Learning in the Digital Age

John Seely Brown

Learning is a remarkably social process. In truth, it occurs *not* as a response to teaching, but rather as a result of a social framework that fosters learning. To succeed in our struggle to build technology and new media to support learning, we must move far beyond the traditional view of teaching as delivery of information. Although information is a critical part of learning, it's only one among many forces at work. It's profoundly misleading and ineffective to separate information, theories, and principles from the activities and situations within which they are used. Knowledge is inextricably *situated* in the physical and social context of its acquisition and use.

Information and Knowledge

Key differences between the terms *information* and *knowledge*, which are often used interchangeably, are instructive. First, whereas information is usually considered independent of any particular individual—it can be looked up in a book or retrieved online—knowledge is usually associated with a knower,

that is, it resides in someone's mind. Second, given this personal attachment, knowledge appears more difficult to detach than information. It's harder, for example, to pick up, write down, and transfer than information. Third, one reason knowledge may be so hard to give and receive is that it seems to be acquired more through assimilation. Knowledge is something we digest rather than merely hold; it's usually deeply intertwined with the knower's understanding of the practices surrounding its use.

When we look at teaching beyond the mere delivery of information, we see a rich picture of learning, one that embraces the social context, resources, background, and history within which information resides. Knowledge, following Michael Polanyi, can be thought of as having two dimensions: explicit and tacit.[1] If we think of knowledge as a tree, the explicit dimension is like the leaves, branches, and trunk—the parts above ground. The tacit dimension is like the roots buried below the surface and deeply immersed in the soil that makes it robust. The explicit lives in books and in our brains as concepts and facts and deals with the "know-*what*." The tacit deals with the "know-*how*" that is best manifested in work practices and skills. The tacit resides in action, most often in participation with others. As a consequence, tacit knowledge can be distributed as a shared, socially constructed understanding that emerges from collaboration.

Learning by doing with others offers students the opportunity for in-depth enculturation into a particular practice, where

one *learns to be* a physicist, social scientist, historian, etc., in contrast to just *learning about* such professions. Students could absorb the social and practical aspects of a profession (its practices) and gain tremendously from their proximity to practitioners, especially when they can watch, listen, and peripherally participate. Enculturation is crucial to such learning, since relatively little of the complex web of practice can effectively be made the subject of explicit instruction. A great deal of knowledge inevitably remains implicit in practice. The conventional route of trying to render the implicit explicit, which is the standard alternative to enculturation, is highly problematic.[2]

Legitimate Peripheral Participation

Jean Lave and Etienne Wenger sum up their view of learning as socially situated in their notion of *legitimate peripheral participation (LPP)*. As they put it,

> "Legitimate peripheral participation is . . . an analytic viewpoint on learning, a way of understanding learning. We hope to make it clear that learning through legitimate peripheral participation takes place no matter which educational form provides a context for learning, or whether there is any intentional educational form at all. Indeed, this viewpoint makes a fundamental distinction between learning and intentional instruction."[3]

Consistent with the tenets of LPP, it's through participation in communities that deep learning occurs. People don't learn to become physicists by memorizing formulas; rather it's the implicit practices that matter most. Indeed, knowing only the explicit, mouthing the formulas, is exactly what gives an outsider away. Insiders know more. By coming to inhabit the relevant community, they get to know not just the "standard" answers, but the real questions, sensibilities, and aesthetics, and why they matter.

Universities[4]

The relationship between learning and credentials—degrees and diplomas—is problematic, precisely because students can gain credentials without having gained access to knowing communities. They can, and frequently do, end up with the right label but without the experience it's meant to signify. The real test of a university is the community access it provides. Any attempt to retool the education system must retain not only its degree-granting feature, but must also involve expanding access to the communities of practice that comprise the university and not simply to the content of courses.

Graduate education today, which usually involves a form of apprenticeship, offers the intensive, in-depth enculturation that stems from participation in a particular community. Contrary to popular assumptions that as people delve further into

an academic field, they simply become more theoretical, the reality of graduate education today is that practice, not theory, is at the top of the pyramid.

