



THE HORIZON REPORT

2007 EDITION

a collaboration between
The NEW MEDIA CONSORTIUM
and the
EDUCAUSE Learning Initiative
An EDUCAUSE Program

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EXECUTIVE SUMMARY

The annual *Horizon Report* describes the continuing work of the NMC's Horizon Project, a research-oriented effort that seeks to identify and describe emerging technologies likely to have a large impact on teaching, learning, or creative expression within higher education. The *2007 Horizon Report* is the fourth edition in this annual series. Again this year, as in years past, the report reflects an ongoing collaboration between the New Media Consortium and the EDUCAUSE Learning Initiative (ELI), an EDUCAUSE program.

The core of the report describes six areas of emerging technology that will impact higher education within three adoption horizons over the next one to five years. To identify these areas, the project draws on an ongoing conversation among knowledgeable persons in the fields of business, industry, and education; on published resources, current research and practice; and on the expertise of the NMC and ELI communities. Many of the examples under each topic area feature the innovative work of NMC or ELI member institutions. The Horizon Project's Advisory Board surveys the field to identify significant trends and challenges in higher education, investigates possible topics for the *Report*, and ultimately directs the selection of the six topics that appear here.

The focus of the Horizon Project centers on the applications of emerging technologies to teaching, learning, and creative expression, and the format of the *Horizon Report* reflects that focus. Each topic includes an overview to familiarize readers with the concept or technology at hand, a discussion of the particular relevance of the topic to those activities, and examples of how the technology is being or could be applied. Each description is followed by an annotated list of additional examples and readings which expand on the discussion in the *Report*.

Key Trends

As it does each year, the Horizon Advisory Board again reviewed key trends in the practice of teaching, learning, and creativity, and ranked those it considered most important for campuses to watch. Trends were identified through a careful analysis of interviews, articles, papers, and published research. The six trends below emerged as most likely to have a significant impact in education in the next five years. They are presented in priority order as ranked by the Advisory Board.

- *The environment of higher education is changing rapidly.* Costs are rising, budgets are shrinking, and the demand for new services is growing. Student enrollments are declining. There is an increasing need for distance education, with pressure coming not only from nontraditional students seeking flexible options, but from administrative directives to cut costs. The "shape" of the average student is changing, too; more students are working and commuting than ever before, and the residential, full-time student is not necessarily the model for today's typical student. Higher education faces competition from the for-profit educational sector and an increasing demand by students for instant access and interactive experiences.
- *Increasing globalization is changing the way we work, collaborate, and communicate.* China, India, and other southeast Asian nations continue to develop skilled researchers and thinkers who contribute significantly to the global body of knowledge and whose work fuels much innovation. Additionally, globalization of communication, entertainment, and information provides students with wider perspectives and resources than ever before, placing them in a new and continually changing learning space.

- *Information literacy increasingly should not be considered a given.* Contrary to the conventional wisdom, the information literacy skills of new students are not improving as the post-1993 Internet boomlet enters college. At the same time, in a sea of user-created content, collaborative work, and instant access to information of varying quality, the skills of critical thinking, research, and evaluation are increasingly required to make sense of the world.
- *Academic review and faculty rewards are increasingly out of sync with new forms of scholarship.* The trends toward digital expressions of scholarship and more interdisciplinary and collaborative work continue to move away from the standards of traditional peer-reviewed paper publication. New forms of peer review are emerging, but existing academic practices of specialization and long-honored notions of academic status are persistent barriers to the adoption of new approaches. Given the pace of change, the academy will grow more out of step with how scholarship is actually conducted until constraints imposed by traditional tenure and promotion processes are eased.
- *The notions of collective intelligence and mass amateurization are pushing the boundaries of scholarship.* Amateur scholars are weighing in on scholarly debates with reasoned if not always expert opinions, and websites like the Wikipedia have caused the very notion of what an expert is to be reconsidered. Hobbyists and enthusiasts are engaged in data collection and field studies that are making real contributions in a great many fields at the same time that they are encouraging debate on what constitutes scholarly work—and who should be doing it. Still to be resolved is the question of how compatible the *consensus sapientum* and the wisdom of the academy will be.
- *Students' views of what is and what is not technology are increasingly different from those of*

faculty. From small, flexible software tools to ubiquitous portable devices and instant access, students today experience technology very differently than faculty do, and the gap between students' view of technology and that of faculty is growing rapidly. Mobile phones, to name just one example, are very different tools to students than to faculty; rather than being mere tools for voice communication, these devices store music, movies, and photos, keep students in touch with their friends by text and voice, and provide access to the wider world of the Internet at any time.

Critical Challenges

The 2007 Horizon Project Advisory Board also considered critical challenges facing higher education over the five-year time period described in this report, and there were many identified. The six challenges listed below were ranked as most likely to impact teaching, learning, and creative expression in the coming years, and appear in priority order as determined by the Advisory Board.

- *Assessment of new forms of work continues to present a challenge to educators and peer reviewers.* Both at the student and at the professional level, assessment is lagging behind creative work. Learning that takes place in interdisciplinary, context-rich environments such as games and simulations is still difficult to evaluate. Capturing a portfolio of work, when much of that work takes place in new media forms like blogs, podcasts, and videos, poses a problem for learners and for professors seeking tenure.
- *There are significant shifts taking place in scholarship, research, creative expression, and learning, and a profound need for leadership at the highest levels of the academy that can see the opportunities in these shifts and carry them forward.* At few points in the history of the academy has there been an opportunity to really impact the ways in which learners and scholars

interact. We are seeing the convergence of many new ideas on how we work, learn and interact, and it will take visionary leadership to see and capitalize on these shifts. At the same time, few leaders are following critical trends such as those listed in the previous section, and fewer still are speaking out on the issues that accompany them. The thoughtful perspectives of university presidents, provosts, and other learning-focused leaders, for example, could temper the moral panics that hamper effective conversations on critical topics such as digital rights, online safety, and access. Needed changes in faculty reward, promotion, and tenure processes will almost certainly not occur without visionary leadership.

- *While progress is being made, issues of intellectual property and copyright continue to affect how scholarly work is done.* Intellectual property law presents a number of challenges to institutions of higher education. As universities amass more and more digital material, they need to find ways to protect existing copyright, safely share material, and address issues of digital ownership to meet their legal obligations and their own interests as holders of intellectual property. Additionally, while remixing content is a rising trend, it is unclear what is acceptable and what infringes on the rights of the original creator.
- *There is a skills gap between understanding how to use tools for media creation and how to create meaningful content.* Although new tools make it increasingly easy to produce multimedia works, students lack essential skills in composition, storytelling, and design. In addition, faculty need curricula that adapt to the pace of change and that teach the skills that will be needed—even though it is not clear what all those skills may be.
- *The renewed emphasis on collaborative learning is pushing the educational community to de-*

velop new forms of interaction and assessment. Collaborative work continues to be a critical component of scholarly activities. The phenomenon of social networking is a direct response to this challenge, as the educational community is finding ways to connect and contribute using social networking tools. Collaborative experiences in virtual worlds, massively multiplayer games, and emerging forms of scholarly work are also on the horizon.

- *Higher education is facing a growing expectation to deliver services, content and media to mobile and personal devices.* The expectation of anytime, anywhere access has not diminished. We are beginning to see examples of university services and content delivered to mobile phones, and this trend will increase as students put pressure on campuses to offer meaningful content via mobile devices.

These challenges and trends reflect the changing nature of the way we seek, classify, and perceive information, all crucial activities in teaching, learning, and creative expression. They provide a framing perspective with which to consider the possible effects of the six technologies described in this edition of the *Horizon Report*.

Technologies to Watch

The technologies featured in the *2007 Horizon Report* are placed along three adoption horizons that represent what the Advisory Board considers likely timeframes for their widespread adoption on university campuses. The first adoption horizon assumes the likelihood of broad adoption within the next year; the second, adoption within two to three years, and the third, adoption within four to five years.

