

WHITEPAPER

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VIRTUAL CLASSROOM:

Leveraging Concepts of Virtualization to Deliver
Student Labs and Online Assessments





INTRODUCTION

Fueled by current economic conditions, colleges and universities are experiencing an unprecedented surge in enrollment. Online education and programs offering technical degrees and certification are particularly attractive to new students, as evidenced by leaders like ITT Education Services, Inc., which reported a 33.5% enrollment increase in Q2 2009.¹ While this spike presents exciting new growth opportunities, it also underscores an escalating challenge: how to efficiently and effectively meet the demands of a growing student population.

To accomplish this, institutions of higher education are turning to virtualization, one of the hottest technologies in IT infrastructure.² By deploying virtualization, and particularly virtual desktop labs, schools can provide IT students with superior learning experiences that prepare them for an increasingly connected—and digitally mediated—civic life. Virtualization also eliminates the need to maintain and manage large, expensive systems across several campuses, giving colleges and universities a scalable, cost-effective solution that supports next-generation learning, assessment, and development.

This whitepaper reveals how colleges and universities can leverage virtual labs (vLabs), or virtualization technology, to improve operational efficiencies, reduce overhead and technology-related expenses, and position themselves as leaders in the higher education sector. Ultimately, institutions will learn how to harness the power of virtualization to revolutionize performance-based assessments by capturing, disseminating, and refining information faster—and more efficiently—than ever before, thereby becoming models of higher education that attract more students, employers, and accrediting and funding bodies.

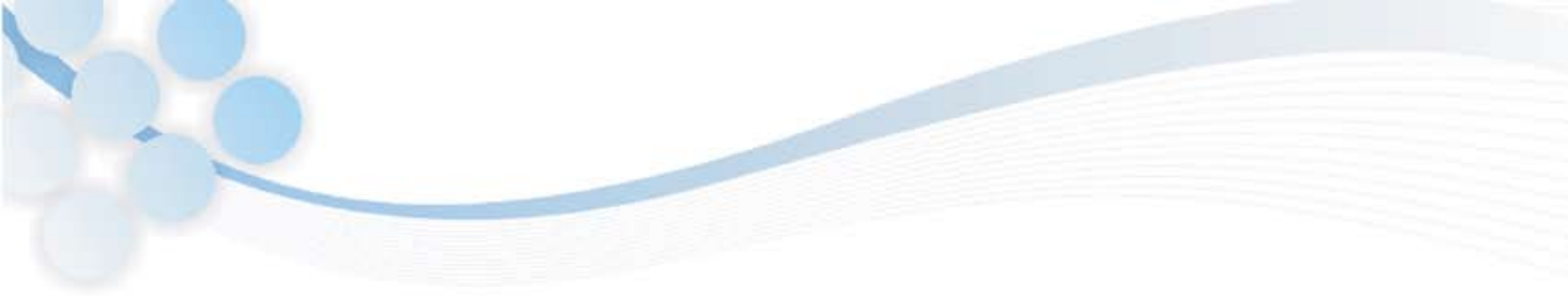


UNIVERSITY IT LAB TRENDS

While the concept of virtualization is growing in popularity, schools seem reluctant to integrate true, hands-on virtual lab technology into their infrastructure. As Cathy Davidson writes in *The Future of Learning Institutions in a Digital Age*, “Institutions of higher learning have changed more slowly than the modes of inventive, collaborative, participatory learning offered by the Internet and an array of contemporary mobile technology.”³ Self study and e-learning courses do utilize technology to give students greater flexibility, but this asynchronous method of study does not facilitate active participation. And online collaborative learning, which extends beyond self-study to include web-based conferencing tools and allows students to participate with their peers, still fails to engage students in a way that can boost retention rates.^{4, 5}

To encourage active participation among students—and thus boost retention—institutions need to foster a virtual environment that gives students hands-on experiences and allows them to assess and master the skills necessary to thrive in the “real world.”

