"The Biggest Problem Confronting Universities Is Not What You Think It Is"
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De Lange Conference VIII
Rice University
The Future of the Research University in a Global Age
February 27-28, 2012

(As prepared for delivery)

This morning I want to offer some straight talk about universities. It is my view that most of us engaged in higher education at the elite level focus the bulk of our attention upon the wrong issues. Our research universities are wondrously complex institutions that defy easy analysis or understanding. We therefore tend to concentrate upon their most visible components, such as scientific research, star professors, state-of-the-art facilities and technology, economic development, international impact, and football and basketball teams. It has become a cliché that American universities are the best in the world. This is a claim that, while valid in important dimensions, can lead us to complacency and neglect of serious problems.

Much of the international reputation we enjoy is based upon two outstanding features of American universities: unrelenting commitment to an atmosphere of free and open inquiry, and excellence in scientific research. Our enduring dedication to intellectual freedom ensures that ideas compete with each other fairly, whatever their origin or consequences. In scientific research, we clearly lead the rest of the world, thanks in large measure to the enormously successful 60-year partnership between the federal government and our universities. These twin advantages, open inquiry and superb science, attract the best talent from around the world to American universities, not only to our graduate programs, but increasingly to our undergraduate colleges as well.

In other aspects of our enterprise, however, we find ourselves hard-pressed. Our funding model, first of all, is under severe duress. States have repeatedly reduced their support of public universities, most severely in the past five years, a disinvestment that now threatens to erode their quality and competitiveness. This past year, 41 states cut their spending on higher education, from 1 percent in Indiana to 41 percent in New Hampshire (Illinois State University Center for the Study of Higher Education). When you add several years of no faculty salary increases, loss of graduate student positions, and political and ideological assaults upon the professoriate, which have been withering in some states, you have a formula for loss of confidence and low morale on many campuses.

Some public universities have understandably attempted to make up the deficit in state support by raising undergraduate tuition aggressively and increasing the proportion of
out-of-state students. But this strategy, which typically covers less than half the loss in state funds, undermines the public mission of providing access, creates anger in the state, meets resistance in the legislature, and has now attracted the attention of the White House. We are starting to see larger classes, more adjunct faculty, and fewer small sections for discussion. These are coping mechanisms which, if continued, will lead to general deterioration in the quality of undergraduate education, the very part of our universities that depends most upon state support. Many states have shifted the burden of paying for college from their general funds to students and their families. This shift contributes to the growing perception that higher education, once seen as a public good, has now become a private interest.

Tuition and fees plus room and board at private universities have, in some cases, reached $55,000 per year. Although most students do not pay that full cost, and though generous financial aid policies and endowment spending have actually brought down the real costs for the average student for the past five years, a degree carrying a price tag of well over $200,000 creates automatic sticker shock in the public. It also raises real questions about whether or not we have been paying enough attention to holding down expenses at a time of national recession and joblessness.

The airwaves are rife with predictions of disruptive change coming to the economic model of higher education, as it has in the publishing and recording industries, and for-profit colleges and online education are challenging the time-honored paradigm of high-cost, on-campus, 18-to-21-year-old education. It is no wonder that parents paying and borrowing for a college education steer their children toward practical majors that seem to promise instant employment, and discourage them from studying the liberal arts and sciences in pursuit of a well-balanced education. A private interest in education today means a purely economic one.

From this inversion of values flows our second problem: a redefinition of the purpose of undergraduate education. Fifty years ago, when I started college, there was a widely shared view in America that the purpose of a college education was to prepare students to become educated citizens capable of contributing to society. As a result, the states provided most of the resources for public colleges and universities, which in turn charged little or no tuition. College was in the public interest because it gave graduates an appreciation of history and literature, taught them a foreign language, and produced scientific literacy in a portion of the public. High school prepared students for the work place, college enabled them to understand something about the world and to develop their critical faculties in order to make reasoned judgments on public issues confronting the state and nation.

Today, many Americans believe that the sole purpose of going to college is to get a job, any job. The governors of Texas and Florida are quite clear on this point, and draw the corollaries that college should be cheap and vocational, even when delivered at major research universities like the University of Texas and the University of Florida. Liberal Arts degrees in fields like Anthropology and English are “useless” because they do not lead directly to jobs, this argument runs, hence they are of no value whatever since jobs
are the only goal of a degree. But one does not need to refer to such extreme cases to grasp the general trend: a university education is seen as strictly utilitarian now because: a) so many students and their families pay a large share of the costs and only naturally want a ready return on their investment; b) the job market today is highly competitive and most desirable jobs require a college degree; and c) the gap in earnings between college and high school degree holders is huge, particularly over a full career.

A college education has always had a utilitarian component, but that was not understood to be its sole or even primary purpose. Today, however, many Americans hold a purely instrumental view of undergraduate education, and thus want a detailed accounting of the value of that education. Hence our third problem: close public scrutiny and political accountability. Parents want to know, what did my daughter learn, and how does it contribute to her career? State legislatures want to know: what is the graduation rate at our university? How many undergraduate students do faculty members teach? How many students are majoring in Physics at our state universities? In Chemistry? In Philosophy? What percentage of courses in department X is taught by teaching assistants and adjuncts?