The two technologies that appear on this year's nearest adoption horizon, user-created content and social networking, are already established on many campuses, and examples are readily available. Those in the mid-term horizon, mobile phones and

virtual worlds, are not hard to find on campuses with leading-edge technologists and adventuresome faculty. Naturally, the farthest horizon contains the two least-adopted topics: new scholarship and emerging forms of publication, and massively multiplayer educational gaming; but even in this horizon practical examples exist, though they are still in development or in experimental stages.

In the body of the report, each featured technology includes specific examples, but as the horizon moves farther out in time these tend to be more isolated. Our research indicates that each of these six areas will have significant impact on college and university campuses within the next five years.

- **User-Created Content.** It's all about the audience, and the "audience" is no longer merely listening. User-created content is all around us, from blogs and photostreams to wikibooks and machinima clips. Small tools and easy access have opened the doors for almost anyone to become an author, a creator, or a filmmaker. These bits of content represent a new form of contribution and an increasing trend toward authorship that is happening at almost all levels of experience.
- **Social Networking.** Increasingly, this is the reason students log on. The websites that draw people back again and again are those that connect them with friends, colleagues, or even total strangers who have a shared interest. Social networking may represent a key way to increase student access to and participation in course activities. It is more than just a friends list; truly engaging social networking offers an opportunity to contribute, share, communicate, and collaborate.
- **Mobile Phones.** Mobile phones are fast becoming the gateway to our digital lives. Feeding our need for instant access, mobile phones are our constant companions and offer a connection to friends, information, favorite websites, music, movies, and more. From

applications for personal safety, to scheduling, to GIS, photos, and video, the capabilities of mobile phones are increasing rapidly, and the time is approaching when these little devices will be as much a part of education as a bookbag.

- **Virtual Worlds.** Customized settings that mirror the real world—or diverge wildly from it—present the chance to collaborate, explore, role-play, and experience other situations in a safe but compelling way. These spaces offer opportunities for education that are almost limitless, bound only by our ability to imagine and create them. Campuses, businesses, and other organizations increasingly have a presence in the virtual world, and the trend is likely to take off in a way that will echo the rise of the web in the mid-1990s.
- **The New Scholarship and Emerging Forms of Publication.** The nature and practice of scholarship is changing. New tools and new ways to create, critique, and publish are influencing new and old scholars alike. Although this area is farther out on the horizon, we are beginning to see what new publications might look like—and how new scholars might work.
- **Massively Multiplayer Educational Gaming.** Like their non-educational counterparts in the entertainment industry, massively multiplayer games are engaging and absorbing. They are still quite difficult to produce, and examples are rare; but steps are being taken toward making it easier to develop this kind of game. In the coming years, open-source gaming engines will lower the barrier to entry for developers, and we are likely to see educational titles along with commercial ones.

Not unlike last year, some of these topics will seem familiar to regular readers of the *Horizon Report*. Educational gaming, a mid-term horizon topic last year, appears here in two variants: virtual worlds and massively multiplayer educational gaming. Over the past year, it has become clear that these topics,

while related, are not simply two sides of the same coin. Virtual worlds are not games, but spaces where many sorts of activities might occur, most of them social. Massively multiplayer games sometimes take place in virtual worlds, but not always. They are more structured, with clear goals and objectives built in, and players interact with the setting in ways that are generally very different than the ways one might interact with the elements of an open-ended virtual world.

Mobile phones also make a reappearance, in the same horizon as last year but nonetheless a year closer. The networks to support them have arrived (or very nearly so), and the capabilities of phones have continued to increase at a rapid pace. Campuses are beginning to implement programs that provide every student with a cell phone, much as they have done with computers in the past. Clearly, the use of the mobile phone as an educational tool is becoming more widespread and accepted.

Social computing and personal broadcasting, topics from last year's report, have ties to this year's social networking and user-created content, but there are important differences. Social networking is more about connecting with the wider community, whereas social computing (now so well established that it has all but lost its name) has to do with tools that facilitate collaborative work. Personal broadcasting is one facet of user-generated content, and is likewise so commonplace just one year later that it is widely found on campuses in the form of scholarly blogs and podcasts.

We have watched these returning and related technologies move closer, develop offshoots that have moved faster or slower than their parent topics, and become so much a part of daily life that the technology is transparent and the content shines through. In the coming years, the same changes will influence the six topic areas selected for the *2007 Horizon Report*, and we will watch with interest their effect on campuses.

About the Horizon Project

Since the launch of the Horizon Project in March 2002, the NMC has held an ongoing series of conversations and dialogs with hundreds of technology professionals, campus technologists, faculty leaders from colleges and universities, and representatives of leading corporations. Each year, an Advisory Board considers the results of these dialogs and also looks at a wide range of articles, published and unpublished research, papers, and websites to generate a list of technologies, trends, challenges, and issues that knowledgeable people in technology industries, higher education, and museums are thinking about.

The project uses qualitative research methods to identify the technologies selected for inclusion in each annual report, beginning with a survey of the work of other organizations and a review of the literature with an eye to spotting interesting emerging technologies. When the cycle starts, little is known, or even can be known, about the appropriateness or efficacy of many of the emerging technologies for these purposes, as the Horizon Project expressly focuses on technologies not currently in widespread use in academe. In a typical year, 75 or more of these technologies may be identified for further investigation; for the 2007 report, more than 100 were considered.

By engaging a wide community of interested parties, and diligently searching the Internet and other sources, enough information is gathered early in the process to allow the members of the Advisory Board to form an understanding of how each of the discovered technologies might be in use in settings outside of academe, to develop a sense of the potential the technology may have for higher education settings, and to envision applications of the technology for teaching, learning, and creative expression. The findings are discussed in a variety of settings—with faculty, industry experts, campus technologists, and of course, among the Horizon Advisory Board. Of particular interest to the Advisory Board every year is finding educational applications

for these technologies that may not be intuitive or obvious.

To create the *2007 Horizon Report*, the 27 members of this year's Advisory Board engaged in a comprehensive review and analysis of research, articles, papers, and interviews; discussed existing applications, and brainstormed new ones; and ultimately ranked the items on the list of candidate technologies for their potential relevance to teaching, learning, and creative expression. Most of this work took place online over the fall of 2006, using a variety of tools, including a special wiki site and a set of *del.icio.us* links dedicated to the project. The *del.icio.us* tags are listed under the "Further Reading" section of each of the six topic areas, and readers are invited to view not only the resources that were listed in the report, but many others that were used in our research as well. Readers are further encouraged to add their own examples and readings to these dynamic lists by tagging them for inclusion in each category.

From the more than 100 technologies originally considered, the twelve that emerged at the top of the initial ranking process were further researched. Once this "short list" was identified, the potential applications of these important technologies were explored in greater detail by higher education practitioners who were either knowledgeable about them, or interested in thinking about how they might be used. A significant amount of time was spent researching applications or potential applications for each of the areas that would be of interest to practitioners.

Penultimately, each of these twelve was written up in the format of the *Horizon Report*. With the benefit of the full picture of how the topic would look in the report, the "short list" was then ranked yet again. The six technologies and applications that emerged are detailed in the sections that follow, and those descriptions are the final results of this process.

USER-CREATED CONTENT

Time-to-Adoption Horizon: One Year or Less

From classifying and tagging to creating and uploading, today's "audience" is very much in control of the content we find online. This active audience is finding new ways to contribute, communicate, and collaborate, using a variety of small and easy tools that put the power to develop and catalog the Internet into the hands of the public. The largest and fastest-growing websites on the Internet are all making use of this approach, which is redefining how we think about the web and how it might be applied to learning.

Overview

A little group of Web 2.0 technologies—tagging and folksonomic tools, social bookmarking sites, and sites that make it easy to contribute ideas and content—is placing the power of media creation and distribution firmly into the hands of “the people formerly known as the audience” (Rosen, 2006). No longer satisfied to be consumers of content, today’s audience creates content as well. Producing, commenting, and classifying are just as important as the more passive tasks of searching, reading, watching, and listening.

