

Prepared remarks of

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**IMPLICATIONS OF THE “FLATTENING”—IF NOT FLAT—WORLD FOR  
HIGHER EDUCATION IN THE U.S. AND IN TEXAS**

I might be considered a curious choice as a speaker at this venue—I’m not an expert on higher education or on science and engineering.

What I can bring to the discussion is some impressions based on a lot of engagement around the world, and a sense of the strategies that many other countries in the “emerging economies” are pursuing, and what that means for us.

The topic is one that I don’t need to acquaint this audience with. The National Academies study “Rising above the Gathering Storm” is probably sitting at your bedsides at home. While the topic of U.S. competitiveness and the role of higher education in sustaining that competitiveness has been a recurring one—remember Sputnik—the National Academies report has refocused broader national attention on an issue that you have all been concerned about for a long time.

The “Gathering Storm” report and all the companion studies—like the American Electronics Association’s “Losing the Competitive Advantage” from last year—tell a disquieting story about the U.S. losing its comparative advantage in the education and training of the next generation of workers and the corresponding implications for our economy, our society, and even our security.

Tonight I want to reframe the question slightly, both to give it more nuance and more breadth. The trends that these reports document should both disturb and energize us—but it is important for us to understand that in this flattened world, preparing our students and workers for the future is not a zero-sum game. Not only is it largely irrelevant what our “comparative” numbers are, we will actually benefit from the remarkable achievements we are now seeing in many countries which only a few years ago seemed mired in hopeless poverty and despair. But to do so, we have to both understand and stay in the game—and that’s the part I will focus on here.

The dire scenario is as follows: the rest of the world—and in particular, China and India—are surging ahead in the production of scientifically and technically trained workers, which over time will undermine U.S. economic competitiveness and reduce the U.S. to a second-rate power. The U.S. is failing to turn out the skilled workers we need, leading both to an increased reliance on foreign-born skilled personnel and to the migration of jobs overseas where equally skilled workers can produce goods and services of comparable quality at a fraction of the cost.

The challenge was nicely framed by Shirley Ann Jackson, President of Renesselear Polytechnic and recently president of the American Association for the Advancement of Science, when she said, “The sky is not falling. Nothing horrible is going to happen today. The U.S. is still the leading engine for innovation in the world, it has the best graduate programs, the best scientific infrastructure, and the capital markets to exploit it. But there is a quiet crisis in U.S. science and engineering that we have to wake up to. The U.S. today is in a truly global environment and those competitor countries are not only wide awake, they are running a marathon while we are running sprints. If left unchecked this could challenge our preeminence and capacity to innovate.”<sup>1</sup> The problem is put more colorfully by Craig Barrett, “Intel can thrive as a company even if we never hire another American.”<sup>2</sup>

The comparative numbers are of course familiar to you. In 2004 the National Science Board found the number of 18-24 year old Americans who receive science degrees fell to 17<sup>th</sup> in the world rankings from 3<sup>rd</sup> in the 1970s.<sup>3</sup> The U.S. now ranks 6<sup>th</sup> in the number of engineering degrees awarded—70,000 compared to 600,000 from China and 350,000 from India (or, post-correction following a Duke University report, 140,000 compared to 350,000 from China).<sup>4</sup> China and India doubled their production of 3 and 4 year engineers, computer scientists and information technologists while the U.S. is stagnant. Similar stories can be told about the declining share of U.S. patents—which have fallen from 60% to 52% of the world’s total since 1980—or in scholarly journals—the number of American papers in the *Physical Review* has declined from 61% in 1983 to 29% in 2004.<sup>5</sup>

The rankings challenge reaches back into the early years of schooling. In 2003 fourth graders in Taiwan, Singapore, and Japan outperformed our fourth graders in math and science, and by eighth grade Hong Kong and Korea jump ahead of us.<sup>6</sup>

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<sup>1</sup> Quoted in Thomas L. Friedman, *The World is Flat: A Brief History of the Twenty-First Century* (New York: Farrar, Straus and Giroux, 2006), 326.

