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“The world is changed.”
– Galadriel (J.R.R. Tolkien)

As detailed in popular publications like the book *The World Is Flat*, the world is changing in many ways. Some sectors, such as business and science, have leveraged these changes to their benefit. By contrast, higher education has adapted very little in response to these changes and is consequently in very real danger of becoming irrelevant. Of the many changes that are occurring, at least six are worth considering in the context of the Future of Higher Education and these are outlined in Table 1.

Table 1. Changes Occurring in the Business, Science, and the World

From	To	Examples
Analog/Print	Digital	Voice over IP (VOIP), e-books, digital newspapers (New York Times, Washington Post)
Closed	Open	Open source software, open access weather and astronomical data, Public Library of Science journals
Tethered Isolated	Mobile Connected	Batteries in laptops, cell phones, wireless internet access Email, instant messaging, hypertext, web services, and other systems interconnect people, content, and computers
Generic	Personal	Customized interiors for cars; skins and ring tones for cell phones; hard drives, RAM, and video components in computers
Consumption	Participation	Blogs, podcasting, and video podcasting let ordinary people report news, produce internet radio shows, and distribute their own movies

Business, science, and life generally are moving rapidly toward digitization, openness, and the other indicators in the “To” column, while higher education stands relatively still in the “From” column. There is an increasingly sharp distinction in the learning activities in which today’s students engage inside and outside the classroom. A typical experience in a higher education classroom might be characterized as follows:

Students are inside a classroom (*tethered* to a place), using textbooks and handouts (*printed* materials), they must pay tuition and register to attend (the experience is *closed*), talking during class or working with others outside of class is generally discouraged (each student is *isolated* though surrounded by peers), each student receives exactly the same instruction as each of her classmates (the information presented is *generic*), and students are students and do not participate in the teaching process (they are *consumers*).

Compare the classroom learning experience with the same student’s learning experiences outside the classroom:

From her dorm room / the student center / a coffee shop / the bus a student connects to the Internet using her laptop (she is *mobile*), uses Google to find a

relevant webpage (a *digital* resource which is *open* for her to access). While carrying out her search, she chats with one friend on the phone and another using instant messaging to see if they can assist in her search (she is *connected* to other people), she follows links from one website to another exploring related information (the content is *connected* to other content), she quickly finds exactly the information she needs, ignoring irrelevant material (she gets what is important to her *personally*), and she shares her find with her friends by phone and IM (she *participates* in the teaching process).

A similarly digital, open, mobile, connected, personal, participatory story could be told about a day in the life of an engineer or researcher. As life, business, and science drift further from higher education, how is higher education to continue adding value to the lives of those who pour their hearts, souls, years, and dollars into education? What is higher education's value proposition? This question is worth considering.

Once upon a time, the courses of our colleges and universities were the primary repositories of post-secondary curricular content. Today, initiatives like OpenCourseWare provide content seekers from around the world with a legitimate alternative source of curricular materials.

Once upon a time, the university library was the primary repository of research like peer-reviewed journals and monographs. Today, initiatives like the Public Library of Science and pre-print services like Arxiv.org provide individuals from around the world with a legitimate alternative source of research findings.

Once upon a time, a college or university's faculty was the primary repository of technical and academic expertise in a community. Today, technologies like email and instant messaging put seekers of expertise in touch with faculty at many universities as well as professionals, "pro-am" hobbyists, and others from around the world almost instantly.

Once upon a time, the degree programs of our colleges and universities were the credentials most highly valued by employers. Today, certifications like the Microsoft Certified Systems Engineer, Cisco Certified Internetwork Expert, and the Red Hat Certified Architect certificates are sometimes worth more to an employer than a four-year degree in computer science.

Once upon a time, higher education enjoyed monopoly positions with regard to curricular content, research archives, expertise, and credentialing. Each of these monopolies has been broken in the recent past, but higher education has yet to recognize and respond to these changes in the environment.

How is higher education to respond? On the surface distance education seems like a reasonable response. But are online classes the answer? In short, no. Table 2 highlights the features of a normal online course.

Table 2. Characteristics of Online Classes

Analog/Print	Digital
Closed	Open
Tethered	Mobile
Isolated	Connected
Generic	Personal
Consumption	Participation

While it is true that the materials in an online course are digital, and can therefore be accessed and used by multiple people simultaneously, and while it is true that these courses can be accessed from a variety of locations, online courses appear to meet only two of the six criteria we might consider necessary for higher education to stay aligned with business, science, and life in general. Online courses require tuition, registration, and passwords (are *closed*), are notoriously more socially *isolating* than face to face courses, provide digital copies of exactly the same lecture notes and activities to all students (are *generic*), and place students in the position of simply downloading materials (the epitome of *consuming*).

We must recognize that not only is “the world” changing, but our students are changing along with it. Normal life experience for today’s undergraduates involves assumptions about instant, on-demand access to multiple sources of information and multiple people via myriad technologies. Walk into any teenager’s bedroom and you will see them watching a DVD, listening to music, surfing the web, talking on the phone, and instant messaging with a few friends – all at the same time. Is it any wonder that these students who simultaneously manage and filter multiple channels of synchronous and asynchronous information tend to find a 60 minute lecture difficult to tolerate?

With significant changes occurring in its societal context and participant base, higher education must innovate in teaching and learning, as well as other areas, to hope to remain relevant.

*“A crisis is a terrible thing to waste.”
– Paul Romer*

How, specifically, is higher education to respond to its changing environment and the changing nature of its core areas (content, research, expertise, and credentialing)? “E-learning” (at least as commonly conceived) is not the answer. The university experience must align more closely with its societal context and participant base. Higher education must continue its efforts to become digital and mobile, while working to become significantly more open, connected, personal, and participatory.