Sites like *Flickr*, *Odeo*, *YouTube*, *Google Video*, and *Ourmedia* make it easy to find images, videos, and audio clips, but the real value of these sites lies in the way that users can classify, evaluate, and add to the content that is there. Using simple interfaces, visitors can build shared collections of resources, whether they be links, photos, videos, documents, or almost any other kind of media. They can find and comment on items in other people’s lists, sharing not only the resources themselves but information and descriptive details about them.

The emergence of collective wisdom through tagging allows interesting materials to quickly float to the top and be found. Naturally, these materials are not necessarily at all related to learning or creativity, but the process does highlight what people are paying attention to. The challenge for us as educators is to figure out how to harness that power in a learning context.

Tasks that were difficult to do in the past—or that resulted in private collections on an individual computer—can now be done with a few clicks of the

mouse, on a shared site where others can see and benefit from them. The tools that make this possible are built from the ground up to enhance collaboration, and they are compatible with everything that we already use. Many are accessible via a web browser; even those that are run locally often take advantage of the browser’s always-available interface.

Pervasive use of these tools is already in evidence among students, and this will only grow in the coming months. The social aspects of these audience-centered technologies, firmly established as powerful tools for creative expression, offer great potential to build community in the context of teaching and learning as well. Nonetheless, we face a significant challenge as we seek to marshal these techniques in the service of education, as this aspect of the new web turns the traditional view of what a website should be on its head.

Relevance for Teaching, Learning, and Creative Expression

Using tools for creating and tagging content, teachers can foster collaborative work not only among their own students, but with colleagues, students, and community members from around the world. Tools like *del.icio.us* and *Flickr* have no classroom boundaries. Examples, commentary, and feedback are all available from a wide audience all the time.

Sites that allow easy upload of images, video, audio, and other media also provide students with a low-cost, low-risk means to publish their work as they develop their skills. Comparing their own work to that of others can give students a valuable perspective

on their own abilities and inspire them to try new ideas or techniques.

Another value of these tools for education may lie in their ability to connect people and facilitate work without the need to consult a central technology support center. Researchers, project groups, and study groups can select only the tools that they need and set them up on their own, often simply by agreeing to use one particular tool or another or creating “friends” lists with services they already employ. Inter-institutional collaboration has become more common, and these tools support the kinds of work that happens at a distance. These tools also lend themselves to classroom applications, providing a space where work begun in the classroom can be seamlessly carried on outside of class.

Yet another important aspect of these tools is their accessibility. Many are free and require nothing more than a web browser to use; interfaces are simple and similar to others we are already familiar with. Sites that allow users to upload content—even to edit it online—make it possible to work from any computer with an Internet connection, and for multiple users to access, view, and work on the same files. Issues of file format, operating system compatibility, disk storage space, and versioning, all of which can stand in the way of productive collaborative work at a distance, disappear when using server-based shared editing spaces.

A sampling of applications of user-created content across disciplines includes the following:

- **Create collaborative, student-authored resources.** These tools allow (and encourage) shared responsibility for development of course resources, links, and materials. Colleagues can cross institutional boundaries to collaborate on projects and research. Courses from chemistry to literature are already using tools like *del.icio.us* to create and share reference libraries of online articles, tools, and other resources.
- **Enable asynchronous public feedback on assignments.** Photography students at Rowan

University use *Flickr* to post, organize, share, and critique their colleagues’ work for each assignment. The professor provides feedback on the site to each student for each assignment, and an in-class critique brings the discussion into the classroom.

- **Give voice to communities and encourage idea sharing.** Invite your audience to share what they already know, as the leaders of a workshop at Wesleyan College did. Participants—and the community at large—were invited to tag relevant examples for inclusion in a *del.icio.us* list of applications of Web 2.0 technologies in categories including social bookmarking, podcasting, wikis, and blogging.

Examples of User-Created Content

The following links provide examples of user-created content applications.

ETEC 540 - Text Technologies (UBC)

weblogs.elearning.ubc.ca/textologies/links.html

The masters-level course *Text Technologies: The Changing Spaces of Reading and Writing* at the University of British Columbia uses a course blog that includes this list of resources, collaboratively built with social bookmarking tools.

PennTags

tags.library.upenn.edu

PennTags allows the University of Pennsylvania community to identify and organize web resources, journal articles, and online catalog content.

Uth TV

www.uthtv.com

Pronounced “Youth TV,” this is an online community of young people sharing original works of video, audio, and other media.

Zotero

www.zotero.org

Developed by the Center for History and New Media at George Mason University, *Zotero* is

a free, open source research tool that enables scholars to gather, annotate, organize, and share references via a web browser, and also provides export in standard citation formats.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about user-created content.

Folksonomies: Tidying Up Tags?

www.dlib.org/dlib/january06/guy/01guy.html

(Marieke Guy and Emma Tonkin, *D-Lib Magazine*, January 2006) This paper looks at what makes folksonomies work.

The People Formerly Known as the Audience journalism.nyu.edu/pubzone/weblogs/pressthink/2006/06/27/ppl_frmr.html

(Jay Rosen, *PressThink*, June 27, 2006) This “statement” from the people formerly known as the audience to the media industry describes the new audience and what they want—control of content.

Social Bookmarking: Mark It, Manage It, Share It www.acenet.edu/AM/Template.cfm?Section=Home&TEMPLATE=/CM/ContentDisplay.cfm&CONTENTID=16057

(Mary Beth Lakin, *American Council on Education Website*, June 2, 2006) This brief article describes social bookmarking and its implications for publishing, research, and education.

Time’s Person of the Year: You

www.time.com/time/magazine/article/0,9171,1569514,00.html

(Lev Grossman, *Time*, December 13, 2006) The entire web population shares in this year’s recognition by Time Magazine, citing the rise of user-generated content.

Using Social Software to Teach Social Software innovateonline.info/index.php?view=article&id=260

(Ulises Mejias, *Innovate*, June/July 2006) This article shares results of a graduate class on social software at Columbia University where students explored the field by using the tools and examines larger pedagogical implications for education. Requires free registration to access full text.

Web’s Second Phase Puts Users in Control education.guardian.co.uk/elearning/story/0,,1801086,00.html

(Steve O’Hear, *The Guardian*, June 20, 2006) This brief article discusses several web-based tools and describes potential applications to education.

del.icio.us: User-Created Content del.icio.us/tag/hz07+user_content

(*Horizon Project Advisory Board and Friends*, 2006) Follow this link to find additional resources tagged for this topic and this edition of the *Horizon Report*. To add to this list, simply tag resources with “hz07” and “user_content” when you save them to *del.icio.us*.

SOCIAL NETWORKING

Time-to-Adoption Horizon: One Year or Less

The expectation that a website will remember the user is well established. Social networking takes this several steps further; the website knows who the user's friends are, and may also know people that the user would like to meet or things the user would like to do. Even beyond that, social networking sites facilitate introduction and communication by providing a space for people to connect around a topic of common interest. These sites are fundamentally about community—communities of practice as well as social communities.

Overview

Undoubtedly the most pervasive aspect of Web 2.0, social networking is all about making connections and bringing people together. Conversations that take place in social networking contexts are inherently social, and often revolve around shared activities and interests. The heart of social networking is fostering the kinds of deep connections that occur when common pursuits are shared and discussed.

Students are tremendously interested in social networking sites because of the community, the content, and the activities they can do there. They can share information about themselves, find out what their peers think about topics of interest to them, share music and playlists, and exchange messages with their friends. Two of the best-known examples, *MySpace* and *Facebook*, have thousands of members who connect daily or hourly. Social networking services like *RateMyProfessors*—which allows young people to find out about professors from a student's perspective before they take a class—attract students by giving them a place to share their opinions and see what others have to say. These sites are frequently customizable and user-controlled; when you create a page on *MySpace*, you have complete control over what to show and who will see it, and how the page will look to you and to others.

