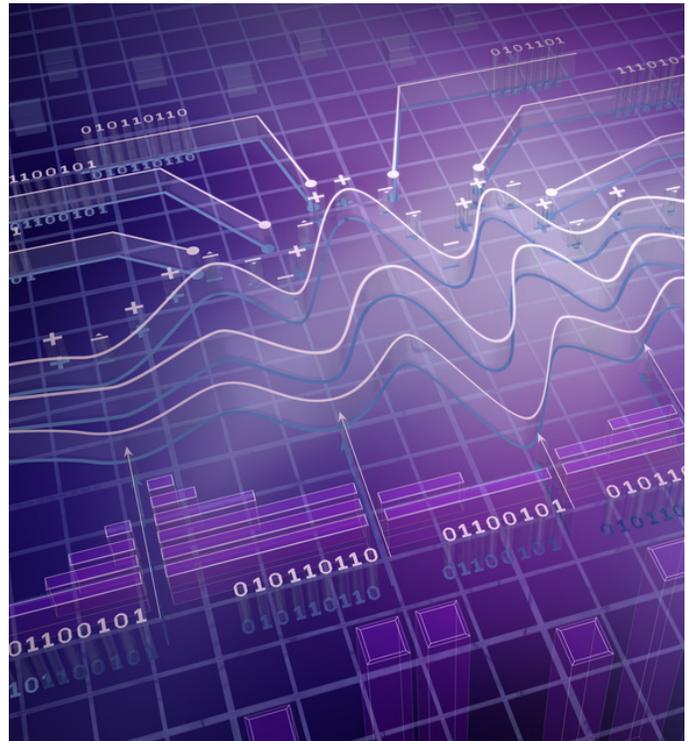


**John Mullen**, vice president and general manager, Education, State and Local Government, Dell



**Big data is a hot topic on today's campuses. The aggregation and analysis of large amounts of data in university systems present both a challenge and an immense opportunity to impact student success. What do university leaders need to know about data analytics and data management to improve student outcomes and meet institutional goals?**

**JOHN CAMPBELL:** The use of analytics has demonstrated the potential to improve student success on campuses ([itap.purdue.edu/learning/tools/signals](http://itap.purdue.edu/learning/tools/signals)). Institutions should consider analytics a process of gathering, predicting, acting, monitoring, and refining based on the data they have. While many focus on data collection and developing predictive models, the key to a successful project is the **actions** that are taken based on the analytics. These actions should occur in near real-time, be connected to the current activities within the course, and provide multiple avenues for students to get help. Projects based on this model have been shown to improve student success and overall retention. As institutions consider the "big data" challenge, they should first identify the large amount of data stored within the student information system as well as online instructional tools such as the learning management system and clickers. In addition, institutions should examine potential new data sources from emerging tools and services such as online tutorials and e-textbooks, which have the potential to provide additional insights to student success. Some of this data might be located on campus, while other emerging data sets could come from various institutional partners.



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The degree of transparency that comes with big data is unprecedented. Nearly two decades ago, management scholar Peter Drucker warned that the biggest change for academia was that the academy would become accountable. With the advent of big data, it is now possible for extremely granular levels of inquiry to occur. For administrators this means being able to not only examine student-focused data points, but also view the institution through the lens of empirical efficacy. This degree of transparency will make stakeholders at all levels extremely nervous, if not prompt outright faculty revolts. Thus, managing transparency and weighing results is a task that administrators must manage.

**PHIL ICE:** University leaders need to be aware of two primary issues when thinking about the role of big data in their institutions. First, the aggregation of data is far more difficult than the analysis. While much has been made of sophisticated methodologies for predicting factors that influence student success and retention, even basic statistical techniques can yield enough information to keep administrators and advisors busy for years. The real challenge is to federate the disparate data sets that exist across the university. Siloed data stacks and turf battles over who owns data make meaningful analysis extremely difficult at most institutions. Administrators must learn what data types are relevant and exercise the political will to engage in large-scale federation and data warehouse activities.