To encourage active participation among students—and thus boost retention—institutions need to foster a virtual environment that gives students hands-on experiences and allows them to assess and master the skills necessary to thrive in the “real world.” Some colleges and universities have launched experimental forms of virtualization—with successful results. In 2007, Professor Ed Lamoureux of Bradley College started a course entitled *Field Research Methods in Second Life*, which was conducted entirely in the virtual world format of the popular game *Second Life*.³ Monroe College also integrated *Second Life* into its curriculum, requiring most students to complete one or two full semester internships through the virtual internship program. This interactive learning portal proved so successful, interns cultivated networking opportunities that, in two cases during the program’s first year, led to employment.⁶



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All of this is made possible through virtualization, a trend that continues to grow—and is sure to escalate—for institutions of higher learning as well as the field of Information Technology itself. According to a 2006 Gartner Special Report, “Virtualization is the highest impact trend changing infrastructure and operations through 2012. It will change how you manage, how and what you buy, how you deploy, how you plan, and how you charge.”⁷ A 2008 Citrix survey, conducted at the annual EDUCAUSE conference in Orlando, Florida, indicates that an overwhelming percentage of higher education IT experts are interested in adding virtual desktop delivery to their institution’s virtualization profile.⁸ And research firm IDC predicts that 45 percent of servers will be virtualized by the end of 2009—a 23 percent jump from just 18 months prior.⁹

Virtualization, which essentially allows multiple servers to fit on one machine, enables colleges to increase server utilization and thus reduce the manpower and resources needed to manage and maintain several servers across disparate campuses. In addition to giving students greater flexibility with 24/7 access, virtualization also requires lower operating costs than traditional methods of IT deployment. As a result, colleges and universities gain the freedom to test and refine new courses without having to maintain physical labs or costly upgrade equipment.

Businesses have already seen impressive savings through virtualization. According to a recent IDC study, 88 percent of U.S.-based organizations saved 20 percent of capital expenditures by employing virtualization.¹⁰ This holds true for institutions of higher education that were early adopters of virtualization. Art Gloster, vice president for information services at Bryant University, reported that the school saved an estimated \$35,000 in the four years since implementing virtualization technology.¹¹

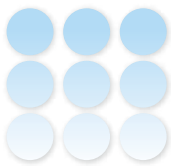


vLabs technology offers far-reaching benefits that can help institutions accomplish this by keeping pace with the business sector and preparing students for real-world scenarios.

What businesses have realized is that the exchange of ideas no longer relies on the contiguity of time and space; learning and innovation are happening all the time—through online portals and collaborative sites—and success now hinges on the ability to foster and capture the best of those myriad ideas. This is all made possible by deploying virtualization strategies and technologies. If colleges and universities are to continue to produce employable graduates who are not only adept, but also capable of transforming these technologies, they have to mirror the evolution happening in the business world. Essentially, they must revitalize current forms of learning to show students how to leverage virtual channels to thrive in a connected, collaborative environment.

vLabs technology offers far-reaching benefits that can help institutions accomplish this by keeping pace with the business sector and preparing students for real-world scenarios. Colleges and universities will be able to capture the significant cost-savings that several organizations and, increasingly, institutions of higher education, are realizing. By providing anytime, anyplace access for students in a way that fosters participatory learning, and allowing colleges and universities to centralize hardware, save on administrative and capital costs, and achieve faster ROI, vLabs can give schools the next-generation solutions they need to adapt to a more connected, digitized world.

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VLABS BENEFITS:

Increased Innovation

- Real-time lab environment
- Reduced costs compared to traditional IT infrastructure
- Delivers scenarios based on Microsoft, Cisco, Linux, and other systems

Enhanced, Experiential Learning

- Hands-on virtual environments replicate a real-life working environment
- Scalable 24/7 access to live networking hardware and software
- Gives students scheduling flexibility/self-paced learning environment

Improved Assessments

- Allows for real-time feedback
- Facilitates more responsive educational environment

HOW VLABS WORKS:

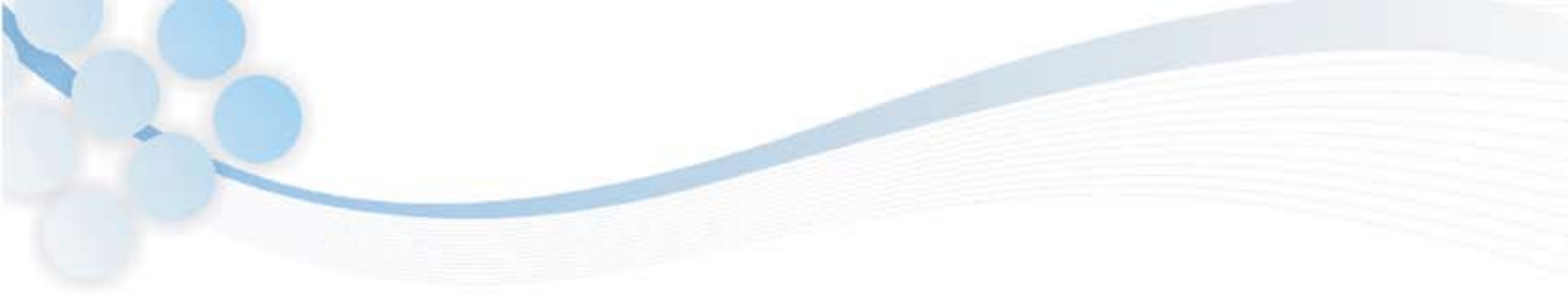
vLabs provides a dedicated, real-time lab environment without the risks of costly technological investments associated with traditional IT deployment. Instead of relying on several servers running across various physical locations, vLabs provides a dedicated, real-time lab environment without the risks of costly technological investments associated with traditional IT deployment. Instead of relying on several servers running across various physical locations, vLabs servers are hosted in a single data center. The schools themselves are not required to maintain the infrastructure.

Below is a brief overview of the vLabs process:

- Students are free to choose when to use vLabs, which typically run for 60 minutes
- Every vLab includes a detailed breakdown of objectives to be met and tasks to be completed
- Instructors can choose to provide real-time virtual assistance
- Students can verify results at the end of labs by using a self-assessment feature
- Lab reports with students' responses and embedded screenshots are sent to instructors for grading



Figure 1: vLab embedded within a course.



Clearly then, vLabs will enhance student learning in a way that benefits not only the learners, but also the employers who hire them, and the colleges and universities that provided them with the innovative, translatable education designed to meet real-world expectations.

STUDENT EXPECTATIONS

Studies show that experiential learning enables students to retain more knowledge than they do in lecture-based environments.¹² This heightened retention gives students the confidence they need to individually perform complex tasks in the workplace—and increases the likelihood that graduates will not require extensive on-the-job training. This is why colleges and universities must move beyond environments that merely simulate an actual IT environment, such as e-learning and passive online collaboration, if they want to adequately prepare their students for real-world applications, working scenarios and work place success.

Hands-on IT experiences—the crucial ingredient in cultivating confident, highly skilled professionals—are central to vLabs. With the benefit of real-time interaction, students can quickly assess their own skills, strengths, and weaknesses, and work on areas that need improvement prior to graduation. As Lucinda Willis, assistant professor of technology and training at Indiana University of Pennsylvania points out, IT students can leverage virtual training to “prove they can do hands-on stuff before they learn how to

assist someone [as part of a corporate help desk].” She uses this analogy: “It’s like when you learn to bake a cake—you can’t do anything unless you prove that you understand what all the measurement tools are.”⁴

Looking back on Monroe College’s Second Life internship program, one can see how experiential-based learning translates into employability with little training required. According to Professor John McMullen, who helped pioneer the program, this technology put students at the cutting edge: “They won’t only be doing research, but they’ll be developing tools that will make them more employable.”¹³

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IT LAB CHALLENGES IN HIGHER EDUCATION

There are of course myriad challenges presented by traditional IT labs and large-scale technology deployment. These include physical limitations such as having an inadequate number of desktops to serve a growing student population, resource limitations that prevent 24/7 maintenance and lab support for students, and prohibitive costs that must compete with shrinking budgets. Deploying complex vertical IT systems at multi-campus schools is expensive, and puts colleges and universities in a vulnerable position: how can school administrators decide between the value of rolling out the latest technology versus the costly overhead required to do so? Will they have the resources to manage a wide range of operating systems and applications? And if they do implement large, complex systems, can they risk losing their sizeable investment if the system fails?