These questions put us in an uncomfortable position, because in some cases we do not know the answers, in others we do not like the answers. We have assiduously eschewed the use of instruments assessing the value of general education, particularly at our major universities. I do not know how much longer we can avoid this issue nationally, given the level of scrutiny and skepticism in the public and the state houses. In some states, the reckoning has already come, and it is not pleasant.

The truth is that the professionalization of the professoriate has been crucially beneficial for research and graduate training, but problematic for undergraduate education at most large universities. Several recent studies, some of them flawed but still indicative, have revealed that a significant percentage of students do not improve their critical thinking and writing much at all in the first two years of college. This should come as no surprise, given the dearth of small classes requiring active participation and intellectual interaction. Faculty members owe more allegiance to their departments than to their college as a whole, and rarely attend, collectively, to the question, asked from the individual student’s point of view, “what is college for?” “What do I need to learn?” “What courses should I take?”

The results for students are painfully evident: they are adrift in a sea of courses having little to do with one another. Many courses, even at the upper division level, have no prerequisites and many require no debate or public speaking or the writing of papers that receive close attention and correction. Many students today go through college with very little intellectual engagement, that is, asserting and defending ideas on paper and in public. Their curriculum is a mélange of courses drawn almost haphazardly from dozens of discrete academic departments. And there is substantial evidence, as we shall see, that students are fleeing demanding majors in favor of easier ones that have the added lure of appearing to promise immediate access to jobs.
The combination of drastic state disinvestment in public universities, student careerism, and pedagogical failings of our own, has serious consequences for the country as a whole. To take one significant example, we now know that more than 50 percent of the students starting college with a stated desire to major in science or engineering drop out of those majors before graduating. We are no longer in a position to blame this problem entirely on the high schools. A substantial body of research demonstrates conclusively that the problem is frequently caused by poor undergraduate teaching in physics, chemistry, biology, math, and engineering, particularly in the freshman and sophomore years. Students are consigned to large lecture courses that offer almost no engagement, no monitoring, and little support and personal attention. The combination of poor high school preparation and uninspiring freshman and sophomore pedagogy has produced a stunning dearth of science and engineering majors in the U.S. Our country now falls well behind countries like China and India in turning out graduates with strong quantitative skills.

According to figures produced by the Organisation for Economic Co-operation and Development, the U.S. ranked 27th among developed nations (ahead of only Brazil) in the proportion of college students receiving undergraduate degrees in science or engineering. As a result, American students are a dwindling proportion of our graduate enrollments in science and engineering. In 2009, foreign students on temporary visas earned more than half of the doctoral degrees awarded in the U.S. in engineering, physics, computer sciences, and economics, according to the PCAST report “Engage to Excel,” that came out three weeks ago. At the Master’s level, the percentages are only slightly lower. That same report estimates that the United States, under current assumptions, will in the next decade under produce college graduates in STEM fields by one million.

Liberal arts colleges strongly outperform research universities in sending graduates to Ph.D. programs in science and engineering. (See chart.)

My remarks, then, are not the lament of an aging, down-at-the-mouth humanist decrying declining enrollments in Classics, literature, and philosophy, which, by the way, are holding up fairly well. Rather, they are the admonition of an aging administrator who fears the practical as well as intellectual consequences of falling public investment, short-term student careerism, and inadequate attention by university faculties and administrators to undergraduate education, particularly in the freshman and sophomore years.

In spite of what you are probably thinking, I am not a pessimist, I am a realist. I think we can do something about this decline if we muster our collective will to do so, and the year 2012 offers several significant opportunities for drawing public attention to the problem. This year we will celebrate the 150th anniversary of the Morrill Act, the national founding of land grant universities designed to educate a broad cross-section of Americans in practical as well as theoretical subjects. It is time to renew that national aspiration, made, remarkably, in the middle of the Civil War. We will also soon have the report of the National Research Council on the state of our research universities. The chairman of the committee writing that report, Chad Holliday, has already stated publicly that the
committee is considering a call for the “third big thing” in higher education. This would follow the Morrill Act and the extraordinarily successful research partnership created by the federal government with the nation’s universities after World War II, coupled with the enormous expansion of access created by the GI Bill. It is encouraging that a distinguished group of business and academic leaders will focus national attention on the problems and opportunities confronting research universities at this challenging time.

But if we in higher education hope to attract renewed public support and investment in our enterprise, we need to acknowledge our own shortcomings and begin to address them. First, we need to say loudly and clearly that improving undergraduate education will receive our closest attention and best efforts. The classroom is where we meet the American public most directly, where public scrutiny is now centered, and where public accountability is now upon us. We need to alter faculty incentives by making undergraduate teaching at least equal to research and graduate teaching in prestige, evaluation and reward. And we need to do research-based teaching, in other words, to take account and advantage of the latest findings of cognitive science, which are extensive, on how students learn. In brief, they learn by doing, not by just listening to someone else; they learn by solving problems, not by passively absorbing concepts; they learn best in groups of peers working things out together.