**TECHNOLOGY INSIGHT FROM DELL:** Virtually every aspect of the education system generates data. And when used effectively, we know that it has the potential to pinpoint effective teaching strategies and interventions, as well as enable increased accountability and transparency. It even has the potential to reach students from the moment they express interest in attending a school to retaining them throughout their education and onto becoming alumni. However, we know that acquiring the rich data is just one part of the process. We must also incorporate sound data management and governance strategies that will accompany the proper knowledge transfer to empower university leaders and faculty in critical decision making processes. By understanding how to effectively collect, store, analyze, and share many different types of data—including new data and metadata types such as social media and social collaboration activity data—institutions can develop predictive analytics, combine it with traditional education intelligence, and turn it into actionable knowledge. We also know this is helping universities reduce costs and increase efficiencies. We're pleased to work with universities to build high-efficiency Education Data Management (EDM) environments, powered by Intel and to specifically provide master data management and data governance, data warehousing and in-memory computing, education intelligence, and an education data portal.

## What role does infrastructure—particularly networking and storage—play in providing a platform that enables 21st century learning?

**JOHN CAMPBELL:** Since the mid-1970s, with the introduction of the first personal computers, the promise of computer-assisted learning has focused on the ownership of a particular device running a particular application. Today's learning platforms need to focus on learner mobility—students being able to actively engage on topics from whatever device they are currently using (phone, tablet, or computer), wherever they are located. This approach requires new storage and networking solutions that include ubiquitous access and adaptability to the nature of the workload. Learners need

to be able to create, manage, and reform collaborative groups that might include people inside and outside formal learning organizations. Faculty members need environments in which they can provide mentoring and feedback captured on different devices, but stored in a larger learning portfolio. The challenge not only includes the “quantity” of the service (i.e., bandwidth and storage), but the security and access mechanisms for students to share, create, and collaborate across many different types of users (e.g., peers at their institution, informal colleagues around the world, etc.).

**PHIL ICE:** I believe that this question has been made almost irrelevant with the advent of cloud-based data centers. The ability to virtualize infrastructure at a

fraction of the cost of on-premises implementations has changed the way that we look at infrastructure. Having the ability to throw up a new instance for any system in a matter of minutes and provide virtually infinite failover for high-capacity systems, dramatically changes the way that IT departments serve the university. However, if CIOs are ultra-conservative and refuse to adapt to this new reality, then their institutions will be destined to be laggards and pay multiples of what progressive institutions do for the same services.

**TECHNOLOGY INSIGHT FROM DELL:** Digital content is changing the landscape of learning, enabling learning to now take place beyond a lecture hall or even a campus—on any day and at any time. We also know that digital content means increased data that needs to be stored and accessed electronically. This is driving requirements for universities





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to take a hard look at their storage and data access capabilities. Students, faculty, and staff expect easy, fast access to digital content. All the while, universities also need to provide secure access from a broad range of computers and mobile devices that will, at the same time, safeguard privileged information. To accommodate data growth, protect and retain data, and provide the flexibility for change, we see university leaders looking for opportunities to cost-effectively enhance existing storage and data access capabilities with limited resources. We see an important first step in this process is to conduct a readiness assessment. A readiness assessment will show you what your current infrastructure looks like, help you to focus in on the challenges you are trying to solve, identify how to best leverage your current technology as well as where you may need to supplement—in other words you will have a blueprint or roadmap that can help you be better prepared today and into the future.

## **Certain technologies—like lecture capture—are emerging as key to a 21st century learning platform. What are some innovative ways that campuses can use lecture capture to step up the teaching and learning experience?**

**JOHN CAMPBELL:** Many campuses are exploring the “flipped” classroom approach to improve student success (*blogs.itap.purdue.edu/learning/2012/02/24/flippedclassroom*). Lectures are captured by the faculty member [outside of class] and made available to students online. Students can review the content, take notes, and sometimes take a small quiz to check for understanding. During the “traditional” classroom time, students focus on solving problems as individuals and in small groups. This provides a period of active engagement where the faculty can provide guidance on misconceptions or difficult concepts. The “flipped classroom” approach focuses on integrating a number of Chickering and Gamson’s *Seven Principles of Good Practice*, including improving student-to-faculty and student-to-student interactions, and providing prompt feedback. Many institutions that have explored the flipped classroom approach have found better learning gains compared to typical lecture approaches. Lecture capture is one technology that can provide the basis for this approach.