While there are no hard and fast answers to any of these questions, schools that utilize virtualization will no longer need to grapple with these tough decisions. In the aforementioned 2008 Citrix study, higher education professionals cited “computer lab challenges” as one of the most important virtualization issues facing colleges and universities today. Of the respondents, 62 percent believed that deploying virtual computer labs would help address this issue by reducing the costs associated with maintaining physical lab equipment. Additionally, more than half agreed that virtualization would “make their institution more competitive,” presumably because such a technology would simplify the delivery of semester-based instructional applications and resources.⁸

A DYNAMIC PERFORMANCE ASSESSMENT TOOL

Teachers have the difficult task of performing as both coach and non-judgmental mentor, and being equally adept at scrutinizing student performance to see if they “measure up” or “make the grade.” This challenge is exacerbated by inefficient assessment techniques, requiring teachers to conduct labor-intensive grade logging and maintain a question bank for thousands of test items.

While aligning student outcomes with course objectives is an ongoing challenge, the fact that most institutions still rely on pen and paper testing only makes things worse. As Cathy Davidson points out, educational institutions are still “holding desperately to the fragments of an educational system, which, in its form, content, and assessments, is deeply rooted in an antiquated mode of learning.”³

Below is an illustration of the current method of imparting in-class assessments:

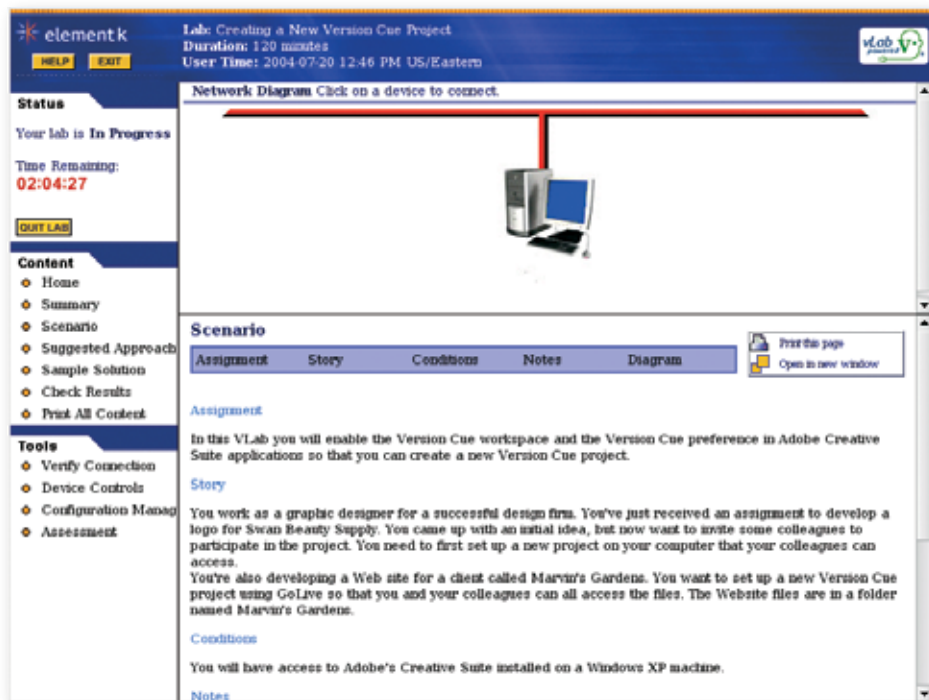
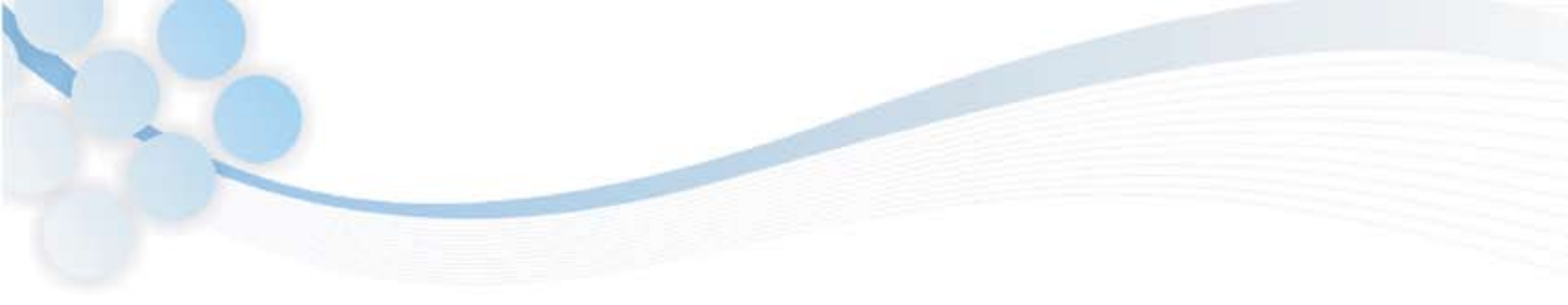


