

CHAPTER 17

Higher Education in the 21st century: Global Imperatives, Regional Challenges, National Responsibilities and Emerging Opportunities

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INTRODUCTION

We live in a time of great change, an increasingly global society, driven by the exponential growth of new knowledge and knitted together by rapidly evolving information and communication technologies. It is a time of challenge and contradiction, as an ever-increasing human population threatens global sustainability; a global, knowledge-driven economy places a new premium on technological workforce skills through phenomena such as out-sourcing and off-shoring; governments place increasing confidence in market forces to reflect public priorities even as new paradigms such as open-source software and open-content knowledge and learning challenge conventional free-market philosophies; and shifting geopolitical tensions are driven by the great disparity in wealth and power about the globe, manifested in the current threat to homeland security by terrorism. Yet it is also a time of unusual opportunity and optimism as new technologies not only improve the human condition, but also enable the creation and flourishing of new communities and social institutions more capable of addressing the needs of our society. Such issues provide the context for higher education in the 21st century.

GLOBAL IMPERATIVES

Our world today is undergoing a very rapid and profound social transformation, driven by powerful information and communications technologies that have stimulated a radically new system for creating wealth that depends upon the creation and application of new knowledge and hence upon educated people and their ideas. As Thomas Friedman stresses in his provocative book, *The World is Flat*, information and telecommunications technologies have created a platform “where intellectual work and intellectual capital can be delivered from anywhere — disaggregated, delivered, distributed, produced, and put back together again”, or in current business terms, this gives an entirely new freedom to the way we do work, especially work of an intellectual nature (Friedman, 2005).

Our economies and companies have become international, spanning the globe and interdependent with other nations and other peoples. As the recent report of the National Intelligence Council’s 2020 Project has concluded, “the very magnitude and speed of change resulting from a globalizing world — apart from its precise character — will be a defining feature of the world out to 2020. Globalization — growing interconnectedness reflected in the expanded flows of information, technology, capital, goods, services, and people throughout the world will become an overarching mega-trend, a force so ubiquitous that it will substantially shape all other major trends in the world of 2020.” (National Intelligence Council, 2004). It is this reality of the hyper-competitive, global, knowledge-driven economy of the 21st century that is stimulating the powerful forces that will reshape the nature of our society and our knowledge institutions.

Nations are investing heavily and restructuring their economies to create high-skill, high-paying jobs in knowledge-intensive areas such as new technologies, financial services, trade and professional and technical services. From Paris to San Diego, Bangalore to Shanghai, there is a growing recognition throughout the world that economic prosperity and social well-being in a global, knowledge-driven economy require investment in knowledge resources. That is, regions must create and sustain a highly educated and innovative workforce and the capacity to generate and apply new knowledge, supported through policies and investments in developing human capital, technological innovation, and entrepreneurial skill (Council on Competitiveness, 2004).

Markets characterized by the instantaneous flows of knowledge, capital and work and unleashed by lowering trade barriers are creating global enterprises based upon business paradigms such as out-sourcing and off-shoring, a shift from public to private equity investment, and declining identification with or loyalty to national or regional interests. Market pressures increasingly trump public policy and hence the influence of national governments. Yet the chal-

lenges facing our world such as poverty, health, conflict and sustainability not only remain unmitigated, but in many respects become even more serious through the impact of the human species — global climate change being foremost among them. The global knowledge economy requires thoughtful, interdependent and globally identified citizens. Institutional and pedagogical innovations are needed to confront these challenges and insure that the canonical activities of universities — research, teaching and engagement — remain rich, relevant and accessible.

REGIONAL CHALLENGES

Regions face numerous challenges in positioning themselves for prosperity in the global economy, among them changing demographics, limited resources, and cultural constraints. The populations of most developed nations in North America, Europe and Asia are aging rapidly where over the next decade the percentage of the population over 60 will grow to over 30% to 40%. Half of the world's population today lives in countries where fertility rates are not sufficient to replace their current populations, e.g. the average fertility rate in EU has dropped to 1.45, below the 2.1 necessary for a stable population. Aging populations, out-migration, and shrinking workforces are having an important impact, particularly in Europe, Russia, and some Asian nations such as Japan, South Korea and Singapore. The implications are particularly serious for schools, colleges and universities that now experience not only aging faculty, but excess capacity that could lead to possible closure.