The first two years of undergraduate education, however, are different. These undergraduates are, after all, the primary targets of education's delivery mechanisms. Fortunately for them (and for universities) life is full of unintended consequences. While undergraduate curricula may be designed to deliver mass quantities of predigested knowledge, to do so universities must pull together practitioners from numerous specialized communities. This intermingling on campus enriches students' opportunities for exposure to a variety of communities. As they progress through their undergraduate years and focus on a specific field of study, students also engage to some degree in a particular community, and begin to understand its character and what joining it would entail. A diploma, then, is a reasonably safe indicator that its bearer has learned the rudiments of community joining—that is, that he or she has begun to learn.

It's the learning communities that universities establish and nurture that remove them from the realm of a delivery service, or from being mere traffickers of information, to knowledge creators. An on-campus social learning environment offers exposure to multiple communities of scholars and practices, giving students broad access to people from different fields, backgrounds, and expectations, as well as opportunities for intensive study, all of which combine to form a creative tension that spawns new ideas, perspectives, and knowledge.

Digital Learners

Many of the current, and certainly most of the next, generation of students who reach college age are remarkably immersed in technology, far more so than we or other members of any older generation can likely fathom. Today's digital kids think of information and communications technology (ICT) as something akin to oxygen: they expect it, it's what they breathe, and it's how they live. They use ICT to meet, play, date, and learn. It's an integral part of their social life; it's how they acknowledge each other and form their personal identities. Furthermore, ICT to some degree has been supporting their learning activities since their first Web search and surf years ago.

Figure 1 shows a set of dimensional shifts that describe kids in the digital age. The dimensions are presented in turn, but they actually fold in on each other, creating a complex set of intertwined cognitive skills.

The first dimensional shift encompasses the evolving nature of literacy, which today involves not only text but also image and screen literacy. The ability to comprehend multimedia texts and to feel comfortable with new, multimedia genres is decidedly nontrivial. Digital students have developed their own vernacular, a *screen language* for their digital culture. The ability to communicate and express oneself with images (still and moving), sound, and other media is a crucial aspect of the new literacy. Beyond this, information navigation is perhaps the key component of literacy in the digital age. Web-smart kids hone

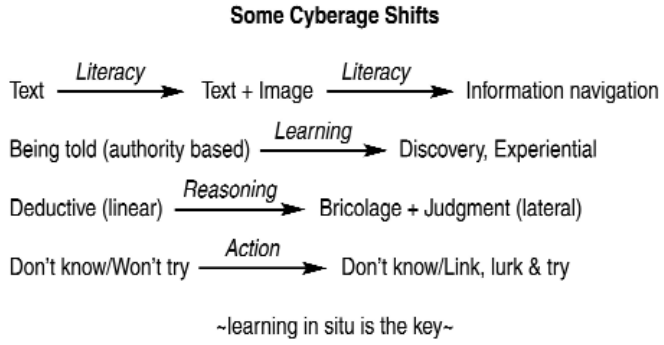

Figure 1. Dimensional shifts describing kids in the digital age.

their judgment skills through experience and triangulation as they surf the sheer scope and variety of resources the Web presents, the magnitude of which largely befuddles the adult unfamiliar with digital technology.

The next dimension shifts learning from an authority-based lecture model to discovery-based learning. Young learners are constantly discovering new things as they browse through emergent digital libraries and other Web resources. Indeed, Web surfing fuses learning and entertainment, creating infotainment.

The third shift, pertaining to reasoning, connects to discovery-based learning in an extremely important way. Classically, reasoning is linked with the deductive and abstract. Yet young learners working with digital media seem to focus more on the concrete, suggesting a form of *bricolage,* a concept having to do with one's abilities to find something (perhaps a tool, some open source code, images, music, text) that can be used or

transformed to build something new. Enormously popular "mash-ups," where music from various Internet sites is mixed together to create digital hybrids, is a prime example of this phenomenon.

The final dimensional shift has to do with a bias to action—to try new things without reading the manual or taking a course. This tendency shifts the focus to learning *in situ* with and from each other. Learning becomes situated in action; it becomes as much social as cognitive. It's concrete rather than abstract, and it becomes intertwined with judgment and exploration.

New Directions in Higher Education

By and large, colleges and universities have embraced technology. A remarkable range of experiments is going on throughout higher education. Some are dramatic; some may prove to be simply daft. It's important to complete all of them, since as much might be learned from failure as from success. The exemplars described below illustrate the range of possibilities that creative thinking can generate and provide a springboard from which to transform learning on campus and beyond.

