

## Creating Effective Digital Learning Environments for Higher Education

### Part One

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*I never teach my pupils; I only attempt to provide the conditions in which they can learn.*

*– Albert Einstein*

## **JUSTIFICATION FOR PROGRAMMATIC CHANGE: UNDERSTANDING THE NEED**

Each year our institutions of higher education are being called to serve increasing numbers of newly-enrolled students who have lived their entire lives surrounded by and interacting with digital tools to gather and process information. These students—“Digital Natives”—have grown up using computers, handheld digital assistants, videogames, digital music players, video cameras, and cell phones to gather and process the information that they use to construct their own understanding of the world (Prensky, 2001a). Information and Communication Technology (ICT) has become so integral to our students’ lives they actually rely on these tools to help them think and learn. Digital Natives expect to be able to use ICT in every aspect of their lives, all the time. So it is no surprise that Digital Natives are not well served by traditional lecture-based modes of teaching alone (Barth, 2001).

Digital Natives entering institutions of higher education expect ICT to be effectively integrated into their learning experiences and they want to be able to access it all from anywhere, at anytime. To meet this need, many colleges and universities are now providing ICT-enriched courses for students who are required to bring student-owned mobile devices with them for classroom use. Additionally, institutions of higher education are now offering courses that combine elements of online learning and face-to-face instruction, known as “blended” courses. A systematic search of the research literature from 1996 through July 2008—*Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies (2009)*—found that students who took either all or part of their instruction online performed better than those taking the same course through traditional face-to-face instruction. These positive results appeared consistent for all types of higher education, undergraduate and graduate, across a range of disciplines. This is notable given that many colleges are reporting that blended instruction is among the fastest-growing types of enrollment.

According to U.S. Secretary of Education Arne Duncan, the study reinforces that “effective teachers need to incorporate digital content into everyday classes and consider open-source learning management systems, which have proven cost effective in school districts and colleges nationwide.” Revolutionary solutions like DyKnow Software combine sound teaching with intuitive technology to help teachers maximize class time and foster collaboration while also minimizing electronic distraction (Berque, 2006). Open-Source E-Learning applications are also a good fit for institutions that are capable of supporting implementation, and commercial options are available now for institutions requiring more support. In light of this information and in response to the influx of Digital Natives into the nation’s institutions of higher education, traditionally-structured educational classrooms are giving way to new collaborative, ICT-enhanced learning environments where all members of the learning community have input in deciding what to learn, how to best create this new knowledge, and what technologies they should use to support the process. Emerging Information and Communication Technologies enable Digital Natives to get connected, construct knowledge in a personally meaningful way, and demonstrate their intellectual competence and creativity using a variety of modalities (Stager, 2005b).

In short, ICT provides the conditions in which Digital Natives learn.

## **READY OR NOT, HERE THEY COME.**

***The spread of digital technology into every other sector of society makes it inevitable that it will eventually permeate school. Eventually, every student—and most pre-school children—will have more computing power than any professor of computer science has today.***

***Indeed, already most home computers have more power than any professor had thirty years ago. And when children grow up with this kind of knowledge-technology it is inconceivable that school will not change very radically.***

***So the choice is not whether we will consider deep changes in school but how many children will be lost before we recognize that we have to do so.***

Excerpted from Vision for Education: The Caperton-Papert Platform,  
by Seymour Papert and [Gaston Caperton](#), 1999.

Interestingly, it is the influx of Digital Natives into our K-16 learning environments that is providing much of the impetus for educational reform today. Let's face it, it's getting harder and harder to ignore the fact that the Digital Natives are coming. Ready or not, here they come. Many have already arrived in our institutions of higher education and many, many more are on their way. Students entering into higher education are accustomed to and are demanding the kinds of active learning experiences that are now possible because of the technology that has become so much a part of these students' collective second nature.