In sharp contrast, developing nations in Asia, Africa, and Latin America are characterized by young and growing populations in which the average age is less than 20. Here the demand for education is staggering since in a knowledge economy, it is clear to all that this is the key to one's future security. Unless developed nations step forward and help address this crisis, billions of people in coming generations will be denied the education so necessary to compete in, and survive in, the knowledge economy. The resulting despair and hopelessness among the young will feed the terrorism that so threatens our world today.

Today we see a serious imbalance between educational need and educational capacity — in a sense, many of our universities are in the wrong place, where populations are aging and perhaps even declining rather than young and growing. This has already triggered some market response, with the entry of for-profit providers of higher education (e.g., Laureate, Apollo) into providing higher education services on a global basis through acquisitions of existing institutions or distance learning technologies. It also is driving the interest in new paradigms such as the Open Education Resources movement (Atkins, 2007). Yet, even if market forces or international development

efforts are successful in addressing the urgent educational needs of the developing world, there are also concerns about whether there will be enough jobs to respond to a growing population of college graduates in many of these regions.

Growing disparities in wealth and economic opportunity, frequently intensified by regional conflict, continue to drive population migration. The flow of workers across the global economy seeking prosperity and security presents further challenges to many nations. The burden of refugees and the complexity of absorbing immigrant cultures are particularly apparent in Europe and North America. In the United States, immigration from Latin America and Asia is now the dominant factor driving population growth (53%), with the US population projected to rise from 300 million to over 450 million by 2050 (National Information Center, 2006). While such immigrants bring to America incredible energy, talents and hope, and continue to diversify the ethnic character of our nation, this increasing diversity is complicated by social, political and economic factors. The full participation of immigrants and other under-represented ethnic groups continues to be hindered by the segregation and non-assimilation of minority cultures and backlash against long-accepted programmes designed to achieve social equity (e.g., affirmative action in college admissions). Furthermore, since most current immigrants are arriving from developing regions with weak educational capacity, new pressures have been placed on US educational systems for the remedial education of large numbers of non-English speaking students.

On a broader scale, the education investments demanded by the global knowledge economy are straining the economies of both developed and developing regions (OECD, 2005). Developing nations are overwhelmed by the higher education needs of an expanding young population at a time when even secondary education is only available to a small fraction of their populations. In the developed economies of Europe and Asia, the tax revenues that once supported university education only for a small elite are now being stretched thin to fund higher education for a significant fraction of the population (i.e., massification). Even the United States faces the limits imposed on further investment in education by retiring baby boomers who demand other social priorities such as health care, financial security, low crime, national security and tax relief (Zemsky *et al.*, 2005; Newman *et al.*, 2004).

These economic, social and technological factors are stimulating powerful market forces that are likely to drive a massive restructuring of the higher education enterprise. Already we see many governments tending to view higher education as a private benefit (to students) of considerable value rather than a public good benefiting all of society, shifting the value proposition from that of government responsibility to support the educational needs of a society to that of university responsibility to address the economic needs of government

— an interesting reversal of responsibilities and roles. Many nations are moving toward revenue-driven, market-responsive higher education systems more highly dependent on the private sector (e.g., student fees and philanthropy) because there is no way that their current tax systems can support the massification required by knowledge-driven economies in the face of other compelling social priorities (particularly the needs of the elderly).

The changing nature of the global economy is also exerting new and powerful pressures on regional educational needs and capacity. The liberalization of trade policies coupled with the ICT revolution has allowed the emergence of global corporations characterized by weakening ties to regional or national priorities. The trend for out-sourcing of business processes and off-shoring of jobs has accelerated as many corporations are now beginning to distribute not only routine production but fundamental aspects of core business activities (e.g., design, innovation, R&D) on a global basis, leaving behind relatively little core competence in their countries of origin. While this can create new regions of high innovation, these too can out-source/off-shore activities to still less expensive, although competent, labour markets, leaving behind enterprises characterized by little value added aside from financial management and brand name — no longer a solid foundation for a prosperous regional economy. From the United States to India to Vietnam to Kenya... the out-sourcing/off-shoring practices of the global corporation continue to distribute value-adding activities ever further, wherever skilled and motivated labour is available at highest quality and lowest cost.

