Introduction

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We live in a complex, hypermediated, fast-moving, and multisensory world. Our nation is home to an astounding mix of races, ethnicities, and religious beliefs. Our daily lives are often driven by devices that enable us to engage our world from multiple perspectives at once. Meanwhile, we face decisions not only on questions of personal well-being but also on ethical and existential issues involving our global society and human destiny—from protection of the environment, to the clash of civilizations, to whether to ban human cloning. How can our institutions of higher learning take full advantage of technological and scientific advances to help prepare future generations for active participation in this complex milieu?

The Forum on the Internet and the University (the Internet Forum) convenes during the Aspen Symposium of the Forum for the Future of Higher Education, held each fall at the Aspen Institute. The Forum is a community of academic leaders and scholars from across the country who explore new thinking in higher education, particularly about issues related to institutional change, strategy, economics, and technology.
The Internet Forum’s research culminates at its Aspen Symposium, where scholars present their work for discussion and debate. Its goals are to

- create a scholarly platform from which participants can explore how the Internet and related technologies can improve learning, and
- assess the opportunities and risks created by rapid technological change.

Scholarship presented during the 2003 Internet Forum is offered here so as to share more broadly the insights, discussions, and inquiry it sparked.

The Frontiers of Knowledge

One of the most valuable contributions colleges and universities make to society flows from their constantly pushing back the frontiers of knowledge on many fronts. One of the most exciting areas—where progress in the past decade or so compares to the revolution in information technology and communications—is in the cognitive and neurosciences. Dramatic advances in our understanding of the brain’s cognitive and perceptual processing have unlocked many of the mysteries of how we learn. How can this new knowledge inform the design and application of new technologies to enhance teaching and learning? The prospect of merging advances in neurosciences
and in information and communication technologies holds much promise.

**Neuroscience and the Potential for Change**

V. S. Ramachandran, director of the Center for Brain and Cognition and professor of neurosciences and psychology at the University of California, San Diego, believes that the real secret to understanding the brain lies not only in unraveling and mapping the structure and function of its modules but also in discovering how they interact with each other to generate the whole spectrum of abilities that we call human nature. He and coauthor Edward Hubbard describe their research on phantom limbs—that is, arms, legs, or fingers, for example, that linger indefinitely in the minds of patients long after they have been lost in an accident or removed by a surgeon. Ramachandran and Hubbard found that large-scale changes in the organization of the brain occur in response to the loss of limbs; such changes in adult humans flatly contradict one of the most widely accepted dogmas in neurology—the fixed nature of connections in the adult human brain.

The implications of these findings are far reaching. First and foremost, they suggest that brain maps can change, sometimes with astonishing rapidity—effects have been seen in patients just 24 hours after amputation. Thus, it is possible that the completely static brain maps in textbooks are highly misleading. It may be that far from signaling a specific location on the skin, each neuron in the map is in a state of dynamic equilib-
rium with other adjacent neurons; its significance depends strongly on what other neurons in the vicinity are (or are not) doing.

Malleability of the adult brain raises intriguing questions for educators: How do we tap the mind power and possibilities that neuroscience is bringing to light? How do we maximize individual potential? Ramachandran and Hubbard believe that we are witnessing a revolution in the history of the human race: understanding ourselves as we transform our understanding of the human brain.

Creative Approaches to Teaching and Learning

Creative and informed approaches to teaching and learning may provide the key to enabling higher education to make meaningful contributions to addressing local, national, and global needs. New technologies offer the possibility of rich learning environments to everyone who has access to a computer and the Internet, helping democratize higher education by providing tools for wide audiences at minimal costs. It is noteworthy that the remarkable long-term efforts to harness the power of new learning media described in this section each began well before the advent of the World Wide Web and evolved with the Web by embracing the opportunities it presents to enrich and expand learning. And yet, while the power of information technology has transformed commerce, entertainment, and personal communication, overall, higher educa-
tion has yet to achieve the critical mass of innovative applications that will transform the centuries-old, traditional approach to teaching and learning that prevails at the nation’s leading colleges and universities.

*The Valley Project*

Edward Ayers, dean of the College and Graduate School of Arts and Sciences and the Hugh P. Kelly Professor of History at the University of Virginia, and Charles Grisham, chief technology officer for the College and Graduate School of Arts and Sciences and professor of chemistry at the University of Virginia, note that despite the tremendous investments that all institutions of higher education have made in IT, the very heart of education—the classroom and the scholarship taught in that classroom—remains largely isolated from the powerful networks we use in the rest of our lives. Even the form of scholarship has barely changed despite all the revolutions in computing: across almost every field, researchers, no matter how sophisticated the technology they use in discovery, translate those discoveries into simple word-processed documents.