Researchers note that online spaces like *Myspace* and *Facebook* give students a safe place to gather, in much the same way that young people of previous generations hung out at the burger joint, the roller rink, or the mall. Not all social networking sites are aimed at students, of course. *LinkedIn* is designed

for professionals, and *Flickr* is used by people of all ages, to name just two examples. Sites like these, though popular, are not the driving force behind the adoption of social networking in education, however. It is the intense interest shown by students that is bringing social networking into academia.

Social networking is already second nature to many students; our challenge is to apply it to education. Social networking sites not only attract people but also hold their attention, impel them to contribute, and bring them back time and again—all desirable qualities for educational materials.

Relevance for Teaching, Learning, and Creative Expression

Because of students' tremendous interest in social networking, colleges and universities are increasingly going to be seeking ways to employ the same strategies that make social networking sites so effective. Although there are not yet many institutional examples of social networking, there are easily dozens of examples that are familiar to students and used by them on a daily basis; institutional uses will emerge very quickly because these approaches clearly appeal to students.

Indications are clear that universities are turning their attention to this phenomenon. Centers like the Social Computing Lab at the Rochester Institute of Technology are beginning to examine the effects of social networking in education (see social.it.rit.edu). This and similar organizations are investigating the ways social networking is being used, evaluating existing tools, and even developing new ones.

Research and use of these systems are occurring in tandem, and both will contribute to the integration of social networking and education.

Another factor that will facilitate rapid adoption is the toolset. The selection of available tools is broad, with many open-source options readily available. It is increasingly easy to build social networking functions into any website; think of the *Google* home page, which allows users to include personal calendars, news, *Flickr* collections, and other modules simply by selecting them from a list. Educational tools are already being developed, including single-purpose tools like *CollegeRuled* (www.collegeruled.com), where students can quickly create class schedules and share them with friends, and bundled tools like *Elgg* (www.elgg.org), an open-source system that lets each user set up a blog, a web profile, an RSS reader, and a file repository with podcasting capabilities. Systems like *Elgg* offer an easy way to provide social networking options without a huge amount of work by providing hosted accounts or even entire private hosted communities. Such open-source systems can also be downloaded and installed on campus, providing a secure internal community site.

Social networking sites are among the fastest-growing, most-used sites on the Internet, and the features that make them so compelling are features that we need to understand and incorporate into higher education websites. The fact that so many students want these interactions and seek them out is a strong indication that we need to be very interested in them as well. The way these sites bring people together makes them powerful and exciting. This is the next step after portals: to harness the power of social networking to build rich, interactive, robust learning communities.

A sampling of social networking applications across disciplines includes the following:

- **Encourage community and self-expression.** Campus-based social networking sites offer a safe, convenient space for students to build

ties with community members and experiment with developing a public self. The University of Pennsylvania offers membership in *Pennster*, its social networking site, to incoming freshmen so that they can begin to get to know their classmates before arriving on campus.

- **Offer immersion in a foreign language environment.** Students learning another language can join a community in that language, where they will be exposed to conversational and colloquial reading and writing, learn about daily life, and establish friendships with native speakers. The *MIXXER* is a site devoted to helping language students find conversational partners and connecting them using voice-over-IP software.
- **Extend the impact and life span of conferences and workshops.** Topical social networking sites can be used before, during, and long after an in-person conference. Attendees can begin to network before they even get to the hallways, and the group's wisdom can be collected and preserved, increasing the effect of the conference and prolonging its usefulness.

Examples of Social Networking

The following links provide examples of social networking applications.

Allegheny College on MySpace
syndicateblog.petersons.com/wordpress/index.php/mike-richwalsky-on-allegheny-colleges-myspace-and-other-online-social-networking-plans

At Allegheny College, it's not just the students who do social networking—the college itself has a *MySpace* page.

Big Blue Brainstorm

www.businessweek.com/magazine/content/06_32/b3996062.htm?chan=top+news_top+news

IBM hosted an online Innovation Jam in September 2006 that used social networking tools as a way to connect participants worldwide.

Know Before You Go

www.ratemyprofessors.com,
www.pickaprof.com

These two services give students an idea of what to expect of a class based on information provided by other students. Students share and seek opinions about 770,000 professors from 6,000 schools at *RateMyProfessors*. *Pick-A-Prof* connects with *Facebook* to integrate students' friends lists with professor ratings.

Many2Many

many.corante.com

This group-authored blog discusses social software, social networking, and their implications for education. Authors include Clay Shirky, Liz Lawley, Ross Mayfield, Sébastien Paquet, David Weinberger, and danah boyd.

Stu.dicio.us

stu.dicio.us

Stu.dicio.us is a notetaking tool that lets students take and share notes, quickly link to *Wikipedia* and *Google* entries for keywords, keep track of assignments, and manage their studies.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about social networking.

How University Administrators Should Approach the Facebook: Ten Rules

chimprawk.blogspot.com/2006/01/how-university-administrators-should.html

(Fred Stutzman, *Unit Structures*, January 23, 2006) This blog entry describes current trends around Facebook and recommends measures for university administrators.

Mashable!

www.mashable.com

(Pete Cashmore, retrieved November 15, 2006) *Mashable!* is a blog focused exclusively on social networks—a meta-collection of social networking sites, with commentary.

The MySpace Effect

www.schoolcio.com/showArticle.php?articleID=193502102

(Christopher Heun, *SchoolCIO*, retrieved December 19, 2006) This article discusses how to balance the benefits of social networking spaces with concerns for student privacy and safety.

Social Networking:**Five Sites You Need to Know**

chimprawk.blogspot.com/2006/06/social-networking-five-sites-you-need.html

(Fred Stutzman, *Unit Structures*, June 14, 2006)

This blog entry gives an overview of five lesser known social networking sites and describes three emerging trends related to the use of such sites.

Social Network Sites: My Definition

many.corante.com/archives/2006/11/12/social_network_sites_my_definition.php

(danah boyd, *Many2Many*, November 12, 2006) This article describes social networking and offers examples.

Social Software in Academia

www.educause.edu/apps/eq/eqm06/eqm0627.asp

(Todd Bryant, *EDUCAUSE Quarterly*, Vol. 29, No. 2, 2006) This article describes a variety of types of social software and lists examples of educational use.

del.icio.us: Social Networking

del.icio.us/tag/hz07+socialnetworking

(*Horizon Project Advisory Board and Friends*, 2006) Follow this link to find resources tagged for this topic and this edition of the *Horizon Report*, including the ones listed here. To add to this list, simply tag resources with “hz07” and “social-networking” when you save them to *del.icio.us*.

MOBILE PHONES

Time-to-Adoption Horizon: Two to Three Years

The convergence of ubiquitous broadband, portable devices, and tiny computers has changed our concept of what a phone is meant to be. A pocket-sized connection to the digital world, the mobile phone keeps us in touch with our families, friends, and colleagues by more than just voice. Our phones are address books, file storage devices, cameras, video recorders, wayfinders, and hand-held portals to the Internet—and they don't stop there. The ubiquity of mobile phones, combined with their many capabilities, makes them an ideal platform for educational content and activities. We are only just beginning to take advantage of the possibilities they will offer.

Overview

Widespread adoption of mobile phones for education and learning was first highlighted in the *2006 Horizon Report*, and signs continue to point to the mid-term horizon as the likeliest timeframe. Already there are many examples of campus-wide programs, individual courses, and creative opportunities that exploit the potential of mobile phones; more are emerging all the time. In the next two years, we predict that mobile phones will be accepted tools on campus, as desirable and common as personal computers.

Mobile phones are becoming the storehouses of our digital lives, containing a growing share of our personal and professional resources and data. Over the last year, mobile phones have become increasingly more powerful and adapted to multiple uses; virtually every phone now sold includes some form of multimedia, if not several, as well as instant messaging, web browsing, and email. QUERTY keypads are common, and geolocation and the capability to record video and audio is quickly becoming a standard feature as well. With over 225 million mobile phones manufactured each year worldwide, innovation in these devices is occurring at an unprecedented pace.