NATIONAL RESPONSIBILITIES

In summary then, the forces driving change in our world — changing demographics (aging populations, migration, increasing ethnic diversity), globalization (economic, geopolitical, cultural), and disruptive technologies (info-bio-nano technologies) — are likely to drive very major changes in post-secondary education as a global knowledge economy demands a new level of knowledge, skills, and abilities on the part of our citizens. The strength, prosperity and leadership of a nation in a global knowledge economy will demand highly educated citizenry and hence a strong system of post-secondary education. It will also require research universities, capable of discovering new knowledge, developing innovative applications of these discoveries, transferring them into society through entrepreneurial activities, and educating those capable of working at the frontiers of knowledge and the professions.

Yet there are broader responsibilities beyond national interests — particularly for developed nations — in an ever more interconnected and interdependent world. Global challenges such as crippling poverty, health pandemics, terrorism and global climate change require both commitment and

leaderships. Whether motivated by the economic design to create new markets or the more altruistic motives of human welfare, affluent nations have a responsibility to address global issues.

The ongoing debate concerning the future of higher education in the United States provides an illustration of the tension between the traditional roles of the university and the needs of the knowledge economy.

A CASE STUDY: THE UNITED STATES

Higher education in the United States is characterized both by its great diversity and an unusual degree of institutional autonomy — understandable in view of the limited role of the federal government in post-secondary education. As *The Economist* notes, “the strength of the American higher education system is that it has no system.” It benefits from a remarkable balance among funding sources, with roughly 25% from the federal government, 20% from the states and 55% from private sources (tuition, philanthropy). Again to quote *The Economist*: “It is all too easy to mock American academia. But it is easy to lose sight of the real story: that America has the best system of higher education in the world!” (*The Economist*, 2005).

Yet, while this remains true in selected areas such as research and graduate education, many other aspects of higher education in the United States raise serious concerns: an increasing socioeconomic stratification of access to (and success in) quality higher education; questionable achievement of acceptable student learning outcomes (including critical thinking ability, civic participation, communication skills and quantitative literacy); cost containment and productivity; and the ability of institutions to adapt to changes demanded by the emerging knowledge services economy, globalization, rapidly evolving technologies, an increasingly diverse and aging population, and an evolving marketplace characterized by new needs (e.g., lifelong learning), new providers (e.g., for-profit, cyber, and global universities), and new paradigms (e.g., competency-based educational paradigms, distance learning, open educational resources). Furthermore, while American research universities continue to provide the nation with global leadership in research, advanced education and knowledge-intensive services such as health care, technology transfer and innovation, this leadership is threatened today by rising competition from abroad, by stagnant support of advanced education and research in key strategic areas such as physical science and engineering, and by the complacency and resistance to change of the American research university (Augustine, 2005).

In recent years, numerous studies sponsored by government, business, foundations, the national academies and the higher education community have suggested that the past attainments of American higher education may have

led our nation to unwarranted complacency about its future. Of particular importance here was the National Commission on the Future of Higher Education, launched in 2005 to examine issues such as the access, affordability, accountability and quality of our colleges and universities (Miller, 2006). This unusually broad commission — comprised of members from business, government, foundations and higher education — concluded that “American higher education has become what, in the business world would be called a mature enterprise: increasingly risk-averse, at times self-satisfied, and unduly expensive. It is an enterprise that has yet to address the fundamental issues of how academic programs and institutions must be transformed to serve the changing educational needs of a knowledge economy. It has yet to successfully confront the impact of globalization, rapidly evolving technologies, an increasingly diverse and aging population, and an evolving marketplace characterized by new needs and new paradigms.”

More specifically, the Commission raised two areas of particular concern about American higher education: social justice and global competitiveness. Too few Americans prepare for, participate in and complete higher education. Notwithstanding the nation’s egalitarian principles, there is ample evidence that qualified young people from families of modest means are far less likely to go to college than their affluent peers with similar qualifications. America’s higher-education financing system is increasingly dysfunctional. Government subsidies are declining; tuition is rising; and cost per student is increasing faster than inflation or family income.