Forward-thinking decision-makers in higher ed are opting to put in place mandatory technology requirements so every member of the learning community can use tablet PCs or notebooks to take notes, solve problems, share solutions during class, and to review and replay their notes after class. Dave Berque, a DePauw professor who uses this approach, recently saw failure rates drop from 14% to 1% after introducing tablets into his introductory computer science classroom (Berque, D., Konkle, M. & Reed, R., 2009). Now that ICT is so integral to the world of education and because mobile computers are quite affordable, durable and portable, educators in institutions of higher education from every discipline are embracing an unprecedented opportunity to build upon the unique skills, attitudes and interests of today's digitally savvy learners. Together, faculty members and their students are developing creative ways to maximize the potential that technology brings to increase student achievement in higher education.

## ***A TEST OF LEADERSHIP: CHARTING THE FUTURE OF U.S. HIGHER EDUCATION***

The United States Secretary of Education brought together a panel of leaders from business, instructional technology and higher education to assess the current state of academia and to develop a comprehensive national strategy for the future of postsecondary education. The commission produced their findings in a report entitled "A Test of Leadership: Charting the Future of U.S. Higher Education." Through this report, the commission called for leaders from the business community to become "directly and fully engaged with government and higher education leaders in developing innovative structures for delivering 21st-century educational services—and in providing the necessary financial and human resources for that purpose (U.S. Department of Education, 2006)." In response, educational learning communities are being formed that draw on the complementary expertise of stake-holders from education, business and government to usher in a new era of public-private partnership in education to ensure that our colleges and university programs remain viable, and that our future workforce gains the knowledge and skills necessary for continued U.S. competitiveness. These new collaborative digital learning environments are being powered by advanced

software and technologies that bring greater performance and greater productivity by automatically adapting to each user's unique needs. Teachers, business leaders, policy makers and students can now decide what to learn, how to best create their new knowledge and which technologies they should use to support the process.

Educational leaders are leveraging the potential that ICT offers to achieve new educational objectives that provide the framework of a world-class education. As a result, competent, digitally literate graduates are proving themselves to be inventive thinkers, self-directed learners, and effective communicators who are well prepared to succeed academically, personally and professionally. The effective use of Information and Communication Technologies in higher education not only sets a new standard of excellence in education, but also ensures the ongoing viability of the higher education program, engages today's Digital Natives, improves student achievement and enables graduates to walk into their futures with all the tools they need for success: Digital age literacy, inventive thinking, effective collaboration and communication skills and high productivity abilities.

### ***DOES TECHNOLOGY IMPROVE LEARNING?***

We know that our students are accustomed to using ICT, and that students who participate in blended courses perform better than other students, but does technology actually improve learning? This question is at the very heart of institutional decisions related to investing in technology-infused learning programs (Preparing Tomorrow's Teachers to Use Technology, 2005).

During the past quarter-century, just as the first Digital Natives have been making their way through the nation's public school system, our understanding of how people learn has advanced tremendously. Research in neurobiology, social psychology, and learning science suggests that these new students actually think and process information fundamentally differently from their predecessors (Prensky, 2001b).

In *How People Learn: Brain, Mind, Experience, and School*, the authors affirm that the Internet provides an ideal learning environment that allows users to learn by doing, to receive feedback, to refine understanding and build new knowledge, and to visualize difficult concepts through modeling and visualization software (Bransford, 1999). When used effectively, technology has great potential to enhance student achievement and enables instructors to bring exciting curricula based on real-world problems into the university classroom. Technology provides both the scaffolding and the tools needed to enhance learning and can provide students and faculty more opportunities for feedback, reflection, and revision. ICT provides opportunities to build communities of learners that include university faculty, deans, and administrators, university students, local and international practicing scientists, researchers, and business people.

*The Milken Exchange on Educational Technology* examined five large-scale studies of educational technology to distinguish positive and negative findings (Milken Exchange on Educational Technology, 1999). The conclusion was that students with access to computer assisted instruction, integrated learning systems technology, simulations and software that teach higher order thinking, design and programming technologies ("smart software"), and/or collaborative networked technologies showed positive gains in academic achievement.