At the same time, more and more kinds of content is available for phones. Many websites and blogs can automatically detect if the browser is housed on a phone and format content accordingly. Video is a click away on almost all new phones, whether you want it streamed to you via the network or played off your SD card, or want to capture it via

your phone's internal video camera—and it is hard to find a phone anymore that does not include a still camera. New genres of filmmaking and photography are developing as artists and students experiment with equipment that fits in their pockets. The mass amateurization of video production is resulting in a new kind of video where the message is much more important than the form.

Photos, email, music, and other personal files already accompany many of us wherever we take our laptops. The newest form of this trend no longer requires the laptop—your phone is your personal digital repository. High speed broadband, combined with the multifunctionality of new phones and increased storage capacity via removable memory, is making rich media and live content the next big application for phones. Not only will you pull out your phone to show the latest wallet photo of your children—you will be able to show a clip of them speaking at their graduation ceremony as well. Hundreds of your favorite songs and podcasts, on-demand video, navigational assistance, restaurant recommendations, your photos—even language lessons—are all just a thumb click away.

Relevance for Teaching, Learning, and Creative Expression

In the not-too-distant future, phones will include projection systems, removing the barrier of the small screen; such devices are now in prototype. It's already possible to attach a small device to your phone that

projects a full-size keyboard made of light—it even makes clicking sounds when you tap the keys. Taken together, mobile computing, portable devices, and ubiquitous broadband mean that we have access to people, information, and data wherever we may be. It's easy to check email, send an instant message, or record and send a short video or series of photos any time, from anywhere. The increasing capability of phones, plus the fact that virtually everyone has one, is already making these devices an attractive delivery platform. Applications for communication, scheduling, training, entertainment, study, and creativity suggest themselves; our task as educators is to select and develop those that are meaningful for education.

For example, the ability of phones to record data has tremendous applications in fieldwork for many disciplines. In the UK, students in a grade-school geography class use cell phones to record data (text and pictures) in the field and submit it to the teacher, who remains in the classroom. Students can create mini-documentaries easily and cheaply with their phones; online tutorials for phone-based moviemaking offer tips and techniques. In Australia, a grant-funded project invited filmmakers to write and shoot five-minute movies specifically for the mobile phone platform (see www.abc.net.au/miniseries), a technique that has been used in visual literacy and cinema courses.

The ability of almost all phones to access email, instant messaging, the web, and calendaring increases the ways in which students and instructors can communicate—and is eroding the digital divide. Some campuses are turning to mobile phones as a replacement for landlines, which are seeing less use. It seems that even students who cannot afford to own a computer are still very likely to own a mobile phone; it simply makes sense to provide services and information they can access with those devices.

A sampling of mobile phone applications across disciplines includes the following:

- **Offer self-paced audio and video tours.** Phones can detect where they are and use that information to deliver relevant information via audio, text, or video. Visitors to the San Francisco Museum of Modern Art, for example, have the option to listen to an audio tour using a traditional headset and device owned by the museum, via a podcast feed, or on their own cell phones.
- **Deliver campus-based services.** Scheduling, networking, emergency updates, and other campus-based information can be delivered quickly and easily. At Montclair State University, all entering students are now required to own a mobile phone that is GPS and web-enabled. An array of academic, social, safety and wellness, transportation, utility and administrative services are delivered to students with these devices. MSU provides the phones and a range of plan options.
- **Encourage creativity and mediamaking.** Students can explore new techniques of creating art and social commentary. In a photography course at Rowan University, students complete an assignment using both the camera of their choice and a mobile phone camera. Students experiment with the technical and conceptual possibilities and limitations presented with each device within the medium of photography.

Examples of Mobile Phone Use

The following links provide examples of mobile phone applications.

Citizen Journalism: Cell Phones as Media Outlets
www.pbs.org/mediashift/2006/07/digging_deeperstanford_fellow.html

Citizen Journalism is the practice of ordinary people using mobile devices to capture and upload news items as they happen.

Hamilton College Vidblinks

my.hamilton.edu/magazine/2005/spring-summer/vidblinks.html

A project at Hamilton College explored the use of rhetorical techniques through cell phone video messages. The project description and sample video clips are available.

The iPhone

www.apple.com/iphone

As the 2007 Horizon Report was going to press, Apple, Inc. announced what appears to be a breakthrough product in the mobile phone market, the iPhone. The device, which has but one button, uses an interactive touch screen and combines the functions of an iPod, a phone, a web browser, and a messaging device.

Pocket Projectors

www.technologyreview.com/BizTech/17860

(Kate Greene, *Technology Review*, December 6, 2006) This article describes emerging technology that is likely to put projectors into cell phones before long.

Rave Wireless

www.ravewireless.com/prod_academic.htm

Rave Wireless offers bus schedules, safety information, and other educational services for students—and universities are subscribing.

Rethinking Computer Science

web.mit.edu/eprom/courses.html

(EPROM, retrieved December 20, 2006) Courses from the Massachusetts Institute of Technology focus on programming on phones—since that is the most widely available platform in some parts of the world.

UT Mobile Service

www.utexas.edu/its/mobile/utmobile.html

The University of Texas at Austin offers a range of services for mobile phones, including the campus directory, event schedules, news headlines, and more.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about mobile phones.

20 Ideas for Using Mobile Phones in Teaching & Learning

teaching.mrbelshaw.co.uk/index.php/2006/09/21/20-ideas-getting-students-to-use-their-mobile-phones-as-learning-tools

(Doug Belshaw, *teaching.mrbelshaw.co.uk*, September 2006) This blog post cites a variety of examples and suggestions for using mobile phones in education.

3G: Not a Failure

www.wirelessweek.com/article/CA6387872.html

(Rohnda Wickham, *Wireless Week*, Nov. 1, 2006) This article describes the current state of the 3G network and where it is headed.

Going to the MALL:

Mobile Assisted Language Learning

lt.msu.edu/vol10num1/emerging/default.html

(*Language Learning & Technology*, Vol. 10, No. 1, January 2006, pp. 9-16) This article describes ways various mobile devices are used in foreign language study.

MobiFilm Academy

www.mobifilms.net/index.html

(Retrieved December 20, 2006) This website is devoted to filmmaking with mobile phones and includes tips and instructions, examples, and an awards competition.

del.icio.us: Mobile Phones

del.icio.us/tag/hz07+mobile

(*Horizon Project Advisory Board and Friends*, 2006) Follow this link to find resources tagged for this topic and this edition of the *Horizon Report*, including the ones listed here. To add to this list, simply tag resources with “hz07” and “mobile” when you save them to *del.icio.us*.

VIRTUAL WORLDS

Time-to-Adoption Horizon: Two to Three Years

*In the last year, interest in virtual worlds has grown considerably, fueled in no small part by the tremendous press coverage of examples like *Second Life*. Campuses and businesses have established locations in these worlds, much as they were creating websites a dozen years ago. In the same way that the number and sophistication of websites grew very quickly as more people began to browse, virtual locations will become more common and more mature as the trend continues. Virtual worlds offer flexible spaces for learning and exploration—educational use of these spaces is already underway and growing.*

Overview

Virtual worlds are richly immersive and highly scalable 3D environments. People enter these worlds via an avatar which is their representation in that space, moving their avatar through the space as if they were physically walking—or in some cases, flying. The most popular virtual worlds are multi-user spaces, meaning that many people can be in the same virtual space and interact with one another in real time. While many popular games take place in virtual worlds, virtual worlds are not themselves games. Pure virtual worlds like *Second Life*, *Active Worlds*, or *There* can be applied to any context, as opposed to game worlds, which generally have a fixed, goal-oriented purpose.

Because of the more rapid acceptance and use of virtual worlds in academia as opposed to gaming in general, this phenomenon remains in the mid-term horizon—moving ever closer, while other aspects of educational gaming, like massively multiplayer online games, remain a bit farther out. Virtual worlds offer an opportunity for people to interact in a way that conveys a sense of presence lacking in other media. These spaces can be huge, in terms of the number of people that use them, and they are growing in popularity because they combine many of the elements that make Web 2.0 really exciting: social networking; the ability to share rich media seamlessly; the ability to connect with friends; a feeling of presence; and a connection to the community.