Studios

Rennselaer Polytechnic Institute (RPI) has been reforming its undergraduate education in science, mathematics, engineer-

ing, and technology for more than a decade. One of the key innovations RPI has implemented is to replace large, introductory lecture-based courses with *studio courses*. These courses apply an integrated, multidisciplinary approach and incorporate technology to create a better learning environment for students and a better teaching environment for faculty. They are designed to bring the interaction often found in small-enrollment classes to large introductory classes. Lecture, recitation, and laboratory are combined into one facility, the studio, capable of accommodating all three teaching methods, where the faculty conducts hands-on interactive learning sessions. While the courses use advanced-function computing technology and tools, they are actually quite structured; their pace is determined by the faculty rather than by student participants.

More recently, the Massachusetts Institute of Technology (MIT) Center for Advanced Educational Services has been working to dramatically restructure MIT's introductory physics course. The goal is to help students develop better intuition about physical phenomena in an area where such intuition can be quickly overwhelmed by the mathematical complexity of the subject. Similar to the RPI studios, the MIT prototype physics studio mixes lecture, recitation, and hands-on laboratory experience. The focus is on an active learning approach, that is, a highly collaborative, hands-on environment, with extensive use of desktop experiments and educational technology. The desktop experiments and computer-aided analysis of data will give students direct experience with basic phenomena, enhancing their conceptualization and understanding of the material.

The MIT Media Lab

The MIT Media Lab is a grand experiment designed to organize inquiry for a new era. Disciplines traditionally kept apart in academia are brought together in the Media Lab—as are basic and applied research—to create a dynamic and collaborative environment that generates workable solutions to real-life problems. Theory and practice are combined in a just-in-time approach to education, wherein students draw on educational resources as needed in support of their larger projects.

For example, Neil Gershenfeld, director of the Physics and Media Group at the Media Lab, has turned the traditional approach to scientific training inside out. Rather than extensive class work illustrated by occasional labs, he teaches just enough of each subject for students to understand where results come from and how they are used. Classes have taken on a supporting role, providing the raw material that is shaped into an education in the creative and stimulating environment of the lab. With this freedom, the students have reinvented the organization of their education. They use the Media Lab for far more than what was originally envisioned. It has become their home, the place where they learn how to think across disciplines and, perhaps more importantly, where they learn to work collaboratively to solve hard problems.

The Open University

Diana Laurillard (see pages 133–156) describes how the Open

University in the United Kingdom has undertaken a radical shift from the standard "transmission model" of teaching by moving beyond a curriculum focused on *what is known* to an emphasis on teaching *how one comes to know.* Conditions for the latter approach include engagement of both the individual and the learning community on many levels. Students' active participation with practitioners, working together on common projects, makes them part of the process of creating knowledge. Students learn by doing and gain the experience necessary to reason, strategize, and understand situations that occur in practice, during their future careers, where they will be called upon to think beyond the facts and rules imparted in a typical classroom setting.

Technology-based courses at the Open University are designed within the *conversational framework,* which outlines the irreducible minimum for academic learning. The framework consists of an iterative dialogue between the teacher and the student that operates on two levels: the discursive, theoretical, conceptual level and the active, practical, experiential level. These levels are bridged by engaging each participant in the processes of adaptation of practice (in relation to theory) and adaptation of theory (in light of practice). The interplay between theory and practice—that is, making the abstract concrete through a reflective practicum—is essential, as is the continual dialogue between the teacher and the student. The traditional transmission model is just one part of this much more complex model for learning as shared understanding.

More Steps Toward Change

The Internet and other technologies honor multiple forms of intelligence—be they abstract, textual, visual, musical, social, or kinesthetic—and therein present tremendous opportunities to design new learning environments that enhance the natural ways that humans learn.