The primary goal of the University of Virginia’s Institute for Advanced Technology in the Humanities (IATH) is to match motivated humanists with broad-minded computer scientists to create new tools for understanding the record of the human experience. One of IATH’s two founding projects is *The Valley of the Shadow*, conceived by Edward Ayers, who has been its driving force for more than a decade. The idea for the project
was straightforward: to put every piece of information about every person in a Northern community and a Southern community in the era of the Civil War in a digital context so that students and scholars would have an unprecedented command over those millions of pieces of evidence. With access to newspapers, diaries, letters, census and military records, maps, photographs, and more, users of the Valley Project Web site are able to immerse themselves in primary sources and begin to understand the immense complexity of historical change.

The Valley Project has been an overwhelming success; the Journal of American History called it the “most sophisticated historical site on the Web.” As successful as the history of the Valley Project has been, however, it has by no means established digital media as an entirely legitimate form of scholarship. To make IT more pervasive and useful, Ayers and Grisham urge that it be worked more seamlessly into our professional structures and practices and into our proven techniques of teaching, scholarship, and research. They believe that American higher education’s massive investment in technology infrastructure will not pay off until teachers and scholars are supported and encouraged to make that machinery work in the classroom and in their scholarship.

The MIT Shakespeare Project

Peter Donaldson, head of the Literature Faculty and director of the Shakespeare Electronic Archive at the Massachusetts Institute of Technology, describes early efforts in the evolution
of the Shakespeare multimedia archive. He and his colleagues began in the early 1990s by using a laserdisc and HyperCard system to create links between the text of Shakespeare plays—about one link for every three lines or so of text—and the time code of the discs so that a student could click on a speech and watch the corresponding film sequence in which the lines were spoken. Additionally, they created software notecards, allowing students to define their own film sequences and include links to the video in their own notes, presentations, and multimedia essays. This new tool confirmed Donaldson’s belief that studying text and moving image in close conjunction could take students beyond just the written word or film and lead to something different from studying either medium by itself. Most striking, perhaps, is Donaldson’s observation that his role as teacher began to shift as he used these new learning tools: the classroom became more like a workshop as students helped one another edit material or offered critiques of preliminary versions of presentations.

Laserdiscs are no longer manufactured, but this early system served its purpose as a proof of concept. The laserdisc system helped launch a new pedagogy and made the style of copious video citation felt in the scholarly world. Donaldson reports that the multimedia essay is now a well-established form for scholarly communication in Shakespeare studies. This apparent contrast with Ayers’s experience as an historian—that despite its huge success, the Valley Project has not established digital media as a legitimate form of scholarship—perhaps may be explained by the underlying nature of Shakespeare as origi-
nally performance based, which lends itself more readily toward media other than the written word and, likewise, makes Shake-
speareans more open to new forms of scholarship.

Donaldson’s work has convinced him that all humanists need to be actively involved in finding technical solutions to scholarly and educational needs. No one, he says, should be passive about technology or new media. He encourages humanists to involve themselves in the work of designing and applying new media and to recognize it as an integral part of their calling.

The Evolving Higher Education Landscape

Higher education is undergoing a metamorphosis as economic forces, demographic shifts, societal needs, and technological advances all exert their influence on the learning environments of traditional liberal arts colleges and research universities. The burgeoning demand for higher education and lifelong learning simply cannot be met by the nation’s current stock of brick-and-mortar institutions; moreover, few such institutions have successfully launched technology-based education ventures. Yet, new technologies, by opening up new forms of teaching and learning available both on and off campus, have facilitated the entry of for-profit companies, which are growing at an annual rate of 20 percent. Further, economic realities are fundamentally altering the scope of traditional institutions as they outsource more activities and compete in the higher
education marketplace—with important implications for their governance structures and strategies. While the challenges currently facing higher education’s leaders are complex and demand forward-looking responses, the possibilities for further advancing the creation, transmission, and application of knowledge are great.

Revolution at the Edges

Clara Yu, Cornelius V. Starr Professor of Linguistics at Middlebury College and former director of the National Institute for Technology and Liberal Learning (NITLE), questions whether small, residential liberal arts colleges—many of which spend $80,000 or more per student per year—can sustain themselves in the face of market realities. How can this sector evolve smoothly to maintain excellence, contain costs, and expand its sphere of intellectual influence so that these colleges not only survive, but thrive?

Yu describes NITLE, a consortium of more than 80 liberal arts colleges. The organization was formed in 2001 with the explicit mission to serve as a catalyst for innovation and collaboration for national liberal arts colleges as they seek to effectively use technology to enhance teaching, learning, scholarship, and information management. Many liberal arts colleges today realize that individual institutions can’t do everything for everyone—yet institutions do want to give their students the opportunities they want and need in an environment that fosters interaction and open scholarly communication.
NITLE has undertaken a broad range of experimental efforts to meet this challenge, directly involving more than 2,500 administrators, faculty, information technologists, librarians, and student technologists in a wide variety of initiatives. One program, for example, facilitates the transition from teacher-focused pedagogy (for example, large lectures, faculty-directed seminars, labs, and so on) to learner-centered processes in an effort to make education more relevant and useful for our future world citizens. This conversion entails rethinking the roles of faculty and students, redesigning the curriculum and course content to take advantage of new learning media, and reimagining the physical and virtual environments in which learning activities take place. This combination of residential learning and today’s technologies may provide the best opportunity to offer a contemporary liberal education that meets the needs of today’s complex world.