**PHIL ICE:** Recording entire lectures is highly inefficient. Very few students have the attention span to watch an entire lecture online. However, skilled instructional designers can edit segments of lectures and combine them with rich resources to create high-quality interactive materials that are appropriately chunked.

**TECHNOLOGY INSIGHT FROM DELL:** Lecture capture enhances and extends existing instructional activities, whether in face-to-face, online, or blended learning environments. It works especially well in subject areas where students can benefit from recast viewing for remediation, as when complex information is discussed or formulas are written on a board. The video-on-demand portion of lecture capture allows students to closely examine the steps of a demonstrated procedure or stop and focus on important actions often found in complex discussions, such as explaining math algorithms or science experiments. Lecture capture may enable freer thinking—students who find themselves struck by a particular comment or point can pursue that line of thought, confident that the lecture itself can be reviewed later.

Lecture capture technology adapts to multiple input locations so that professors and instructors or guest lecturers can present from any location that has adequate capture equipment. At the same time, lecture capture conforms easily to a variety of content delivery models—video podcasts, mobile devices, laptops. This level of flexibility provides convenience for students, offering remarkable fluidity with course timetables to coordinate work and study schedules.

Lecture capture affords new flexibility in the course of study for the student as well. Allowing students to access archives of recorded lessons would enable a student to cross disciplines to watch a math lecture on calculus, and an economics



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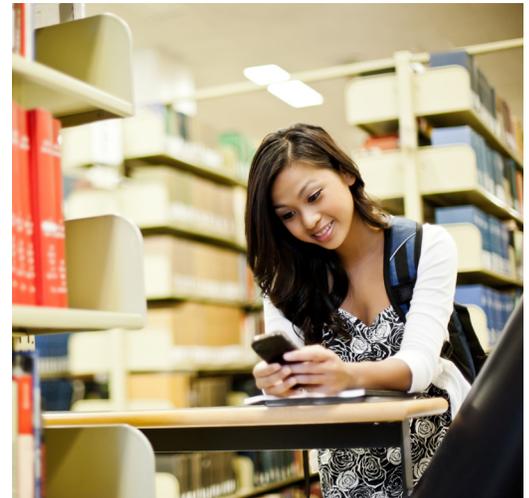
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lecture on Net Present Value for instance, that supports a project/paper or presentation on the development of new thinking about consumer products pricing. Lecture capture provides new educational opportunities—for distributed learning students as well as students studying abroad, residential students in face-to-face or blended courses.

**Students are arriving on campus with diverse learning styles and needs. Yet the process for identifying, acquiring, and supporting tools for accessibility puts pressure on a university's infrastructure and manpower. How do you currently provide accessible technologies for your students?**

**JOHN CAMPBELL:** People are the key to moving the institution forward in providing accessible technologies. With the diversity of learning styles and needs on campuses today, having key staff in place with a strong understanding of the issues is critical. Both students and staff benefit from a thorough understanding of the capabilities and limitations of new technology. Students and staff should be afforded the opportunity to provide input on new technology decisions (for purchasing or when developing new applications). This might take a number of forms. Some institutions, for instance, may create a center to support the institution, such as Purdue's Assistive Technology Center ([itap.purdue.edu/learning/support/atc](http://itap.purdue.edu/learning/support/atc)). Other colleges or universities may choose to actively involve staff or students in the process of reviewing technology purchases through advisory committees or other methods.

**PHIL ICE:** We are a fully online institution. Therefore, students must possess the required technologies to enroll with us. As part of our admissions process we provide guidelines on how systems may be optimized for access. However, ultimately students must ensure that the devices they use to access their courses are appropriately configured. That said, we are engaging in a number of initiatives that are geared at making content platform-agnostic. This process utilizes a variety of technologies to detect the device type and OS that a student is using, and then serves content up in an appropriate fashion. Admittedly, we are not yet at platform neutrality, but we are diligently working not only on the technical side of this problem but also on the design side vis-a-vis form-factor optimization. Providing content in a consumable manner does not mean it will be effective. To ensure meaningful impact, extensive UI/UX testing—grounded in cognitive psychology—must occur. Through this process, form factors account for more than just the device, they account for the underlying learning processes.