Persistent Online Worlds

J.C. Herz (see pages 169–191) describes a vast and dynamic networked model for learning and teaching that already exists: computer games, particularly online multiplayer role-playing games (RPGs), whose worlds persist whether or not an individual player is logged on at any given time. Participants not only compete in these games, but also form clans to collaborate and create new content. RPGs present a valuable model for higher education both as a means to build a networked learning environment and to leverage the technological skills of 21st-century students. Their key characteristic is that they facilitate peripheral, or "edge," activities, such as the interaction that occurs through and around games as players swap discoveries and techniques among themselves, train and extend their avatars, add new constructs to the game, and more generally learn from each other.

A suggestion for evaluating these games (for those of us who did not grow up digital) is to carefully separate the content of the games from the social context that emerges around learn-

ing to be an expert player. The context can become a learning ecology with substantial richness. In other words, we must be careful to separate the center, the game itself, from the activities materializing around the edge, where players not only learn from each other but often make their own extensions and modifications to the game, an activity typical of open source communities.

Similarly, universities could shape online activities into socially contextualized learning environments in which students actively engage in the construction of their learning experience and immediately use their course content. An open, persistent system not bound by semesters or strict discipline borders could allow students to develop over time and track that development along several paths. This system could form the basis of a liberal education grounded in practice.

Herz's vision expands learning from the classroom to the ongoing 24 x 7 world of the next generation of students and takes advantage of their digital culture through a learning environment based on a creative, interactive screen language rather than lectures and textbooks.

Multimedia Literacy Program

The University of Southern California (USC) formed a multimedia literacy program (MLP) several years ago that has served more than 1,500 students with over 40 university courses including Asian Religion, Russian History, Communication Theory, Archeology, Political Science, Women's Studies,

and Quantum Mechanics. The purpose of the MLP is not to teach students the new tools of rich media, but rather to expose them to critical thinking in the visual arts, as well as in their subject matter, and to explore new means of expression and argumentation in nonlinear, interactive, and time-based media. Such media are recognized for their influence on our popular culture; however, the notion that literacy now requires the ability to both read and write with them as well has yet to gain either credibility or clear understanding.

The intent of this ambitious program can be best summarized by MLP's director, Stephanie Barish: "It is imperative that we expand our concept of literacy to include visual, audio, interactive, and combined media and ask ourselves: what will it mean to be truly literate, and by extension, educated in the 21st Century?"[5]

One especially interesting point about the MLP courses is that their impact is felt as much by the faculty as by the students. Nearly all the class projects involve intense collaboration among the students, teaching assistants from the subject matter, teaching assistants from the film school, and the professors. Designing the projects often requires a substantial rethinking of the course material and sometimes the curriculum. Most academics are not used to rendering their thoughts concretely, let alone considering how to structure the interplay among text, image, and sound to enhance a student's understanding of a concept or situation. More generally, the focus is exclusively on content, ignoring how to shape context to facilitate comprehension. (See the sidebar by Nicole Herz on pages

86–91, which provides another glimpse of bringing together visual and textural cultures.)

Virtual Universities

The social view of learning that relies on personal interaction, communication, and peripheral participation runs counter to the belief that virtual universities will eventually replace brick-and-mortar universities as physical and cultural institutions. The idea of the virtual university both underestimates how universities work as institutions and overestimates what communications technology can do.

The virtual, however, can augment the physical and undoubtedly will transform many of the interactions of researchers and students, of teachers and learners. Its contribution to the university of the future will be immense, yet the feasibility and financial viability of technological intervention are as much issues for concern as celebration. Implemented without due understanding, intervention might only further polarize an already deeply divided system. Instead of disappearing, the conventional campus with its rich and respected resources could easily become the exclusive preserve of those who can afford it. Those who cannot would have to make do with the Internet.

An alternative approach is not to divide the student body into those who get to go to campus and those who only get to go online. It may be wiser to consider ways to divide each student's career between time spent on campus or in communi-

ties and time spent online so that more students have the opportunity to experience the best of both worlds. This view is not based simply on a naive desire for a more egalitarian education system. It's also based on what it is that universities do, why people think of them as worthy of huge investment, and, most importantly, on leveraging the natural ways that people learn and the possibilities that technology presents.