The use of virtual worlds in education has grown considerably over the past year. Courses now meet in *Second Life* and other locations. These spaces are used for training emergency response personnel,

developing civic participation and leadership skills, visualizing real time weather data, modeling complex mathematical functions, and experimenting with architectural models, among other uses. A consortium of librarians has built an extensive and growing set of information resources in *Second Life*. Courses from English to Chemistry hold meetings in virtual worlds, making use of their flexibility and powerful building tools to stage dramas and create realistic 3D molecular models. Also on the horizon are open-source versions of virtual worlds like *Croquet*, *Uni-Verse*, *Multiverse*, and others.

Relevance for Teaching, Learning, and Creative Expression

Virtual worlds can be used to create very effective learning spaces. Since they are generalized rather than contextual, they are applicable to almost all disciplines. Settings can be created to pertain to any subject or area of study; locations and artifacts can be as realistic and detailed, or as generic and undefined as desired. 3D construction tools allow easy visualization of physical objects and materials, even those normally occurring at cosmic or nano scales.

The social aspects of virtual worlds are also useful for educational purposes. These worlds lend themselves to role playing and scenario building, allowing learners to temporarily assume the responsibilities of an astronomer, chemist, or engineer without incurring real-world consequences. Researchers and ethnographers have ventured into worlds like *Second Life* to interview and study the inhabitants.

New art forms are emerging in these spaces that take advantage of the unique possibilities for expression available in them. Machinima—filmmaking using virtual world settings and avatar actors—is just one example; new forms of sculpture, painting, and architecture are also evolving.

As more educators begin to explore the opportunities offered by virtual worlds, established courses are paving the way for new offerings. Schools like Trinity University and the University of Texas at Austin have used virtual worlds in teaching for two or three years now; others, like the University of Wisconsin—Madison, Bradley University, and Seton Hall University have begun this year to offer courses using virtual worlds in different capacities and disciplines. Training events, workshops, and discussion groups (which meet, appropriately enough, in *Second Life*) are available to help faculty develop effective uses of virtual worlds.

A sampling of applications of virtual worlds across disciplines includes the following:

- **Expand understanding of cultural and societal experiences.** Many virtual worlds offer an opportunity for students to create as well as observe their surroundings. A literature course at the University of Texas at Austin forwards its goal for students to engage in discovery learning and gain deeper understanding of world literature by extending a study of world architectural styles into *Second Life*. Students create their own buildings that reflect styles they have studied, enabling them to carry their experience of world literature into a virtual world.
- **Experiment with new art forms.** Virtual worlds lend themselves to creative work, blending flat texture design with more sculptural three-dimensional forms. The Otis College of Art and Design has built a gallery, sculpture garden, and meeting space in *Second Life*, where students and faculty can exhibit work that stretches their creativity in painting, sculpture, fashion design, cinematography, interactive displays, and other media.

- **Stage theatrical productions.** All of the activities that are part of real-world theatrical productions have counterparts in virtual worlds: costume design, set design, scriptwriting, choreography, acting, and directing all contribute to a virtual play as to a real one. Productions from murder mysteries to westerns have been staged in *Second Life*.

- **Learn through simulations and role-playing.** Simulated problem-solving activities can be planned in custom settings like a hospital room, a power plant, or even an entire town. Students can become doctors, patients, journalists, or anyone else as they work to accomplish goals within the simulated environment. A few proof-of-concept simulations have opened the door to a host of these activities, and many are now in development.

Examples of Virtual Worlds in Education

The following links provide examples of educational applications of virtual worlds.

The Adding Machine

addingmachine.bradley.edu

This online journal chronicles the progress of an interdisciplinary, inter-institutional production of Elmer Rice's *The Adding Machine*, scheduled for performance in March 2007.

Field Research Methods in Second Life

slane.bradley.edu/com/faculty/lamoureux/website2/slstuff.html

Bradley University offers a course in field research methods in the online virtual world of *Second Life*.

M.U.P.P.E.T.S.

muppets.rit.edu

The Rochester Institute of Technology has developed a custom collaborative virtual environment where students can program and interact with virtual objects as well as create two- and three-dimensional data visualization schemes.

Oakland Jazz and Blues Club Virtual Reality Project

journalism.berkeley.edu/projects/jazzclubs

At the University of California, Berkeley the Journalism and Architecture schools are collaborating on a project that will recreate the 1940-1950's environment of the 7th Street music scene.

Play2Train

irhbt.typepad.com/play2train

This bioterrorism simulation was built in *Second Life* and is designed to teach preparedness through role-playing.

Second Life at Seton Hall University

tltc.shu.edu/virtualworlds

The Teaching, Learning and Technology Center at Seton Hall University is exploring the potential of virtual spaces in the high school and college classroom. Instructional designers, faculty and administrators are working to define best practice, identify strategies for the integration of virtual worlds into the learning experience, and find solutions to training and support challenges.

Simulations in *Neverwinter Nights*

www1.umn.edu/umnnews/Feature_Stories/22Neverwinter_Nights22_in_the_classroom.html

A communications class at the University of Minnesota used a simulation built by modifying the game *Neverwinter Nights* to practice investigative journalism.

The VITAL Lab at Ohio University

vital.cs.ohiou.edu/index.php/Second_Life_Development

The Ohio University *Virtual Immersive Technologies for Arts and Learning (VITAL) Lab* is a research and development lab dedicated to creating immersive virtual environments to enhance teaching, learning, and training activities. Over the past year, the lab has produced projects for middle and high schools, for university students, and for the general public.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about virtual worlds.

Real Learning in a Virtual World

www.csmonitor.com/2006/1005/p13s02-legn.html

(Gregory M. Lamb, *The Christian Science Monitor*, October 5, 2006) This article describes some of the ways *Second Life* is used in college courses.

Right-click to Learn

thephoenix.com/Article.aspx?id=20561&page=1

(Kate Cohen, *The Phoenix*, August 17, 2006) Educators plan activities in *Second Life*.

Terra Nova

terranova.blogs.com

(Retrieved December 27, 2006) This multi-authored blog discusses virtual worlds and their implications.

Top 10 Opportunities in Virtual Worlds

www.tnl.net/blog/2006/08/18/top-10-opportunities-in-virtual-worlds

(Tristan Louis, *The TNL.net Weblog*, August 18, 2006) One in a series of articles about virtual worlds, this post discusses opportunities for vendors, users, and secondary markets.

When Do Online/Computer Simulations Add the Most Value?

blogs.law.harvard.edu/vvvv/2006/12/05/when-do-onlinecomputer-simulations-add-the-most-value

(Gene Koo, *video vidi visum: virtual*, December 5, 2006) This blog post considers three cases where simulations are an advantageous tool for teaching and learning.

del.icio.us: Virtual Worlds

del.icio.us/tag/hz07+virtual_worlds

(*Horizon Project Advisory Board and Friends*, 2006) Follow this link to resources tagged for this topic including the ones listed here. To add to this list, simply tag resources with "hz07" and "virtual_worlds" when you save them to del.icio.us.

THE NEW SCHOLARSHIP AND EMERGING FORMS OF PUBLICATION

Time-to-Adoption Horizon: Four to Five Years

The time-honored activities of academic research and scholarly activity have benefited from the explosion of access to research materials and the ability to collaborate at a distance. At the same time, the processes of research, review, publication, and tenure are challenged by the same trends. The proliferation of audience-generated content combined with open-access content models is changing the way we think about scholarship and publication—and the way these activities are conducted.

Overview

Both the process and shape of scholarship are changing. Nontraditional forms are emerging that call for new ways of evaluating and disseminating work. Increasingly, scholars are beginning to employ methods unavailable to their counterparts of several years ago, including prepublication releases of their work, distribution through nontraditional channels, dynamic visualization of data and results, and new ways to conduct peer reviews using online collaboration. These new approaches present a new challenge: to protect the integrity of scholarly activity while taking advantage of the opportunity for increased creativity and collaboration.