Furthermore, at a time when the United States needs to be increasing the quality of learning outcomes and the economic value of a college education, there are disturbing signs that suggest higher education is moving in the opposite direction. Numerous recent studies suggest that today’s American college students are not really learning what they need to learn (Bok, 2006). As a result, the continued ability of American post-secondary institutions to produce informed and skilled citizens who are able to lead and compete in the 21st century global marketplace may soon be in question. Furthermore, the decline of public investment in research and graduate education threatens to erode the capacity of America’s research universities to produce new the knowledge necessary for innovation.

The Commission issued a series of sweeping recommendations to better align higher education with the needs of the nation, including; 1) reaffirming America’s commitment to provide all students with the opportunity to pursue post-secondary education; 2) restructuring financial student aid programmes to focus upon the needs of lower income and minority students; 3) demanding transparency, accountability and commitment to public purpose in the operation of our universities; 4) adopting a culture of continuous innovation and quality improvement in higher education; 5) greatly increasing investment in

key strategic areas such as science, engineering, medicine and other knowledge-intensive professions essential to global competitiveness; and 6) ensuring that all citizens have access to high quality educational, learning, and training opportunities throughout their lives. A series of actions has been launched by government at the federal and state levels, along with colleges and universities, to implement these recommendations over the next several years.

In a global, knowledge-driven economy, technological innovation — the transformation of new knowledge into products, processes, and services of value to society — is critical to competitiveness, long-term productivity growth, an improved quality of life and national security. It is certainly true that many of the characteristics of our nation that have made the United States such a leader in innovation and economic renewal remain strong: a dynamic, free society that is continually renewed through immigration; the quality of American intellectual property protection and the most flexible labour laws in the world, the best regulated and most efficient capital markets in the world for taking new ideas and turning them into products and services, open trade and open borders (at least relative to most other nations), and universities and research laboratories that are the envy of the world. Yet today, many nations are investing heavily in the foundations of modern innovation systems, while the United States has failed to give such investments the priority they deserve in recent years. Well-documented and disturbing trends include: skewing of the nation's research priorities away from engineering and physical sciences and toward the life sciences; erosion of the engineering research infrastructure; a relative decline in the interest and aptitude of American students for pursuing education and training in engineering and other technical fields; and growing uncertainty about our ability to attract and retain gifted science and engineering students from abroad at a time when foreign nationals constitute a large and productive fraction of the US R&D workforce. (Augustine, 2005; Duderstadt, 2005)

These concerns raised both by industry and the National Academies have finally stimulated the federal government to launch a very major effort, the American Competitiveness Initiative, aimed at sustaining US capacity for innovation and entrepreneurial activities (OSTP, 2006). The elements of this initiative will span the next decade and involve doubling federal investment in basic research in physical science and engineering (from \$9.75 billion/year to \$19.45 B/y); major investments in science and engineering education; tax policies designed to stimulate private sector in R&D; streamlining intellectual property policies; immigration policies that attract the best and brightest scientific minds from around the world; and building a business environment that stimulates and encourages entrepreneurship through free and flexible labour, capital, and product markets that rapidly diffuse new productive technologies.

EMERGING OPPORTUNITIES

The information and communications technologies enabling the global knowledge economy so-called cyberinfrastructure (the current term used to describe hardware, software, people, organizations, and policies) evolve exponentially, doubling in power for a given cost every year or so, amounting to a staggering increase in capacity of 100 to 1,000-fold every decade. It is becoming increasingly clear that we are approaching an inflection point in the potential of these technologies to radically transform knowledge work. To quote Arden Bement, Director of the US National Science Foundation: “We are entering a second revolution in information technology, one that may well usher in a new technological age that will dwarf, in sheer transformational scope and power, anything we have yet experienced in the current information age.” (Bement, 2007).

Many leaders, both inside and outside the academy, believe that these forces of change will so transform our educational institutions — schools, colleges, universities, learning networks — over the next generation as to be unrecognizable within our current understandings and perspectives (Duderstadt, 2005; Brown, 2006). Let me illustrate with several possibilities:

The Global University: The emergence of a global knowledge economy is driven not only by pervasive transportation, information and communications technologies, but also by a radically new system for creating wealth that depends upon the creation and application of new knowledge and hence upon advanced education, research, innovation and entrepreneurial activities. There is a strong sense that higher education is similarly in the early stages of globalization, through the efforts of an increasing number of established universities to compete in the global marketplace for students, faculty and resources; through the rapid growth in international partnerships among universities; and through for-profit organizations (e.g., Apollo, Laureate) that seek to expand through acquisition into global enterprises. New types of universities may appear that increasingly define their purpose beyond regional or national priorities to address global needs such as health, environmental sustainability and international development — what one might call “universities in the world and of the world”.