A New Knowledge Architecture

We are witnessing a profound blurring of the classical boundaries separating teaching, learning, research, administration, communication, media, and play, all brought about by new technologies. For today's students, ICT is not so much a tool as it is a way of life. It's deeply embedded in all aspects of their lives: living and learning are interwoven, and, likewise, they expect their institutional environment to present a seamless web connecting the academic, social, and administrative uses of computing. A framework, or architecture, that unifies these traditionally separate infospheres to produce a new form of a learning ecology—an active place where the virtual and the physical seamlessly and synergistically coexist—is necessary.

Today's generation of students communicates in a language that many academics don't yet understand. It's an ever-evolving language of interpretation and expression, an interactive approach to learning, creating, and responding to information through a complex montage of images, sound, and communi-

cation. Students are pushing learning into a new dimension; it's a mistake to continue to try to teach them in time-worn ways. Their choices of communication need to be diversified to include, for example, visual interpretations of texts and historical figures or soundtracks for poetry. Students can take advantage of the enormous resources of the Web, transforming what they find there by using digital technologies to create something new and expressive. The potential to invigorate investigation in the humanities with this approach is clear.

A change in the basic vehicle used for learning today, from archetypical courses, lectures, and textbooks to various interactive, electronically portable media could be a mode for enhancing our education system. Woodie Flowers (see pages 93–132) envisions entertainment-quality, Web-based modules that use animation, voice and video clips, captions, and text, all combined in accurate, well organized, pedagogically solid productions. He is convinced that the best lecture he has ever given would be no competition for a highly produced new media version covering the same material. A powerful implication of converting entire courses into modules is that students would not necessarily have to be on campus to complete them. Large introductory courses taught at the undergraduate level offer ripe possibilities for moving toward this new architecture.

More advanced and specialized courses could also be converted, although some level of face-to-face contact is certainly necessary to master such material. Indeed, several institutions and NASA recently announced a partnership to produce highly interactive learning modules to teach aerospace engineering.

In some of the modules, students will wear virtual reality glasses that would allow them to see aerospace systems and mechanics, along with animated reproductions of their professor and other students. Such environments are beginning to acknowledge the interactive and social basis of learning and are finding ways to achieve a balance between discovery and reflection in situ. But, as impressive as this sounds, we must facilitate off-campus students to construct their own understanding of these multimedia lectures through some form of social interaction. To this effect, off-campus virtual discussion groups can be created. We must also find ways to support the emergent aspects of learning that come from witnessing not just a wide range of courses, but also from experiencing a wide range of communities of scholars and practices.

Graduate education today, as discussed above, immerses students deeply into their chosen community of practice. Its nature is highly intensive and interpersonal and, thus, calls for more on-campus contact than a typical undergraduate course of study. This is entirely appropriate in light of the social nature of learning. Nevertheless, we can better leverage the resources harbored in the well established learning communities throughout higher education by rethinking their architecture.

The research university of the 21st century should support the development of graduate education that focuses on problems rather than disciplines. The roots of problems are almost inevitably found in the space between disciplines. In-depth explorations at the intersections of disciplines, where ideas collide, will lead to new methods and new concepts to help move

knowledge forward. A typical graduate student could be mentored by two or three faculty members, each from a different discipline, who, together, would advise the student on how to pursue the problem to its root. The student then becomes the boundary object between the disciplines, increasing both the professors' and his or her understanding of the space there.

A New Knowledge Ecology

The traditional university boundaries are blurring, not just because technology is making it possible, but also as a result of the burgeoning demand for education beyond campus and the undergraduate years. Technology can help higher education meet this demand by reshaping the university and extending its reach across time and space.

Across time, universities can maintain active relationships with alumni to help meet their lifelong learning needs. Given the rapid pace of technological advances and knowledge generation, lifelong learning is critical for continued innovation and prosperity. The tremendous growth of corporate-based training programs, which offer short, focused courses on a just-in-time basis, is ample evidence of the need for ongoing education beyond completion of one's degree. However, the networks that connect alumni and universities can offer more than just ongoing education for today's workers. Given their involvement in a practicing community, alumni can enhance the vitality of the network and the university by making contributions based on

their professional experiences. Most participants in a dynamic alumni network will become both learners and teachers. This dual role suggests that universities should move beyond an information push approach to interacting with alumni to more of a dialogue approach where both parties become learners, learning with and from each other. Universities should move from a diode model to a dialogue model when it comes to interacting with alumni and the outside world.