The CEO Forum of Education and Technology's *Key Building Blocks for Student Achievement in the 21st Century* asserts that the definition of student achievement must be broadened to include the 21st century skills that will be required for students to thrive in the global economy. In the same ways that technology has helped to revitalize American business, education technology offers great promise for improving education (CEO Forum on Education and Technology, 2001).

Students with routine access to ICT score higher in writing assessments, demonstrate better analytical skills, collaborate more, and have a higher rate of graduation (Preparing Tomorrow's Teachers to Use Technology, 2005).

And as noted earlier, *Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies* (2009) found that students who took either all or part of their instruction online performed better than those taking the same course through traditional face-to-face instruction. Students who took “blended” courses— those that combine elements of online learning and face-to-face instruction— appeared to achieve the highest. Because blended instruction is among the fastest-growing types of enrollment for many colleges, it is important to recognize that much of the success in blended learning online can be attributed to time engaged in the lesson, rather than to the technology itself. In the case of online learning, ICT affords the student an “expansion of learning time” that is difficult or impossible to achieve with face-to-face instruction. According to the report, “Studies in which learners in the online condition spent more time on task than students in the face-to-face condition found a greater benefit for online learning” (U.S. Department of Education, 2009b).

## ***INFORMATION AND COMMUNICATION TECHNOLOGIES: CURRENT TRENDS AND TECHNOLOGIES TO WATCH***

### ***TRENDS: THE HORIZON REPORT 2010***

Each year The New Media Consortium and the EDUCAUSE Learning Initiative releases its annual *Horizon Report*. The Horizon Project charts the current trends for emerging technologies within the context of teaching, learning and creative inquiry. To create the *2010 Horizon Report*, the 47 members of this year's international Advisory Board conducted a comprehensive review and analysis of research, articles, papers, blogs, and interviews to determine the potential relevance of the topics to teaching, learning, research, or creative inquiry.

The following four trends emerged and are ranked below according to how significant an impact they are likely to have on education in the next five years for the period 2010 through 2015. In addition, three technologies to watch are listed.

#### ***1. Mentoring Digital Natives and technology-mediated learning***

The abundance of resources and relationships made easily accessible via the Internet is increasingly challenging us to revisit our roles as educators in sense making, coaching, and credentialing. Institutions must consider the unique value that each adds to a world in which information is everywhere. In such a world, sense making and the ability to assess the credibility of information are paramount. Mentoring and preparing students for the world in which they will live, the central role of the university when it achieved its modern form in the 14th century, is again at the forefront. Universities have always been seen as the gold standard for educational credentialing, but emerging certification programs from other sources are eroding the value of that mission daily (Johnson, L., Levine, A., Smith, R., & Stone, S., 2010).

#### ***2. Mobile Computing and The Personal Web***

Mobile computing the use of the network-capable devices students are already carrying, is already established on many campuses virtually all higher education students carry some form of mobile device, and the cellular network that supports their connectivity continues to grow. An increasing number of faculty and instructional technology staff are experimenting with the possibilities for collaboration and communication offered by mobile computing. Devices from smart phones to netbooks are portable tools for productivity, learning, and communication, offering an increasing range of activities fully supported by applications designed especially for mobiles.

People expect to be able to work, learn, and study whenever and wherever they want to. Life in an increasingly busy world where learners must balance demands from home, work, school, and family poses a host of logistical challenges with which today's ever more mobile students must cope. A faster approach is often perceived as a better approach, and as such people want easy and timely access not only to the information on the network, but to their social networks that can help them to interpret it and maximize its value. The implications for informal learning are profound, as are the notions of "just-in-time" learning and "found" learning, both ways of maximizing the impact of learning by ensuring it is timely and efficient (Johnson, L., Levine, A., Smith, R., & Stone, S., 2010).