The Paradox of Scope

David Collis, MBA Class of 1958 and senior lecturer of business administration at Harvard Business School, explains the paradox of scope, first identified by corporate strategists to explain the blurring boundaries of today’s firms. The term captures the notion of two opposing forces operating simultaneously: The traditional core of many companies is shrinking as activities such as information technology, logistics, and even manufacturing are outsourced, while at the same time the firm’s periphery is expanding through the proliferation of al-
liances, joint ventures, partnerships, and other long-term contracts. Collis demonstrates that the paradox of scope is also at work in higher education by assessing several key dimensions of colleges and universities, including student composition, revenue sources, and outsourcing activities, among others.

Why does the paradox of scope matter for the governance of higher education? Clark Kerr put the answer simply in his book, *Uses of the University* (2001): because it results in “. . . less control over more things.”2 The expanding periphery and contracting core of today’s colleges and universities stretch the already limited adaptive capability of governance structures to the breaking point. Collis identifies several factors that combine to increase the inertia and reduce the effectiveness of the governance of higher education: Colleges and universities simultaneously pursue multiple goals, often making it difficult to define clear goals; further, it is extraordinarily hard to measure progress or evaluate the achievement of those goals. The existence of multiple constituencies with conflicting objectives, coupled with the absence of effective sanctions against groups with veto power, also suggest the enormous difficulties of the governance task. If we accept that one of the primary purposes of the governing board is to generate insight into an ever-changing environment and thereby set forward-looking strategy for the institution, then, Collis maintains, the problems of current higher education governance are evident.

Collis makes several suggestions to improve upon and design an appropriate governance structure for higher education. The primary challenge in his mind is to take back charge of the
institution. The blurring boundary of the institution creates ambiguity and unclear roles and responsibilities—what the military refers to as “mission creep,” as each succeeding tier of the periphery pursues new directions of its own accord. Collis urges the next generation of academic leaders to put a stop to the undirected expansion of the periphery and to define a clear and unique strategy that specifies the domain in which their institutions will operate and excel.

Getting the University-Industry Partnership Right

Maria Klawe, dean of engineering and professor of computer science at Princeton University, and Telle Whitney, president of the Anita Borg Institute for Women and Technology, discuss the relationship between higher education and industry—an area where peripheral, institutional alliances and joint ventures are expanding in response to fundamental changes in the private commercial sector. Over the past 20 years, the major private research laboratories in the United States—AT&T, Bell, IBM, and Xerox—have downsized considerably and substantially reduced their efforts in independent, fundamental research. Today, their focus is almost entirely product-related.

The effects of these changes on higher education are significant. As their own capacity has declined, companies are funding more basic and applied research at universities. Further, nearly all corporate giving to higher education today is tied directly to corporate goals, and it seems that undirected gifts have virtually disappeared. Klawe and Whitney warn that po-
tential conflict-of-interest situations abound. Universities need to address these situations and help train faculty and graduate students to effectively handle the complex ethical issues arising with greater frequency throughout the academy. They also note that industry's interest in higher education runs deeper than the research it funds on campus: the corporate sector, for example, has been far more proactive than academia in its efforts to build a workforce more representative of the general public. Indeed, industry is frustrated that U.S. colleges and universities are not graduating enough females and minorities to hire. Because industry has decided that diversifying its workforce is important, this issue undoubtedly will influence ongoing corporate interactions with universities.

Additional funding from industry presents a huge opportunity to conduct academic research, allowing universities to pursue knowledge and make positive contributions to society. On the other hand, it poses a serious threat in the potential loss of independence as a result of outside influence over the direction of work and in the diminishment of pure, fundamental research. Striking the right balance in the burgeoning partnership between industry and universities is critical to maintaining the integrity of higher education.

Conclusion

The need for higher education's deep engagement in addressing the complex, global issues that confront us today is press-
ing and immediate. Colleges and universities can contribute both in terms of applying the knowledge generated on their campuses and in producing informed and educated citizens with the capacity to develop creative solutions and pathways toward improving the lives of people worldwide. While the future is uncertain, we do know that the status quo is not sustainable. It seems that the scientific and technological advances and applications described herein may offer the fertile ground from which knowledge and creativity can spring.

The following chapters should inspire your vision and imagination as you consider the future of your institution, higher education, and our global society.

ENDNOTES


2. ThinkEquity, Two Years to Life: Investment Themes in For-Profit, Post-Secondary Education (San Francisco: ThinkEquity, 2002).

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