Figure 2: A Microsoft vLab in progress



How can schools meet a constantly evolving student body or report accurate assessment figures to accreditation boards when depending on archaic technology?

With vLabs, students can see whether they are meeting course expectations, instructors can ensure that course curriculum is aligned with lab and overall school objectives, and institutions can determine the effectiveness of any program—and remain accountable for educational quality.

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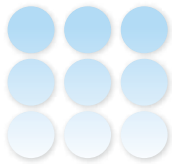
A case in point centers on Professor Bill Reay at Ohio State University, who uses virtualization technologies to not only assess student performance, but his own. He says that being able to constantly monitor student test results and even communicate with them via interactive forums or sessions is “a great way for me to get a sense of how many students understand a particular concept before I move on. It helps me get a sense of what needs explaining, and helps them understand everything as best they can.”⁴

This method allows teachers and students to communicate in entirely new ways, revealing how students really live up and respond to course expectations as opposed to referencing static, letter grades that can’t reflect the full “story” of learning. As Trent Batson put it in his article *Why Do We Assess?*, “If our entire assessment ... started with students telling more of their story in a way that lends itself to building data structures, the entire system would produce much more valuable information for researchers, assessment experts, institutional research offices, and accrediting agencies.”¹⁴

vLabs can bring this “storytelling” process to life. While the aforementioned benefits of vLabs would be attractive to any organization, this technology goes beyond providing enhanced learning for students and reduced institutional expenses. It also provides a revolutionary approach to performance-based assessments that results in more valuable educational experiences for students and faculty, curriculum that’s better aligned with institutional objectives, and finally, poises the school to receive increased funding and achieve greater profitability.

THE ASSESSMENT PROCESS

vLabs eliminate the tedious tasks associated with traditional pen and paper assessment practices. With anytime, anyplace access, teachers can manage proctored exams without having to physically disseminate and collect tests, and painstakingly grade and log results. These labs can be integrated into online offerings or with on-campus courses for a blended learning platform that fosters deeper student engagement.



This process helps teachers capture near real-time information about student performance, while also allowing students to monitor and assess their own strengths and pinpoint areas which may need improvement. Because this process is essentially instantaneous, both students and faculty are provided with real skills-based assessment—vital for thriving in today's digitized world.

How the vLabs assessment process works:

- 1) Student lab reports are delivered to the instructor upon lab completion.
- 2) Teachers can determine a grade for each student based on individual lab reports that reflect student performance.

Below is an illustration of system-based assessments:



Figure 3: Opening a remote console window for Microsoft device



SIX BENEFITS VLABS PROVIDES FOR HIGHER EDUCATION INSTITUTIONS

We have already seen how businesses have reaped significant cost-savings advantages by deploying virtualization across organizations. And while educational institutions operate in a similar manner to most businesses, they face additional complex challenges such as finding ways to manage massive amounts of information, serving an influx of hundreds or thousands of students every few months, and constantly having to refurbish or replace technology for new students each year.