#### ***3. Cloud Computing***

The technologies we use are increasingly cloud-based, and our notions of IT support are decentralized. The continuing acceptance and adoption of cloud-based applications and services is changing not only the ways we configure and use software and file storage, but even how we conceptualize those

functions. It does not matter where our work is stored; what matters is that our information is accessible no matter where we are or what device we choose to use. Globally, in huge numbers, we are growing used to a model of browser-based software that is device-independent. While some challenges still remain, specifically with notions of privacy and control, the promise of significant cost savings is an important driver in the search for solutions (Johnson, L., Levine, A., Smith, R., & Stone, S., 2010).

4. ***The expansion learning time through flexible, life-long learning and dual-mode program delivery systems***

The work of students is increasingly seen as collaborative by nature, and there is more cross-campus collaboration between departments. While this trend is not as widespread as the others listed here, where schools have created a climate in which students, their peers, and their teachers are all working towards the same goals, where research is something open even to first year students, the results have shown tantalizing promise. Increasingly, both students and their professors see the challenges facing the world as multidisciplinary, and the need for collaboration great. Over the past few years, the emergence of a raft of new (and often free) tools has made collaboration easier than at any other point in history (Johnson, L., Levine, A., Smith, R., & Stone, S., 2010).

### ***THREE TECHNOLOGIES TO WATCH: THE HORIZON REPORT 2010***

#### **Mobile Computing**

Time-to-Adoption Horizon: One Year or Less

The available choices for staying connected while on the go are many — smart phones, netbooks, laptops, and a wide range of other devices access the Internet using cellular-based portable hotspots and mobile broadband cards, in addition to wi-fi that is increasingly available wherever people congregate.

#### **Open Content**

Time-to-Adoption Horizon: One Year or Less

The movement toward open content reflects a growing shift in the way academics in many parts of the world are conceptualizing education to a view that is more about the process of learning than the information conveyed in their courses. Information is everywhere; the challenge is to make effective use of it. Part of the appeal of open content is that it is also a response to both the rising costs of traditionally published resources and the lack of educational resources in some regions, and a cost-effective alternative to textbooks and other materials. As customizable educational content is made increasingly available for free over the Internet, students are learning not only the material, but also skills related to finding, evaluating, interpreting, and repurposing the resources they are studying in partnership with their teachers.

#### **Electronic Books**

Time-to-Adoption Horizon: Two to Three Years

As the technology underlying electronic readers has improved and as more titles have become available, electronic books are quickly reaching the point where their advantages over the printed book are compelling to almost any observer. The convenience of carrying an entire library in a purse, pocket, or book bag appeals to readers who find time for a few pages in between appointments or while commuting. Already firmly established in the public sector, electronic books are gaining a foothold on

campuses as well, where they serve as a cost-effective and portable alternative to heavy textbooks and supplemental reading selections.

## CONCLUDING THOUGHTS

*The more powerful technology becomes, the more indispensable good teachers are.*  
– Michael Fullan

When asked about the Department of Education's "Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies (2009)," Lawrence N. Gold, director of higher education at the American Federation of Teachers, said in an interview with Inside Higher Ed's [Scott Jaschik](#), "This report correctly recognizes that online learning and blended learning are growing components of higher education and, employed properly, can play a significant role in promoting student learning." And while he notes that further public investment in experimentation and technology is certainly warranted, Dr. Gold concludes that "successful education has always been about engaging students whether it is in an online environment, face to face or in a blended setting. And fundamental to that is having faculty who are fully supported and engaged in that process as well."

As powerful advances in ICT like DyKnow software solutions and pen-based mobile devices powered by Intel's newest processors enable our multi-tasking Digital Natives to accomplish more in less time, thought leaders from education supported by an on-going collaboration with business and government partners can now more easily implement revolutionary approaches to reaching students, engaging them in learning and preparing them for careers in the 21st century.

## NEXT MONTH

- Leadership and Vision for Success
- Necessary Conditions to Effectively Leverage ICT For Learning In Higher Education
- Introduction, Launch and Implementation of Your Digital Learning Environment
- Challenges and Planning for Programmatic Sustainability

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