

## Why Research Universities Must Change

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It is my view that most of us engaged in education at our nation's leading research universities focus our attention upon the wrong issues. These 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 claim, while valid in important dimensions, can lead to complacency and neglect of serious problems.

Much of our international reputation is based upon two outstanding features of American universities: unrelenting commitment to an atmosphere of free and open inquiry, and excellence in scientific research. These twin advantages 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.

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 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. As states have shifted the burden of paying for college from their general funds to students and their families, the perception has grown that higher education, once seen as a public good, has become a private interest. And these coping mechanisms, 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.

At private universities, tuition and fees plus room and board 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 over 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 we have been paying enough attention to holding down expenses.

The airwaves are rife with predictions of disruptive change coming to the economic model of higher 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. College was in the public interest because it gave graduates an understanding of the world and developed their critical faculties.

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 Universities of Texas and Florida. A university education is more than ever seen as strictly utilitarian. The reasons are clear: a) as more students and families pay a large share of the costs, they naturally want a ready return on their investment; b) the most desirable jobs in this highly competitive job market require a college degree; and c) the gap in lifetime earnings between college and high school degree holders is huge.

Today, as many Americans hold a purely instrumentalist view of undergraduate education, they want a detailed accounting of its value. 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? And much more.

These questions put us in an uncomfortable position, because in some cases we do not know the answers, and in others we know them but do not like them. Many of us have eschewed the use of instruments assessing the value of general education, particularly at our major universities. We have, often for good reason, lacked confidence that such instruments are reliable measures of the value of a research university education, particularly if they are based on a one-size-fits-all approach.

However, given the level of scrutiny and skepticism in the public and in state houses, research universities need to take this issue seriously.

The professionalization of the professoriate has been crucially beneficial for research and graduate training at many institutions, but at most large universities, it has been problematic for undergraduate education. Several recent studies, some 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.

Too many students 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. A student's curriculum is a *mélange* of courses drawn almost haphazardly from dozens of discrete academic departments. And there is substantial

evidence 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. 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 can no longer blame this problem entirely on the nation's 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 the Organisation for Economic Co-operation and Development, the U.S. in 2009 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. An administration report not only states that foreign students are earning more than half of U.S. doctoral degrees in engineering, physics, computer sciences, and economics but also estimates that the United States, under current assumptions, will in the next decade under produce college graduates in STEM fields by one million.

I fear the practical as well as intellectual consequences of these trends. However, I am not a pessimist; I am a realist. In this, the 150th anniversary year of the Morrill Act, I think we can do something to reverse these trends, if we muster our collective will to do so. The anticipated report of the National Research Council on the state of our research universities will, I hope, focus national attention on the problems and opportunities confronting these vital institutions.

But over time, the renewed public investment in higher education that our country needs is unlikely if we do not 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. 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 that takes 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. Initiatives at such institutions as [Johns Hopkins University](#), [Stony Brook University](#), [the University of Michigan](#), [Stanford](#), [Yale](#), and others offer great encouragement. The remarkable thing about them is the acknowledgment by faculty 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. I find these examples exhilarating and promising.

At the Association of American Universities, we hope to disseminate 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. 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. 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.

I am well aware of the difficulty of changing those cultures. It will take a broad and deep effort to realize serious and sustainable gains. The stakes are high, not just for our universities but for the country. In the global knowledge economy, an educated public is essential not just to economic competitiveness but to national well-being.

#### **Bio**

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