Colleges and universities can overcome these challenges through the use of vLabs, which allow them to:

1. Enhance student learning environment
2. Gain a competitive edge in the IT education market
3. Drive new enrollment
4. Improve assessments
5. Reach profitability goals faster
6. Attract funding by implementing “greener” technologies

Enhance Student Learning Environment

The average attrition rate in higher education is a whopping 50 percent. To combat this, many colleges and universities invest in minimal software upgrades or implement procedural changes in an attempt to better connect with students—both with lackluster results. By integrating vLabs into the curriculum, schools can establish continuous contact with IT students in a simple, cost-effective way that improves the learning experience. With experiential-based learning, students are more inclined to engage and remain dedicated to completing their courses of study.

Because vLabs are customizable, schools are free to decide how vLabs are designed, thereby ensuring brand integrity and maintaining the ability to embed their unique pedagogy within the technological framework. This consistency and strength in branding will help students internalize what makes the school uniquely valuable, and increases the likelihood that they will make a stronger, more engaged effort in all academic—and, consequently, all work-related—pursuits.

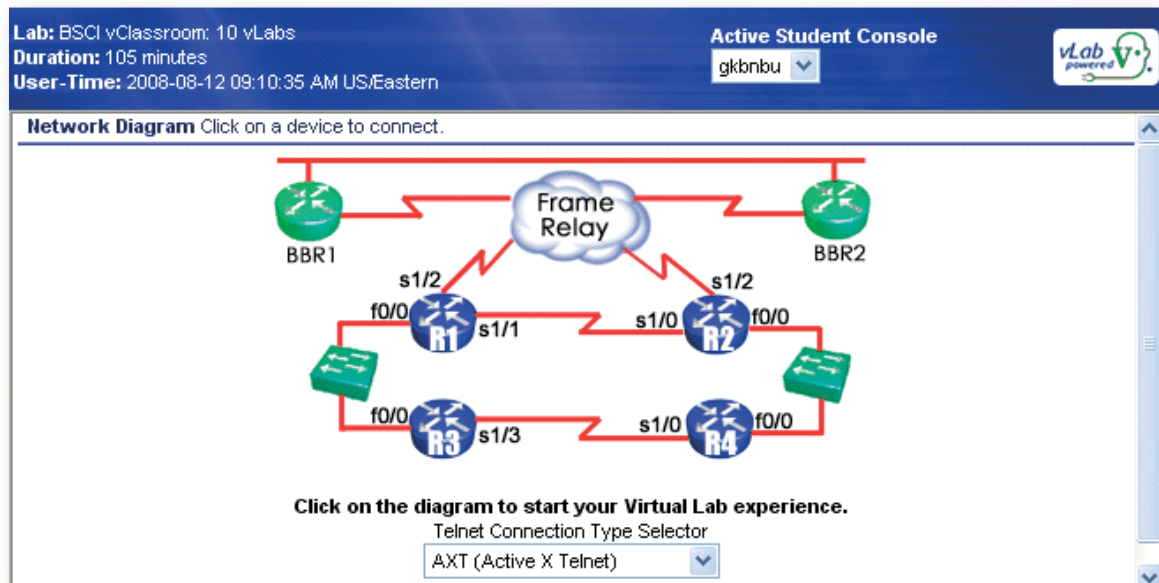


Figure 4: A Cisco vLab in progress



Gain a Competitive Edge in the IT Education Market

Remaining competitive is especially critical during turbulent economic times. Schools that can attract and retain students in downward or stagnant economies can continue to boost their reputation, which in turn increases the likelihood of continued funding from private and/or public resources. And institutions that can adequately prepare students for integrated and collaborative working situations produce more employable students, which, in turn, garners more positive attention from not only accreditation and funding bodies, but top-tier employers that increasingly turn toward these institutions to find future employees. An added benefit includes a reduction in IT and equipment expenditures, which can help make institutions more competitive.