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**TECHNOLOGY INSIGHT FROM DELL:** We believe that every student can learn and should have the support and means to reach their full potential. Many times technology can be an integral piece of this support. Text-to-speech software, closed captioning, magnifying screens, and touch-screen monitors help students engage on campus and everyday life activities by facilitating communication and enabling access to the world around them. We do know that making sure you have a best-in-breed set of technology on your campus can sometimes be a challenging process. From making sure you have the proper planning and management to streamline the process, to learning how to use it in ways that benefit each student's unique needs. To obtain the right mix of special hardware and software, we also know that your faculty must manage a procurement process that involves multiple purchase orders to different vendors. We're so happy to help make this process easier by offering our Dell Assistive Technology Services, powered by Intel. Our team, led by a former special education teacher, has selected some of the best solutions out there and has them packaged and ready to implement on your campus. The team facilitates the implementation and even offers training and instructional and technical support to ensure the students' needs are met.



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## **Higher education faculty members are increasingly taking on a bigger role to ensure that the institution meets its learning outcomes. What kinds of professional tools, student engagement strategies, and resources do faculty need to be on top of student achievement?**

**JOHN CAMPBELL:** Faculty members are a critical piece to implementing new approaches that improve student success. Institutions should consider launching projects that focus on course transformation, such as Purdue's IMPACT project ([purdue.edu/impact](http://purdue.edu/impact)). By bringing together staff with educational technology, instructional design, library, distance education,



and assessment backgrounds, institutions provide faculty with the support framework needed to design, implement, and measure changes based on new approaches. The time and support focused on student success is essential for producing sustainable change throughout the institution. In addition, as information technology leaders, we need to explore new methods that support and empower faculty members to make new changes. This might include introducing new approaches from other institutions or developing new technologies such as the work done by the Purdue Studio ([itap.purdue.edu/studio](http://itap.purdue.edu/studio)).

**PHIL ICE:** In the online environment—our area of focus—there must be a realization that technology and pedagogy are inexorably intertwined and continually evolving. As such, faculty cannot be content to rest upon their laurels, delivering stagnant lectures that are the hallmark of the traditional university. Faculty must learn to continually adapt to the changing environment and stay current on evolving teaching

and learning practices and implementations. Notably, much of this responsibility must be shouldered by the institution. Developing robust faculty learning centers and continuing education programs is key to dissemination of critical information surrounding emerging trends. New faculty members should thoroughly immerse themselves in the online environment to ensure that they engage in best practices from the outset. Centers for teaching and learning, instructional design awareness-building, and emerging technology centers are classic examples of the support structures that enable faculty success.

**TECHNOLOGY INSIGHT FROM DELL:** When students are provided with opportunities to interact with each other in a variety of ways, their learning is enhanced. Many exciting applications of information technology in schools validate that new technology-based models of teaching and learning have the power to dramatically improve educational outcomes. The key question is how to scale-up the scattered, successful “islands of innovation” that instructional technology has empowered into the universal improvements that have been enabled by major shifts in standard educational practices, including those solutions that enable innovation in curriculum; pedagogy; assessment; professional development; administration; learning incentives; as well as partnerships for learning among schools and universities, businesses, homes, and community settings.

Encouraging student participation in today's learning environment requires careful thought around key student engagement strategies such as providing multiple avenues for learning—online learning should include varied opportunities to learn



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new skills or content concepts; developing a compelling digital story line, with more challenging activities that match or exceed a face-to-face learning environment; propelling students toward inquiry and discovery or experiential learning; and introducing activities that encourage interaction and problem solving. Finally, developing relevant and alternative activities to traditional learning are keys. We believe this requires a comprehensive plan to address the key components with resources and technology, such as lecture/less capture, social networking tools and critical thinking applications all delivered with an orchestration of hardware and software management, seamless delivery and management, service and support, and finally asset management and professional development.

*\* Participation in this interview does not imply endorsement of Dell.*

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