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,

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

Hunter Rawlings is president of the Association of American Universities. This article is adapted from a speech delivered on February 28, 2012, at the De Lange Conference at Rice University.