New forms of scholarship, including fresh models of publication and nontraditional scholarly products, are evolving along with the changing process. Some of these forms are very common—blogs and video clips, for instance—but academia has been slow to recognize and accept them. Some scholars worry that blogging may cut into time that would otherwise be used for scholarly research or writing, for example, or that material in a podcast is not as well researched as material prepared for print publication. Proponents of these new forms argue that they serve a different purpose than traditional writing and research—a purpose that improves, rather than runs counter to, other kinds of scholarly work. Blogging scholars report that the forum for airing ideas and receiving comments from their colleagues helps them to hone their thinking and explore avenues they might otherwise have overlooked.

As just one of many emerging examples, for its *Series on Digital Media and Learning*, a set of six edited volumes on the impact of digital media (in press), the MacArthur Foundation sponsored a group of online conversations for the authors of the volumes. These included a symposium in a virtual world, an online conference conducted via the web, and a series of substantive online dialogs with invited experts. The authors framed the discussions to address gaps in the literature of their field or unanswered questions related to the overall work, and posed the same questions to all three groups. The three venues served to uncover a variety of perspectives; attendees of the virtual symposium were adept in digital media, for example, while the online conference attracted a more traditional, scholarly audience. These activities were undertaken not as a form of peer review but in the course of authoring the volumes—as part of the scholarly process.

While significant challenges remain before the emerging forms of scholarship we are seeing are accepted, nonetheless, there are many examples of work that is expanding the boundaries of what we have traditionally thought of as scholarship. In the coming years, as more scholars and researchers make original and worthwhile contributions to their fields using these new forms, methods for evaluating and recognizing those contributions will be developed, and we expect to see them become an accepted form of academic work.

Relevance for Teaching, Learning, and Creative Expression

The real potential of this trend for education is to expand the audience for scholarship and research—not only among those at scholarly institutions, but among the public as well. Academics can collaborate with a much wider community and easily reach out to experts from related disciplines. We are already seeing this occur in the “blogosphere”—the community of people who keep and comment on blogs—where scholars post about their current thinking and receive recommendations, pertinent questions, and thoughtful responses from others in their field and beyond.

Increasingly, we are seeing other technologies being applied to the purposes of collaboration as well. Writers use shared editing tools like *Google Docs* and wikis and create online books that accept reader comments at the paragraph level, opening up the process of writing itself to collaboration. These efforts are the early stages of an academic transformation that will, over the next five years, parallel the course we are now seeing with user-generated content of other kinds.

Emerging forms of publication also have the power to make the information being conveyed more easily understood. Visualization tools like *Gapminder* bring statistical data to life. Combined with a traditional paper—or embedded in a less traditional one—interactive charts and graphs give us a new way to see information.

The new scholarship also acknowledges certain complications of traditional methods of publication that arise from the rapid rate of change and discovery of new information in many fields. Emerging forms of the book, including prepublication research and drafts shared online, the incorporation of data visualization tools into online publications, all forms of customized publishing, and the e-book, are ironically causing us to regard the traditional book as an impermanent medium. While books offer a persistence that far exceeds that of other media and

other forms of communication, the content of printed matter is perceived as increasingly ephemeral. A response to that trend is that more and more books are often accompanied by a website, wiki, or other online resource that can communicate new insights as they arise and create and sustain a living community around the concepts entombed in the published material.

A sampling of applications for the new scholarship and emerging forms of publication across disciplines includes the following:

- **Include—and learn from—new voices.** Both books and their authors may benefit from the comments of interested students, colleagues, and members of the public, who in turn will benefit from hearing scholars narrate their process. When his 1999 book *Code and Other Laws of Cyberspace* needed an update, author Lawrence Lessig set up a wiki and invited the public to help him write the second edition, *Codev2*, now available in both print and electronic formats.
- **Control costs and reach wider audiences.** Electronic texts are cheaper and easier to distribute than printed and bound copies. Many people still prefer to purchase and own hardcopies, even if they get a free electronic copy; if sales are important, the benefits of marketing to a larger audience may result in enough sales to make up for those that are lost from people who do not purchase a copy after reading it online. Cory Doctorow, science fiction author and co-editor of *Boing Boing*, found that to be true for his books (see *Giving It Away*, below).
- **Illustrate and educate using a variety of media.** Graphs, photographs, video and audio clips can all be included in an online paper or book. Online textbooks for computer science, history and politics, and other disciplines are available that incorporate illustrations both static and animated, video and audio commentary by experts in the field, and graphs that respond to

user input. Combined with new methods of data visualization, mapping, graphing, and charting, online books are becoming powerful interactive tools for learning.

Examples of the New Scholarship and Emerging Forms of Publication

The following links provide examples of the new scholarship and emerging forms of publication.

Networked Books

GAM3R 7H30RY by McKenzie Wark:

www.futureofthebook.org/gamtheory

The Django Book by Adrian Holovaty and Jacob Kaplan-Moss: www.djangobook.com

These two books are online in prepublication format, where readers can add comments that will inform the authors' work. Both are scheduled for publication in 2007.

NINES

www.nines.org/index.html

NINES is a consortium of scholars promoting and exploring new forms of scholarship.

Poetess Archive

unixgen.muohio.edu/~poetess/about/index.html

Developed at Miami University, the Poetess Archive provides an extensive bibliography and some full texts. Over the next year, the database will be linked to a visualization tool. The accompanying Poetess Archive Journal is an evolving online scholarly peer-reviewed publication that will take advantage of innovative technologies to push the boundaries of research and publication.

Public Library of Science

www.plos.org

The Public Library of Science is committed to making the world's scientific and medical literature a freely available public resource via a new process of peer-reviewed publishing.

Texas Politics

texaspolitics.laits.utexas.edu

An online textbook developed at the University

of Texas at Austin, *Texas Politics* includes audio and video, commentary, a series of live speakers, and other media as well as traditional text.

UO Channel

media.uoregon.edu

The University of Oregon has a library of video productions online, collected in the UO Channel. Featured programs include lectures, interviews, performances, symposia, documentary productions, and more.

Using Wiki in Education

www.wikiineducation.com/display/ikiw/Home

Both a wiki and a published book, *Using Wiki in Education* explores the ways online publishing can extend the life and usefulness of a scholarly work.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about the new scholarship and emerging forms of publication.

Book 2.0

chronicle.com/free/v52/i47/47a02001.htm

(Jeffrey R. Young, *The Chronicle of Higher Education*, July 28, 2006) This article reviews some ways educators are exploring new modes of electronic publishing.

The Book as Place

www.infotoday.com/searcher/nov06/Berinstein.shtml

(Paula Berinstein, *Searcher*, November/December 2006) This article describes the networked book as a destination and a center for community as well as reading material: "The book is now a place as well as a thing and you can find its location mapped in cyberspace."

The Future of Books

www.technologyreview.com/InfoTech/14064

(Jason Epstein, *Technology Review*, January 2005) This article reviews the writer's experiences in the world of traditional publishing and looks ahead to the future of publishing.

Giving It Away

www.forbes.com/home/technology/2006/11/30/cory-doctorow-copyright-tech-media_cz_cd_books06_1201doctorow.html

(Cory Doctorow, Forbes, December 1, 2006)

In this article, a technology writer explains the value of publishing electronic, free versions of books.

The Institute for the Future of the Book

www.futureofthebook.org

(Retrieved December 20, 2006) This organization promotes the next generation of the book with conversation, research, and even software.

del.icio.us: New Scholarship and Emerging Forms of Publication

del.icio.us/tag/hz07+scholarship

(Horizon Project Advisory Board and Friends, 2006) Follow this link to find resources tagged for this topic and this edition of the *Horizon Report*, including the ones listed here. To add to this list, simply tag resources with “hz07” and “scholarship” when you save them to *del.icio.us*.