Fortunately, some of our best universities are leading the way. At Johns Hopkins, the Gateway Science Initiative is embarked on redesigning engineering, math and science instruction to create more active student learning. Some faculty members, instead of lecturing to large classes, post their lectures online, and use the time in class to hold interactive discussions. This enables students to collaborate on solving problems and to write new computer programs together.

At Stony Brook University in New York, the Chemistry Department has for years now being changing its large-enrollment courses in order to make the classroom more student-centered, to provide an active learning experience, and to include learning process skills. The department based its innovations upon research in the cognitive sciences on how people learn, namely by constructing their own understanding through a cycle of exploration, concept formation, and application, by interacting with others, and by reflecting on their progress. Published results demonstrate better student performance, higher grades, and greater persistence and retention.

At the University of Michigan, similar gains have been realized by “high touch” teaching methods and the development of a “Calculus Concept Inventory” in introductory calculus sections. The goal is to ensure that Michigan produces an “interactive classroom” in all 50 sections of Calculus I. This is a remarkable commitment for a large public university to make in this period of punishing reductions in state support. An interactive classroom is defined in the literature as one “where students are actively engaged at all times, developing concepts and strategies to solve non-routine problems, testing solutions for sensibility as well as correctness, and receiving immediate feedback from an instructor or from other students.” Results so far at Michigan are impressive, with strong average
gains in student performance across multiple sections, including those taught by instructors new to the course.

At Stanford, a recent report entitled “The Study of Undergraduate Education at Stanford” recommends that the faculty “see themselves more and more robustly as teachers,” and that new thinking be done about the criteria used in hiring, rewarding, and promoting faculty. It also calls for freshman seminars to be accessible for 100 per cent of the freshman class, and for breadth requirements to focus less on disciplinary content and more on core purposes and learning goals. The authors of the report said it was a fundamental goal to help students develop a “capacity for integrative knowledge,” the kind of knowledge that can be gained only from integrating what they learn across different academic domains. No matter how the Stanford faculty chooses to use this report, it is clear that the committee has grappled seriously with the fundamental purposes of an undergraduate education.

At Yale, a year-long evaluation of curriculum by a “steering committee” in Yale College has reaffirmed the vital significance of undergraduate teaching and the need to base that teaching upon up-to-date research. The steering committee recommends that The Center for Scientific Teaching at Yale lead efforts to improve pedagogy in the STEM fields, particularly at the introductory level. “Faculty in all courses should be encouraged to develop active learning practices, whether in small classes or large lectures. Clickers, study halls, collaborative study, application-based problems and other approaches are being tried in a number of departments. Time and support are needed for faculty to learn about and build on such practices. Departments should make it a high priority to ensure that comprehensive introductory courses are consistently and well taught year after year, so that all students are guaranteed equally strong teaching.”

The remarkable thing to me about all of these examples is the faculty’s acknowledgment that we need to focus much more attention on undergraduate education, and that we need to deliver it more effectively than we have been doing. This means thinking about what students learn, how they learn, and how they can best integrate their knowledge across the curriculum. This thinking represents a major step forward in restoring a proper balance between teaching and research, and in applying the best research to teaching undergraduates at our universities. I find these examples exhilarating and promising.

At the Association of American Universities we hope to play a role in disseminating the findings of such research across our universities, both public and private, and thus to stimulate more students to persist in their study of math and science and engineering than currently do. We have embarked on a five-year project led by top scientists and experts in science pedagogy designed to help science departments implement these new teaching methods in the classroom. One of my hopes for the future of research universities is that student learning will be at the center of faculty concern, research will inform teaching, undergraduate classrooms will be places of engaged, participatory learning, and a university education will be not just a means to an entry-level job, but an invitation to a lifetime of learning.
We are all aware of the difficulty of changing the culture of our universities, so it will take a broad and deep effort to realize serious and sustainable gains. But the stakes are high, not just for our universities, but for the country as a whole. In the global knowledge economy, an educated public is essential not just to economic competitiveness, but to national well-being. Furthermore, since it appears that in years hence we will be educating many of the world’s most ambitious and talented students at the undergraduate as well as graduate level, that will be a good outcome for everyone, not just Americans.

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• STEM fields in this analysis include engineering, physical sciences, math and computer sciences, and life sciences, but not social and behavioral sciences.

• This analysis was performed using NSF NCSES methodology. This is the number of doctorates in STEM fields awarded per 100 baccalaureate degrees awarded in all fields nine years prior to a given year.

• The Oberlin 80 Colleges is a group of liberal arts colleges that graduate a large number of future doctorate recipients in STEM fields. A list of members can be found here.

• AAU Universities consists of the 59 U.S. members of AAU.

• Very High Research Universities is a classification of the Carnegie Foundation for the Advancement of Teaching. It encompasses 108 universities, including the 59 U.S. members of AAU.