

A Potential Concern about a Positive Future for American Higher Education and the American Economy: A Comparison of Degrees Awarded in STEM Fields in the US and China. (0217)

Abstract: Ability to innovate is clearly an advantage in global economic competition. Preparation of professionals in science, technology, engineering, and mathematics is important in creating the intellectual resources for innovation. Countries differ significantly in the priority they place on the preparation of people in the STEM fields--with significant potential impact on their future well-being.

This presentation will compare the degrees awarded in the STEM fields in the US and China.

The US has a lower percentage of degrees awarded in the STEM fields than China. Further, many of the degrees awarded in the STEM fields in the US are actually awarded to Chinese students studying in the US. These Chinese students have increasing incentives to return to China. Could this situation lead to concerns about a positive future for higher education in the US and ultimately about the positive future of the US in global economic competition?

Paper 1000 word summary of the work.

This paper compares the degrees awarded in the STEM fields, science, technology, engineering, and mathematics, in the United States and China. China awards more degrees in the STEM fields than does the US, measured either in absolute numbers of degrees awarded or in the percentage of total degrees awarded accounted for by STEM degrees.

Emerging from the financial meltdown and addressing the debt crisis is likely to intensify international economic competition, now and in the foreseeable future. In the new era of knowledge-based industries, the country which produces the greatest reservoir of these intellectual resources to foster innovation will clearly have an economic advantage. Significant sources of these intellectual resources are the people being educated and awarded degrees in the STEM fields. Higher education plays the key role in the generation of these essential intellectual resources.

This study uses historical trend analysis to compare the number and percentage of degrees awarded in the fields of science, technology, engineering, and mathematics in the US and in China. First, data was collected from the OECD showing the number of degrees awarded in the scientific fields as a percentage of the total number of degrees awarded across major developed countries. A comparison of the resulting country percentages shows that the United States has among the lowest percentage of degrees awarded in the scientific fields. The country comparisons charted show the US at the bottom of the 30 OECD countries.

Then, detailed data were collected from national statistical data bases, in particular IPEDS, the Integrated Postsecondary Education Data System, on the numbers of degrees awarded at three levels, BA or BS, MA or MS, and doctorate over almost a 40-year period, beginning in 1970.

These data were organized into tables and charts were produced showing the long-term trends in the award o STEM degrees.

These table and chart formats were then transformed into templates to be used in an effort to collect similar data for other countries. The first use of the template is for China. Though the Chinese data is currently available only for recent years, they clearly indicate that the profile of degrees awarded in scientific fields than does the United States. In the United States many more degrees are awarded in business and law than in the STEM fields.

Of even further concern to the US is that many of the degrees in the STEM fields awarded in the United States, are awarded not to American students, but to Chinese students studying in the US. As the Chinese economy burgeons, these Chinese students will have greater incentives to return home.

The National Science Survey of Earned Doctorates indicates that close to one-third of the doctorates earned in the US are earned by international students. This survey also confirms that the degrees earned by the international students are concentrated in the STEM fields:

More than half of the engineering degrees are awarded to international students, 44 percent of the math and computer degrees, and 35 percent of the degrees earned in the physical sciences.

As a strategy for increasing the number of STEM degrees awarded in the US, it might be possible to work to overcome the gender gap. While this is possible, the analysis of the trend data by gender shows an alarming drop-off of the percentage of degrees awarded to women at the BA or BS level, indicating that the pipeline is narrowing, in some cases to an alarming degree.

It should also be acknowledged that, as a nation, China is making major national investments to develop world class universities at a time when the US is forcing many of even its greatest universities to adapt to reduced public financial support. This does not bode well for a positive future for American higher education, and consequently, for a positive American economic future.

This is not a time for complacency for any nation. The template for the comparative analysis of degrees awarded in the STEM fields is intended to be used by analysts from other countries to assess their resources for innovation. It would be most relevant for use by educators in the UK and continental Europe.

References:

National Science Foundation, Survey of Earned Doctorates.

OECD, Organization for Economic Cooperation and Development, Education at a Glance, OECD Indicators, Paris, France

US Department of Education, Institute for Education Statistics, Digest of Education Statistics: 2010.

Cheryl B. Leggon and Willie Pearson, Jr, 2008 "Assessing Programs to Improve Minority Participation in STEM Fields: What We Know and What We Need to Know." In Ronald Ehrenberg and Charlotte Kuh, Editors, Doctoral Education and the Faculty of the Future. Ithaca: Cornell University Press.

Willie, Pearson, Jr., "Trends in African American Male Doctorate *Degree* Attainment in Science, Technology, Engineering and Mathematics (*STEM*) Fields: 1995-2005. ...
www.nasonline.org/site/DocServer/Pearson_CV2009.doc?docID=58961