

Key Emerging Technologies for Postsecondary Education

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From the 2010 Horizon Report: Postsecondary Level

The annual Horizon Report describes the continuing work of the New Media Consortium's Horizon Project, a qualitative research project established in 2002 that identifies and describes emerging technologies likely to have a large impact on teaching, learning, or creative inquiry on college and university campuses within the next five years. The Report is produced as part of an ongoing collaboration between the New Media Consortium (NMC) and the EDUCAUSE Learning Initiative (ELI), an EDUCAUSE program. The 2010 Advisory Board, like those before it, considered a broad picture of emerging technology and its intersection with the academic world through a close examination of primary sources as well as through the lens of their own experiences and perspectives.

Key Trends

Trends are surfaced through an extensive review of current articles, interviews, papers, and new research. The list of trends is ranked according to how significant an impact they are likely to have on education in the next five years. The following four trends have been identified as key drivers of technology adoptions for the period 2010 through 2015:

- *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. 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

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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.

- *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 logistical challenges for today's ever more mobile students. Faster is often perceived as better, and people want easy, timely access both to information on the network and to their social networks. The implications for informal learning are profound, as are the notions of "just-in-time" learning and "found" learning.

- *The technologies we use are increasingly cloud-based, and our notions of IT support are decentralized.* The continuing adoption of cloud-based applications and services is changing the ways we configure and use software and file storage, and even how we conceptualize those functions. What matters is that our information is accessible no matter where we are or what device we choose to use. We are growing used to a model of browser-based software that is device-independent. While some challenges still remain, specifi-

cally with notions of privacy and control, the promise of significant cost savings is an important driver in the search for solutions.

- *The work of students is increasingly seen as collaborative by nature, and there is more cross-campus collaboration between departments.* Where schools have created a climate in which students, their peers, and their teachers all work towards the same goals, where research is something open even to first year students, the results have shown tantalizing promise. 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.

Critical Challenges

Critical challenges that face learning organizations are drawn from a careful analysis of current events, papers, articles, and similar sources, as well as from the personal experience of the Advisory Board members in their roles as leaders in education and technology. Challenges ranked as most significant in terms of their impact on teaching, learning, and creative inquiry are listed in the order of importance:

- *The role of the academy—and the way we prepare students for their future lives—is changing.* In a 2007 report, the American Association of Colleges and Universities recommended strongly

that emerging technologies be employed by students in order for them to gain experience in “research, experimentation, problem-based learning, and other forms of creative work.” The academy must adapt teaching and learning practices to meet the needs of today’s learners; to emphasize critical inquiry and mental flexibility, and provide students with necessary tools for those tasks; to connect learners to broad social issues through civic engagement; and to encourage them to apply their learning to solve large-scale complex problems.

- *New scholarly forms of authoring, publishing, and researching continue to emerge but appropriate metrics for evaluating them increasingly and far too often lag behind.* Citation-based metrics, to pick one example, are hard to apply to research based in social media. New forms of peer review and approval, such as reader ratings, inclusion in and mention by influential blogs, tagging, incoming links, and retweeting, are arising from the natural actions of the global community of educators, with increasingly relevant and interesting results.

- *Digital media literacy continues its rise in importance as a key skill in every discipline and profession.* But training in digital literacy skills and techniques is rare in teacher education programs. In higher education, the lack of formal training is

being offset through professional development or informal learning, but we are far from seeing digital media literacy as a norm. This challenge is exacerbated by the fact that digital literacy is less about tools and more about thinking, and thus skills and standards based on tools and platforms have proven to be somewhat ephemeral.

- *Institutions increasingly focus more narrowly on key goals, as a result of shrinking budgets in the present economic climate.* Schools are challenged to support a steady—or growing—number of students with fewer resources and staff. In this atmosphere, it is critical for information and media professionals to emphasize the importance of continuing research into emerging technologies as a means to achieve key institutional goals.

Technologies to Watch

The six technologies featured in each *Horizon Report* are placed along three adoption horizons that indicate likely time frames for their entrance into mainstream use. Note that the *Horizon Report* is not a predictive tool. It is meant, rather, to highlight emerging technologies with considerable potential for teaching, learning, and creative inquiry. Each of them is already the focus of work at a number of innovative institutions around the world, and the work we showcase here reveals the promise of a wider impact.

Key Emerging Technology for Postsecondary Education

On the **near-term horizon**—within the next 12 months—are *mobile computing* and *open content*.

• **Mobile computing**—use of the network-capable devices students are already carrying—is already established on many campuses, although before we see widespread use, concerns about privacy, classroom management, and access will need to be addressed. 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 offer an increasing range of activities fully supported by applications designed especially for mobiles.

• **Open content** is the current form of a movement that began nearly a decade ago, when schools like MIT began to make their course content freely available. Today, there is a tremendous variety of open content, which represents a profound shift in the way students study and learn. The open content movement is a response to the rising costs of education, the desire for access to learning in areas where access is difficult, and an expression of student choice about when and how to learn.

In the **second adoption horizon**—two to three years out—we will begin to see widespread adoptions of *electronic books* and *simple augmented reality*. Both of these technologies are entering the mainstream of popular culture; are already used at a surprising number of campuses; and are expected to see much broader use across academia over the next two to three years.

• **Electronic books** have been available in some form for nearly four decades, but the past 12 months have seen a dramatic upswing in their acceptance and use. Convenient and capable electronic reading devices combine the activities of acquiring, storing, reading, and annotating digital books, making it very easy to collect and carry hundreds of volumes in a space smaller than a single paperback book. Electronic books promise to reduce costs, save students from carrying pounds of textbooks, and contribute to the environmental efforts of paper-conscious campuses.

• **Simple augmented reality** refers to the shift that has made augmented reality accessible to almost anyone. Augmented reality used to require specialized equipment, none of which was very portable. Today, applications for laptops and smart phones overlay digital information onto the physical world quickly and easily. Augmented reality is establishing

a foothold in the consumer sector, and in a form much easier to access than originally envisioned.

On the **far-term horizon**—four to five years—are *gesture-based computing* and *visual data analysis*.

• **Gesture-based computing** is already strong in the consumer market and we see a growing number of prototypical applications for training, research, and study, though this technology is still some time away from common educational use. Devices controlled by natural movements of the finger, hand, arm, and body are becoming more common. Game companies in particular are exploring the potential offered by consoles that require no handheld controller, but instead recognize and interpret body motions. As we work with

devices that react to us instead of requiring us to learn to work with them, our understanding of what it means to interact with computers is beginning to change.

• **Visual data analysis**, a way of discovering and understanding patterns in large data sets via visual interpretation, is currently used in the scientific analysis of complex processes. Visual data analysis is an emerging field, a blend of statistics, data mining, and visualization, that promises to make it possible for anyone to sift through, display, and understand complex concepts and relationships. ■

For details on the technologies discussed briefly in this condensation, download the complete 2010 Horizon Report at www.nmc.org/pdf/2010-Horizon-Report.pdf.



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