<sup>2</sup> Quoted in Friedman, 357.

<sup>3</sup> Friedman, 330.

<sup>4</sup> The National Academies, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future* (Washington, DC: National Academies Press, 2006), ES-10. The controversy regarding the figures is detailed in David Epstein, “The Disappearing Chinese Engineers,” *Insider Higher Ed*, 13 June 2006 <http://www.insidehighered.com/news/2006/06/13/numbers> (30 September 2006).

<sup>5</sup> National Science Board figures quoted in Friedman, 349.

<sup>6</sup> National Center for Education Statistics, “Highlights From the Trends in International Mathematics and Science Study: TIMSS 2003,” 14 December 2004, <<http://nces.ed.gov/pubs2005/2005005.pdf>> (30 September 2006).

Some of these developments are hardly surprising. China has four times the population of the U.S.; India, more than triple. One would expect over time that these numbers and the gap will continue to grow. China's GDP is growing at over 8% a year, and India's close to that. The U.S. economy, by contrast, is growing by 3-4%. Yet no one would contend that we could, or should, aspire to the growth rates of emerging countries. Catch-up is an important part of the story—in numbers and in quality. Obviously, that means increased competition, but competition brings benefits in terms of price, quality, and innovation.

Then there is the concern about the growing percentage of foreign students in our advanced science and technology programs—a concern exacerbated by the emerging (and likely to grow even faster) trend of foreign-born students returning to their countries of origin after receiving their degrees. In the late 1990s graduate students from China and India had very high five-year stay rates—90% and 86% respectively. But the more advanced emerging economies had much lower stay rates—Taiwan 47% and Korea 34%—and there is emerging evidence that Chinese and Indian students are following that pattern as more and better job opportunities are created in their countries.<sup>7</sup>

In 2002 foreign nationals received over 50% of doctoral engineering and math degrees, and 40% of computer science degrees. In 2004, the largest numbers of students overall come from China (15.4%) and India (13.9%).<sup>8</sup>

Texas has been home away from home to a significant number of foreign students. Texas as a state is ranked third in the number of international students in 2004-2005 after California and New York. We have the third largest number of foreign students here at the University of Texas at Austin of any school in the U.S. with over 5,300 in 2004. Although as a percentage of our enrollment, we are considerably behind most leading private universities, and somewhat behind some of our important public sector peers. A&M too hosts a good contingent—some 3,700 in 2004.<sup>9</sup>

But again, this is not all bad news. The ones that stay contribute to our competitiveness; the ones that return help build more vibrant economies at home, with more markets for our goods. They also have been exposed to our way of life—hopefully a positive influence on their own political and economic development.

Indeed, there is more danger in the opposite direction—that they stop coming here, a phenomenon that we witnessed following 9/11 and the associated security crackdown. From 2003-2005 graduate applications from international students declined by 32% and despite a significant rebound since then, thanks to actions taken by the State Department, they remain down by 23% since 2003. There have been significant gains from China—

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<sup>7</sup> Michael G. Finn, "Stay Rates of Foreign Doctorate Recipients from U.S. Universities, 2003," Oak Ridge Institute for Science and Education, November 2005  
<<http://orise.ornl.gov/sep/files/stayrate05.pdf#search=%22stay%20Rates%20of%20Foreign%20Doctorate%20Recipients%20from%20U.S.%20Universities%2C%202003%22>> (30 September 2006).

<sup>8</sup> OECD, *Education at a Glance: OECD Indicators 2006* (Paris: OECD Publications, 2006), 305.

<sup>9</sup> International Institute for Education, "Open Doors 2005: Report on International Educational Exchange," OpenDoorsOnline, 2005 <http://opendoors.iienetwork.org/> (30 September 2006).