Learning networks, such as the one suggested above, go far beyond the usual broadcast variety of distance learning programs and differ in important ways from two-way interactive video conferencing. Learning networks resemble a virtual town, an open community in which each learner uses the network's resources as needed according to his or her learning styles, interests, and background. The network is supported by students, faculty, alumni, researchers, practicing professionals, retirees, and mentors, all seeking learning experiences and, in the process, contributing to the education of other participants.[6]

Learning networks can help transform the university into a learning organization and extend its reach across space. And they can serve as a springboard to an even more encompassing form, a broad *knowledge ecology* that reaches beyond the university's resources to draw on the strengths of the cultural institutions surrounding it (for example, libraries and museums) as well as on the equally important contributions of the region's corporations and government. Effectively linked, these resources would form an ecology that stimulates increasingly rich intellectual and educational opportunities.

Conclusion

Learning technologies are not a panacea that will resolve the many issues that higher education faces today. Instead, new technologies lead directly to institutional issues, starkly highlighting them in contrast to the widespread need for education and the possibilities technology presents to fill that need. Higher education today has the opportunity to reshape itself and play an important role in the future of our society. Whether that role is ultimately fulfilled will depend on fresh, creative thinking and a firm commitment to move teaching, learning, and the university into the digital age.

ACKNOWLEDGMENTS

This paper is based on a transcript from a talk given at the Aspen Forum and draws on material from *The Social Life of Information*[7] and "Universities in the Digital Age."[8] More about these papers and topics can be found on the Web site of *The Social Life of Information*, http://www.slofi.com. Maureen Devlin has been instrumental in developing this paper from my talk, material from past writings, and events that transpired at the Aspen Forum.

ENDNOTES

1. M. Polanyi, *The Tacit Dimension* (Garden City, NY: Doubleday, 1966).

2. S. D. N. Cook and J. S. Brown, "Bridging Epistemologies: The Generative Dance Between Organizational Knowledge and Organizational Knowing," *Organization Science*, Vol. 10, No. 4, July-August 1999, pp. 381–400.

3. J. Lave and E. Wenger, *Situated Learning: Legitimate Peripheral Participation* (New York: Cambridge University Press, p. 40).

4. This section is adapted from J. Brown and P. Duguid, "Universities in the Digital Age," *Change,* July/August, 1996.

5. Conveyed to the author through personal communication.

6. R. Larson, "MIT Learning Networks: An Example of Technology-Enabled Education," in *Forum Futures: 1998 Papers*, edited by M. Devlin and J. Meyerson (New Haven, CT: Forum Publishing, 1999, pp. 59–74).

7. J. Brown and P. Duguid, *The Social Life of Information* (Boston, MA: Harvard Business School Press, 2000).

8. J. Brown and P. Duguid, "Universities in the Digital Age," op cit.

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Bringing the Humanities into the 21st Century: A Multimedia Revolution in the Classroom

Nicole Herz

An Asian Studies professor discovers that his students recognize the names of a line of Shoguns from playing a popular video game.

An undergraduate receives extra credit in her Modern History class by making an album showing how the art of Kandinsky and Munch expressed an era. She researched and reproduced full-color copies of the chosen paintings from the Internet.

Another student creates his own "soundtrack" to the English Lake Poets by matching poems to rock songs on a compact disc using his school's digital equipment. His roommate creates videos for the poems by juxtaposing words and lines with recorded images.

Educators collect such anecdotes to pass on at conferences and during interviews, rarely taking seriously the fact that today's students are communicating in a language that many academics may not even understand. It's a language of visual eloquence and stylistic wit that was born in the late-nineteenth century. The questions now are, Are we going to continue dismissing this ever-evolving language of interpretation and expression? Or can we in academia find ways to sharpen it, expand it, in short, to bridge the "digital divide" that separates the virtual from Voltaire?

Six years as a teacher and graduate student at the University of Virginia History Department have made a couple of things obvious to me: first, that the gap between traditional and contemporary learning techniques is becoming critically wide; and second, that the custodians of history and literature are turning a blind eye to this gap or denying that the other shore might be the humanities' salvation. My own research on the culture of photography in nineteenth-century Europe has shown me that academia's dismissal of new technologies does not preserve its powers, but erodes them, until its professors are gradually driven to the margins of public life.