Lifelong Learning: Today the shelf life of education provided early in one’s life, whether K-12 or higher education, is shrinking rapidly in face of the explosion of knowledge in many fields. Furthermore, longer life expectancies and lengthening working careers create additional needs to refresh one’s knowledge and skills on a continual basis. Hence, an increasing number of nations are setting the ambitious goal of providing their citizens with pervasive, lifelong learning opportunities. Of course, this will require not only a very considerable transformation and expansion of the existing post-secondary education enterprise but also entirely new paradigms for the conduct, orga-

nization, financing, leadership and governance of higher education. Yet, if successful, it could also create true societies of learning, in which the sustained development of knowledge and human capital become the key paths to economic prosperity, national security and social welfare.

The Meta University: Some of the most interesting activities in higher education today involve an extension of the philosophy of open source software development to open up opportunities for learning and scholarship to the world by putting previously restricted knowledge into the public domain and inviting others to join both in its use and development. MIT led the way with its OpenCourseWare (OCW) initiative, placing the digital assets supporting almost 1,800 courses in the public domain on the Internet for the world to use. Today over 150 universities have adopted the OCW paradigm to distribute their own learning assets to the world (Vest, 2006). Furthermore, a number of universities and corporations have joined together to develop open-source middleware to support the instructional and scholarly activities of higher education, already used by several hundred universities around the world. (Sakai Project, 2007; Moodle, 2007) Perhaps the most exciting — and controversial — effort is the Google print library project in which a number of leading universities have joined together with Google to digitize a substantial portion of their library holdings, making these available for full-text searches using Google’s powerful Internet search engines (Google, 2007). For example, Michigan expects Google to complete the scanning of its entire 7.8 million volume library by 2010. While there are still many copyright issues that need to be worked through, it is our hope that we will be able to provide full access to a significant fraction of this material to scholars and students throughout the world. When combined with the holdings of the other Google book scan members — now roughly a dozen of the world’s leading libraries — the potential of this project amounts to providing full-text search access (and eventually perhaps direct online text access) to over half of the estimated books in the world today — in over 400 languages.

Open source, open content, open learning and other “open” technologies become the scaffolding on which to build truly global universities — what Vest terms the “meta” university (Vest, 2006). As he observes, “the incredibly large scale of education world wide; the huge diversity of cultural, political, and economic contexts; and the distribution of public and private financial resources to devote to education are too great.” Instead Vest suggests that “through the array of open paradigms, we are seeing the early emergence of a Meta University — a transcendent, accessible, empowering, dynamic, communally-constructed framework of open materials and platforms on which much of higher education world wide can be constructed or enhanced.”

Universal Access to Knowledge and Learning: Imagine what might be possible if all of these pieces could be pulled together, i.e., Internet-based

access to all recorded (and then digitized) human knowledge augmented by powerful search engines, open source software (SAKAI), learning resources (OCW), open learning philosophies (open universities), new collaboratively developed tools (Wikipedia II, Web 2.0); and ubiquitous information and communications technology (e.g., Negroponte's \$100 laptop computer or, more likely, advanced cell phone technology). In the near future it could be possible that anyone with even a modest Internet or cellular phone connection has access to all the recorded knowledge of our civilization along with ubiquitous learning opportunities. Imagine still further the linking together of billions of people with limitless access to knowledge and learning tools enabled by a rapidly evolving scaffolding of cyberinfrastructure increasing in power one-hundred to one thousand-fold every decade. In fact, we may be on the threshold of the emergence of a new form of civilization, as billions of world citizens interact together, unconstrained by today's monopolies on knowledge or learning opportunities (Atkins *et al.*, 2007; Kelly, 2006).

Perhaps this, then, is the most exciting vision for the truly global university, no longer constrained by space, time, monopoly or archaic laws, but rather responsive to the needs of a global, knowledge society and unleashed by technology to empower and serve all of humankind.

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