21% in applications and 20% in admissions—and India—23% in applications and 28% in admissions. While applications from the Middle East have increased much more gradually, admission offers actually declined in 2005-2006.<sup>10</sup> Equally troubling, the U.S. has dropped as the preferred destination from 25.3% to 21.6% from the period of 2000-2004.<sup>11</sup>

My concern about restricting foreign students is not limited to whether they get to come here in the first place. Over the last two years we've had a raging debate about the issue of deemed exports—to oversimplify a bit, whether including foreign students in our university labs constitutes an “export” of the technology being developed in the lab, and thus subject to our export control rules.

Needless to say, if applied too broadly, these could have a catastrophic effect not only on our ability to attract top-flight foreign graduate students, but on the effectiveness of our own research. Fortunately, some of the more backward looking proposals seem to have been shelved or watered down, but we must remain vigilant. In this context, Edward Teller said in 1987 that “Secrecy is not compatible with science.”<sup>12</sup>

More generally, we have a stake in seeing developing countries succeed. As they become more prosperous they fuel world growth, which helps our companies and our workers, they become more stable, and I believe history shows, more open politically, benefiting their citizens, and providing us with better partners in addressing the world's global challenges, from public health to the environment to combating international terrorism and crime.

But for this to be a win-win result, we have to stay in the game. We may not need to be top dog in absolute numbers, but we need to assure that our workers have the skills they need to meet the growing competition, that we continue to promote innovation and creativity, and that we sustain the infrastructure necessary to make that possible.

What will that take?

First, although we don't have to worry so much about relative rankings (a hard thing to say as a Longhorn), we do have to worry about the capacity of our future generations to make their way in this increasingly globalized and competitive world. We are in real trouble in a world where only 32% of our 4<sup>th</sup> graders and 29% of 8<sup>th</sup> graders tested proficient in math.<sup>13</sup> Only 15% of U.S. undergraduates receive their degrees in natural

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<sup>10</sup> Council of Graduate Study, “Findings from 2006 CGS International Graduate Admissions Survey, Phase II: Final Applications and Offers of Admission,” CGS, August 2006  
<[http://www.cgsnet.org/portals/0/pdf/R\\_intladm06\\_II.pdf](http://www.cgsnet.org/portals/0/pdf/R_intladm06_II.pdf)> (30 September 2006).

<sup>11</sup> OECD, 289.

<sup>12</sup> Edward Teller, *Better a Shield Than a Sword: Perspectives on Defense and Technology* (New York: Free Press, 1987).

<sup>13</sup> U.S. Department of Education's National Assessment of Educational Progress data quoted in American Electronics Association, “Losing the Competitive Advantage? The Challenge for Science and Technology in the United States,” AeANet, 2005  
<[http://www.aeanet.org/publications/IDJJ\\_AeA\\_Competitiveness.asp](http://www.aeanet.org/publications/IDJJ_AeA_Competitiveness.asp)> (30 September 2006).

science or engineering, yet the growth rate of jobs requiring science and engineering skills is growing at almost 5% per year compared with 1% for the rest of the workforce.<sup>14</sup> To address this problem we've got to start early in exciting our kids in careers in science and engineering, and in providing the quality education and financial support to allow them to follow through. (The NAS found that 1/3 of students intending to major in engineering switched before they graduated.<sup>15</sup>)

Second, we can't limit ourselves to the STEM agenda; it is important both for our budding scientists and engineers to have a broad based education, and to cultivate and support the humanities and social sciences, to give our future leaders a broader sense of leadership and values. President Powers made this point on Friday in his inaugural address, and I think it is crucial.<sup>16</sup>

Third, we need to remain open to foreign students, and foreign innovation. There are understandable concerns about national security, but we need to think about the national security as well as the economic cost of closure. A Zogby survey of Arab countries, which included Egypt, Jordan, Lebanon, Morocco, Saudi Arabia, and the United Arab Emirates, showed that people who have been to U.S. have a slightly more favorable view of America.<sup>17</sup>