Drive New Enrollment

Having state-of-the-art technology drives growth by attracting IT-savvy students. As they are already immersed in technology, students of the millennial generation are drawn to schools known for their high-tech capabilities and ability to prepare students for IT positions. vLabs brings colleges and universities up to speed by integrating the latest technologies in dynamic new ways that heighten hands-on learning experiences.

Improve Assessments

“What gets measured gets our attention, gets funding, and gets taught.”¹⁵ That statement, made by The Center for Public Policy in Higher Education in 2006, is an axiom by which institutions of higher learning must operate. Particularly now, in an era of increasing scrutiny and shrinking budgets, providing evidence that a school’s pedagogical goals are being met is critical. vLabs allows colleges and universities to capture student performance, assess whether course objectives are being met, and refine courses to better meet the needs of a rapidly expanding and often widely dispersed student population. All of this can happen in near real-time, allowing schools to make changes that quickly boost performance, and ultimately, garner the necessary funding and accreditation to thrive in an increasingly competitive market.



Reach Profitability Goals Faster

Because of the relatively low expenses associated with vLabs deployment, schools can reduce technology, equipment, and personnel expenditures. In addition to lowering IT, hardware, and administrative costs, colleges and universities can also decrease licensing costs. This, combined with increased student attraction and retention through cutting-edge technology, helps institutions do what might seem impossible in today's economy: meet or even exceed revenue and profitability goals.

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Attract Funding By Implementing Greener Technologies

Increasingly, grants and other sources of funding are becoming available to organizations and institutions that implement sustainable technologies into their infrastructure. The Kresge Foundation, a private, national organization, is awarding grants to colleges and universities that build environmentally sustainable facilities; the U.S. Environmental Protection Agency provides funding for institutions that integrate environmental initiatives; businesses and organizations like the Student Conservation Society (sponsored by NBC) and BP have designed energy grants and greening contests. As the paradigm has shifted to recognize and reward organizations and institutions that make a commitment to sustainable practices and technologies, it is likely that this trend toward funding green initiatives will continue.

Institutions can capitalize on this trend by deploying vLabs, as unlike most large-scale IT deployment, vLabs is both cost-effective and green. Because it provides a centralized service, vLabs requires less energy than heavily energy-dependent technologies dispersed across disparate networks, thus reducing CO2 emissions. Colleges and universities can not only cut costs by integrating vLabs technology, but can also be recognized as leaders in green technology and attract more funding from eco-conscious businesses and organizations.



CONCLUSION

Meeting the demands of digitally adept student population requires new technologies that break traditional paradigms. Schools are still largely operating on the same foundations—with the same technologies—as they have since the first university was established more than 200 years ago. By implementing a vLab model for hands-on training and education, institutions of higher education can shatter those boundaries and create dynamic new ways of engaging with, assessing, and preparing students for a successful transition into the working world. Ultimately, colleges and universities can broaden and streamline technology program offerings, reduce overhead associated with IT expansion and maintenance with less risk than traditional IT-related investments, and prepare our next generation of leaders by constantly refining curricula with radically improved performance-based assessments.

To learn more about vLabs, please visit:

- vLab online demo: http://knowledge.elementk.com/keycode/dm_offerprice_presentation.jsp?keycode=DEMOVLAB44320933
- <http://niit.com/LearningSolutions/Learning%20SolutionforHigherEducationInsituations/Pages/VirtualLabs.aspx>



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ABOUT VENKAT SRINIVASAN

Venkat Srinivasan has over 15-years experience in business strategy, new business development, strategic relationship management, and operations in the education and training industry. His insight into the business of higher education, and experience designing and developing learning and student retention solutions for institutions truly set him apart from others in his field. Venkat started out as part of the NIIT faculty, and went on to design and develop various new programs, including increasing student retention and reducing attrition rates by 50%. Venkat now works as Vice President for NIIT.

- Look out for his blog - <http://www.niit.com/highereducationblog/default.aspx>.



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