The name of this panel, “innovative teaching and learning strategies,” might first conjure images of specific behaviors we might ask a professor to demonstrate in the classroom, such as “use a problem-based approach” or “have students work in small teams.” The

diversity of teachers' and learners' preparation and background, combined with the differences in the academic disciplines themselves, make it impossible to conscientiously recommend these or any other specific teaching technique for application to all content areas in all classrooms at all levels from community college to graduate school. However, there is at least one innovative teaching and learning strategy that can be applied broadly to the great benefit of higher education and all its stakeholders: openness.

I believe that the movement toward greater openness in education, as exemplified by programs like the OpenCourseWare (OCW) initiatives at MIT, Johns Hopkins, Tufts, Notre Dame, and Utah State universities, the Foothill-De Anza Community College, and the Utah College of Applied Technology, is one of the truly great innovations in teaching and learning that has occurred in the last several decades. In the context of my remarks to the Commission, I believe that openness is the gateway to connectedness, personalization, and participation. Openness is a catalyst for further innovation. A few examples:

As a faculty member, if I want to connect my course materials to prerequisite materials from classes students have already taken in order to create review opportunities or provide remediation, this connectivity is possible only if both I and the students have access to these materials. Without this openness, there is nothing to connect to, and the level of connectivity my students expect is not attainable.

As a faculty member, if I want to personalize the experience for my students – or more importantly, if I want to empower my students to meaningfully personalize the experience themselves – we have to be permitted to edit and customize the materials we will use. Without this openness, nothing can be changed or adapted, and the level of personalization my students expect is not attainable.

As a faculty member, if I want to engage my students in creating and contributing resources, tutorials, and other study materials to a class, this is much more easily done when the course material repository is open. Without this openness, there is no space for the students to make contributions, and the degree of participation in the experience our students expect is not attainable.

Many in the public look up to Research I universities as the very pinnacle of higher education. It may be surprising, then, to hear that when faculty at MIT, USU, and other universities are invited to open their syllabi, lecture notes, assignments, and other materials for everyone to see, some faculty respond by asking first for time to tidy up their course materials. They are cautious because the move toward openness takes teaching directly into the heart of the scholarly world for the first time – it exposes teaching to the quality-increasing pressures of peer review. This openness also opens the materials to other kinds of review, creating an unprecedented level of transparency to all higher education stakeholders, including parents and alumni, with regard to an institution's teaching and learning activities.

Several recent reports already brought to the attention of the Commission, such as *Innovate America* and *Rising Above the Gathering Storm* have indicated the absolute urgency with which the U.S. must work to develop, recruit, and retain the best and brightest students from home and abroad to study science and engineering. Recent analyses of evaluation data from MIT OCW show that “35 percent of freshmen who were aware of OCW prior to deciding to attend MIT indicate the site was a significant or very significant influence on their choice of school”¹. This number is up from eight percent the year before. The world’s best and brightest students are already seeing this strategy of openness as an incredible innovation capable of catalyzing further innovations, and they are beginning to include a commitment to openness in the list of criteria by which they select institutions.

The time will come when an OpenCourseWare or similar collection of open access educational materials will be as fully expected from every higher education institution as an informational website is now. The United States can be either the leader in this innovation, as we were with the previous generation of higher education websites, or we can follow the rest of the world. There are already active consortia of universities engaged in OCW projects in China, in Japan, and in South America, as well as efforts at individual universities in Europe and other parts of the world. In terms of the total number of universities actively involved, the U.S. is already behind. Our first mover advantage in this area, and our subsequent ability to attract top students, will not last long. We must broaden higher education’s commitment to openness and begin to innovate atop that platform.

It is commonly said with regard to large sections of general education courses that “everything past the fifth row of the auditorium is distance education.” To some extent this is correct – the tried and true techniques for teaching a 30 student course can deteriorate rapidly as the number of students increases to 50, then to 100, and then to 300, until the value of our best pedagogical tools seems to have vanished completely. What we will be amazed to find, however, is that the inverse is also true: there exist techniques for facilitating learning among extremely large groups of students that deteriorate just as rapidly as 10,000 students become 2,000, and then 200, and then 50. Higher education is largely unacquainted with these innovative teaching and learning strategies because before the Internet it was never possible to have a group become so large while each member of the group retained the ability to communicate with every other member of the group.

There is much for us to learn by studying the social, linguistic, and political structures of very large online communities. These communities are a core part of the everyday experience of many of our students, and they are the models our students will compare us against in terms of openness, connectedness, personalization, and participation. And as every good student knows, there is much to be learned from studying the grading rubric for the exam, and these large online communities may well hold the key to both

¹ Carson, S. (2006). 2005 Program Evaluation Findings Report, Draft 6 January 2006.

affordably scaling up our educational offerings while simultaneously achieving better alignment of higher education with the rest of society. This is just one area of innovation that could be enabled by a commitment to openness in higher education.

“It is not necessary to change. Survival is not mandatory.”
– *W. Edwards Deming*

In summary, higher education has fallen out of step with business, science, and everyday life. In order to realign itself with changes in society and in its student base higher education must find the will to innovate in the areas of openness, connectedness, personalization, and participation. I believe that openness is the key to enabling other innovations and catalyzing improvements in the quality, accountability, affordability, and accessibility of higher education. It is my recommendation that the Commission do everything within its power to promote a commitment to openness within higher education. In thinking about this work the Commission might fruitfully consider the many ways in which colleges and universities have collaborated with state and federal organizations to promote a culture of diversity in higher education.