MASSIVELY MULTIPLAYER EDUCATIONAL GAMING

Time-to-Adoption Horizon: Four to Five Years

The term “serious games” has been coined to describe games that have an educational purpose and non-entertainment goals. Educators are taking a hard look at one type of serious game, massively multiplayer educational games, and finding strong potential for teaching and learning. These games are still time-consuming and often expensive to produce, but practical examples can easily be found. Interest is high and developments in the open-source arena are bringing them closer to mainstream adoption year by year.

Overview

The interest and trend of educational gaming has accelerated considerably in the last year. Discussion and research has continued, identifying games that are goal-oriented and those that are more social in nature; games that are easy to construct and play, and those that are more complex and time-consuming; and games developed expressly for education versus commercial games that are appropriated for educational use. One genre that offers interesting potential for education is massively multiplayer online (MMO) games, which bring many players together in activities that are sometimes collaborative and sometimes competitive, generally goal-oriented, and often tied to a storyline or theme.

Like other kinds of games, educational MMOs combine a carefully crafted setting with specific educational objectives. What makes these games especially compelling and effective is their multiplayer nature—students can work in small or large groups, or can pursue goals solo, all in the context of a larger community of player-learners. Role-playing is a possible, but not essential, component. Other possible interactions include mentoring of newer players by more experienced ones, competitive team activities, and collaborative world-building.

Although it is common to picture these games in the setting of a 3D virtual world—and indeed some of them take place in such spaces—that is not a requirement, and many popular MMOs are text-based or built on simple graphical interfaces. Experiments with educational massively multiplayer games date back

ten or more years to MOOs and MUDs (text-based multiplayer environments); educational examples encouraged learners to describe and build parts of the real world, or immersed them in descriptions and interactions in other languages.

We are now seeing a resurgence of interest in educational MMOs. For example, the Synthetic Worlds Initiative at Indiana University is creating an MMO, set in a 3D virtual world, about the life and times of William Shakespeare, in which students are transported to Shakespeare’s world and learn about the customs, language, and events of the time. In general, these games are still relatively rare, due to the difficulty and cost of producing them. Cost will become less of a factor as open-source MMO gaming engines are further developed, and within a few years it is likely that educational MMO games will be commonplace in a variety of disciplines. Open-source efforts like *WorldForge* (www.worldforge.org), and low-cost engines like *Multiverse* (www.multiverse.net) may be successful in lowering the barrier to development of these complex games.

Relevance for Teaching, Learning, and Creative Expression

It seems clear that games can be effectively applied in many learning contexts. They can engage learners in ways other tools and approaches cannot, and their value for learning has been established through decades of research. MMOs in the entertainment sector have been seen to attract and retain players;

as of July 2006, there were over thirteen million active subscriptions to MMOs worldwide (see www.mmogchart.com).

Increasingly, we know more about how games work and how to apply them to teaching and learning. Over the past year, awareness and interest in educational gaming has grown, research has continued, and further forays into bringing games into the classroom have advanced our understanding and led to a more widespread acceptance of this trend. As work progresses on open-source MMO engines, it will eventually become more common to see MMOs that offer immersive, engaging experiences in a variety of disciplines. It will still require effort and thought to create appropriate spaces and design compelling problems, but the very nature of MMOs lends itself to use by many people, spreading the benefits to many students.

Another aspect of MMOs that is of value to the educational community is the types of activities they make possible. These games offer opportunities for both discovery-based and goal-oriented learning, and can be very effective ways to develop team-building skills. It is possible to design activities that cannot be completed by a single player; a group must work together to strategize, develop a solution, maximize the various talents of the team members, and execute their plan in concert to succeed. The game teaches much more than just the controls required to move through the world.

A sampling of massively multiplayer educational gaming applications across disciplines includes the following:

- **Study foreign language and culture.** MMOs offer the opportunity for virtual immersion, not only in a visual or design sense, but also in reading, writing, listening, and even speaking. A world based on an ancient or modern culture could include quests that require players to read instructions, listen to non-player-characters speaking clues, and write their own responses or answers, all in a foreign language and in a setting that allows them to feel what it was or is like to be part of that culture.

- **Develop leadership and management skills.** Even in non-educational MMOs, leadership and management skills come into play. Research has shown that players who take on the responsibility of leading a guild (group of affiliated players) or a raid (smaller group of players who team up to complete a specific objective) develop skills which are transferable into their lives at work and at school (*Life as a Guild Leader*, Nick Yee, March 20, 2006, p.10. Retrieved from www.nickyee.com/daedalus/archives/001516.php).
- **Practice strategy and apply knowledge competitively.** Multiplayer games offer an opportunity for students to practice what they have learned. For example, a free online game called *Rich Man Game* (www.richmangame.com) pits players against each other on a weekly basis to make business deals and build up their net worth. Although it is not set in a 3D virtual world, *Rich Man Game* is a massively multiplayer online educational game.

Examples of Massively Multiplayer Educational Gaming

The following links provide examples of applications for massively multiplayer educational gaming.

Games, Learning, and Society

[website.education.wisc.edu/gls](http://www.education.wisc.edu/gls)

Offered at the University of Wisconsin—Madison, the *Games, Learning and Society* minor is designed for students who are interested in game design, the impact of games on culture, and gaming in education.

Immersive Education

www.gridtoday.com/grid/944856.html

Immersive Education, developed at Boston College's *Grid Institute*, combines interactive virtual reality and sophisticated digital media with collaborative online course environments and classrooms. The press release describes the project.

Innovation Awards

engage.doit.wisc.edu/sims_games/index.html

The University of Wisconsin System is encouraging faculty to explore the potential of gaming in education by offering grants for research and development of faculty-designed games.

Synthetic Worlds Initiative

swi.indiana.edu

The Synthetic Worlds Initiative is a research project at Indiana University whose aim is to promote innovative thinking about virtual worlds. A multiplayer game about the life of Shakespeare and an academic conference embedded in the context of a live-action game are just two of the projects underway now.

Thinking Worlds

www.thinkingworlds.com

Thinking Worlds is an educational games authoring engine and a community of user-developers; once created, games can be shared within the community.

For Further Reading

The following articles and resources are recommended for those who wish to learn more about massively multiplayer educational gaming.

Digital Game-Based Learning: It's Not Just the Digital Natives Who Are Restless

www.educause.edu/apps/er/erm06/erm0620.asp

(Richard Van Eck, *EDUCAUSE Review*, vol. 41, no. 2, March/April 2006: 16–30) This article discusses why digital game-based learning is effective and engaging and outlines educational applications.

Games in Education Video

video.google.com/videoplay?docid=6117726917684965691&q=games+in+education

(Mark Wagner and Michael Guereña, retrieved December 20, 2006) This 20-minute video includes interviews with Jim Gee, Clark Aldrich, and Henry Jenkins on the topic of educational gaming.

Massively multiplayer online games (MMOs) in the new media classroom

www.ifets.info/journals/9_3/14.pdf

(Aaron Delwiche, *Educational Technology & Society*, 9 (3), 2006: 160-172) This paper reports findings from two MMO-based courses in the context of situated learning theory.

MMOG Research

website.education.wisc.edu/steinkuehler/mmogresearch.html

(Constance Steinkuehler, *University of Wisconsin—Madison*, retrieved December 20, 2006) A bibliography of research papers on the topic of massively multiplayer online gaming in education.

Serious Games Initiative

www.seriousgames.org

(Retrieved December 20, 2006) The Serious Games Initiative helps develop collaborations between the electronic game industry and projects involving the use of games in education, training, health, and public policy.

del.icio.us: Educational Gaming

del.icio.us/tag/hz07+educational_games

(*Horizon Project Advisory Board and Friends*, 2006) Follow this link to find resources tagged for this topic and this edition of the *Horizon Report*, including the ones listed here. To add to this list, simply tag resources with “hz07” and “educational_games” when you save them to del.icio.us.

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ISBN 0-9765087-4-5