Academia sees students learning, creating, and responding to information through a complex montage of images, sound, and communication; but it doesn't really *look*. Instead of welcoming students' interactive approach to information, it continues to ignore it, insisting on the same five-paragraph box that has ruled over the humanities for the last century or more.

It's true that a few preliminary steps have been made: Lynn Hunt's CD-ROM on Revolutionary France has brought interactivity into the classroom; one finds textbooks today with links to the World Wide Web in every chapter; and some college professors have created innovative class Web pages that serve as forums for discussion. However, we are still far from incorporating all the intellectual resources available that could push learning into a new dimension. The reason is that academics continue to insert themselves into a matrix of knowledge, power, and authority that has historically shaped the humanities. In other words, we refuse to learn from the culture and technology that thrives outside the university—the visualizing, messaging, and innovating driven by the young. If the professors are so eager to have their students interface with what's valuable in the past, shouldn't those students have the opportunity to bring to the table the ideas they deem relevant in the present?

Since the late nineteenth century, societies in the West have constructed themselves (the nation, gender, class, religion, fashion, and consumerism) with images. When we think about the Civil War, for example, or the Holocaust, or the Cold War, a series of artifacts, symbols, photographs, artworks, and visual propaganda comes flowing into our minds. Students in the humanities need to understand how this cognitive, or perceptual,

shift took place (logographic to visual) and the political implications of that shift. They already use the postmodern language of images with a virtuosity that surpasses our most dedicated theorists of visual culture. Now it's up to the professors to invite them to bring their abilities to the texts and images of the past.

Innovators such as Darwin, Freud, and Martin Luther King, Jr. transformed culture by touching people's imaginations and emotions. Rather than force students to interpret their ideas in two dimensions, we ought to diversify the choices of communication. The following suggestions focus on how recreating the classroom as a multimedia laboratory can awaken students and teachers to the real value of the humanities.

- Allow students to interpret the logographic documents of the past in language that is relevant to them in the 21st century. Our responses to nineteenth-century essays do not have to take the form of nineteenth-century essays. Students can show how theories of the past have shaped entire genres of film, news media, science fiction, and graphic arts.
- Encourage students to use technologies such as digital contact and imagery (for example, chat rooms, e-mail, the Internet), film, video, music, and games to show how and why the words of the past may be meaningful in the present and future.
- Reassure young people that the value of authors and poets lies not in the fact that their reprinted books sit in libraries and bookstores, but that they take us on amazing journeys. If Dickens and Hemingway remain relevant today, then

> their ideas, and the feelings they orchestrate, can be interpreted and judged. The important thing is not to imitate the past, but to discover the human connection between you and those words from the past.

As young people invent more ways of using the technology at their disposal, they don't necessarily grasp the idea that their generation is part of a continuing human evolution with long roots. The history of culture and technology can shed light on our own obsessions. For example, educators could help students trace an activity like surfing the Net back to the Victorian armchair traveler. We are no more curious or knowledge-hungry than our ancestors. We're just a lot faster and, in some cases, less patient for more information. Our constant use of cell phones, too, has roots in the golden age of the letter, postcards, and telegraph, an age when the circulation of news and information parallels the explosion of communication today.

Multimedia is vital to our investigation of how culture and society have changed in the recent past. For example, how can we compare contemporary representations of the family with the realities of our changing life cycles? How do we really grapple with phenomena like "information overload" in a culture that lives on the constant production, processing, and packaging of information? We have to use the tools that can best recognize and combat our most problematic issues, which is the technology itself.

This proposal merely outlines the challenge that faces academia and points to new ways of using the language and dialects of multimedia. I have not discussed the class privileges and deprivations that determine who gets to use and shape the me-

dia today (and yesterday), nor have I described how issues of race and gender play their role in the production of pixels and other vocabularies. Furthermore, as a teacher I am well aware that students, like everyone else, often want to complete projects with the absolute minimum amount of effort possible, going so far as to cheat in a variety of ways. It's up to all educators to come up with the techniques that help students *want* to reach their highest potential. Resolutions for such issues and more can be discovered in workshops, interdisciplinary programs, courses, and projects where students and professors work together to promote the future of learning.

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