Fourth, we need to familiarize our students with the increasingly globalized world, curriculum, and life experiences. In 2004-2005 some 2,200 UT/Austin students studied abroad. UT/Austin ranks fourth among major research universities and this is a 6% increase from 2003-2004 following a 21.6% increase from the year before—but it is only 4% of our enrollment. Only 1,000 from A&M studied abroad that year. Texas ranks fourth in study abroad after California, New York, and Pennsylvania. The good news is that 82% of UT undergrads consider study abroad a part of a well-rounded education, but the gap between that perception and reality is glaring. The further good news is that we are seeing real increases in study in Asia and the Middle East, but in absolute numbers the results are still modest. Nationally, the number of students studying in China increased 90% from 2002-2003 to 2003-2004 and the corresponding increase for India was 65%.<sup>18</sup>

Our leadership both here at UT/Austin and the UT System appreciates the importance of the objective. The UT System's strategic plan sets as a goal "within ten years, UT System will offer incentives and programs to ensure that any undergraduate, graduate, or professional student at a UT System institution who wishes will have an international study experience."<sup>19</sup> In his inaugural speech this week at UT/Austin, President Powers

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<sup>14</sup> National Science Board figures quoted in Friedman, 331.

<sup>15</sup> The National Academies, ES-10.

<sup>16</sup> William Powers Jr., "Address on the State of The University" University of Texas, Austin, 29 September 2006.

<sup>17</sup> Zogby International, *Impressions of America 2004: How Arabs in 6 Countries View America*, (New York: Zogby International, 2004).

<sup>18</sup> International Institute for Education

<sup>19</sup> The University of Texas System, *The University of Texas System Strategic Plan 2006-2015* (Austin: UT System, 2006).

identified the need to expand and coordinate our international efforts. But it's important to keep in mind that meeting the need to be prepared for the globalized world is more than simply studying abroad. In my own teaching here, I challenge my students each semester to come up with a policy topic which does not have an international dimension, confident that, as we social scientists say, the answer is a null set. Whether it is health care, social security and pensions, environment or the like, we truly live in an interdependent world, and all our students must come to appreciate that, and the other cultures and histories and languages that shape it—and not just our professional students and graduate students, but every one of our undergrads as well.

In 2002, the last year of a comprehensive survey, only 34,000 students were studying Chinese at institutions of higher education, and less than 11,000 were studying Arabic.<sup>20</sup> Although the numbers have undoubtedly grown since then, the gap remains enormous. Foreign language study is particularly important in this respect, and President Powers' recent initiative to provide additional support is welcome.

Fifth, continue to support innovation. The U.S. gained its position of prominence on the back of a farsighted commitment to support research and development in both the public and private sector, including substantial support for long term research and development without obvious immediate payoff. In the world I know best, the Defense Advanced Research Projects Administration (DARPA) was the avatar of that approach, supporting the work that—along with Al Gore—led to the creation of the internet, among many other farsighted efforts going back to the work that led to radar in earlier generations. Today we are seeing a cutback in basic research in favor of outcome driven measures, which have their appeal but in the long run will put a ceiling on what we can achieve. This was a major focus of the National Academies' report on the Gathering Storm—and deserves high priority.

It wasn't that long ago that the U.S. was preoccupied with challenges from Japan—smashing Sony TV sets on the steps of the Capitol—too often our response has been to demonize the other guy, rather than tend to what we need to do at home. Today it is China, and to a lesser degree, India. Of course we need fair competition, but if we try to shut down our exchange with the rest of the world, with protectionist trade measures, harsh immigration restrictions, and shortsighted limits on technology transfer that will lead developing countries to look to Europe and elsewhere for partners—we will be the losers.

Tonight, I've tried to layout some ways that we can achieve a win-win result that will benefit our citizens, our country, and the rest of the world. Thank you for your attention.

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<sup>20</sup> Modern Language Association, *Foreign Language Enrollments in United States Institutions of Higher Education, Fall 2002* (September 2003).