

Keep America competitive: stem the innovation gap

Barriers at top American universities confront female and minority students wishing to go into science, technology, engineering and math

Wednesday, February 01, 2012
By Gregory S. Babe



With the new year comes a sobering report that shows a number of Asian countries are creeping ever closer in their efforts to close the innovation gap with the United States.

A National Science Foundation study this month reports China, India, South Korea and others are experiencing tremendous growth in STEM (science, technology, engineering and mathematics), while here at home STEM education, research and development, and manufacturing are either flat or decreasing.

For the United States to remain the global innovation leader we must develop creative solutions, including learning how to harness all the STEM talent this country has to offer. It's a huge task, considering we have done a poor job attracting and retaining women, African-Americans, Hispanics and American Indians to the nation's STEM fields.

Until now, most of the emphasis on solving the problem has been on building the STEM pipeline by reforming elementary and middle school science education with more hands-on, inquiry-based learning.

But what happens when they get to college? Why is it that underrepresented minority students say they intend to study STEM in college at roughly the same rates as their majority counterparts but end up failing to graduate with a STEM degree?

Why are there still very low enrollment numbers for female students in college engineering, physics and computer science courses?

A new Bayer survey of faculty who chair STEM departments at the nation's top 200 research universities helps answer some of these questions, while revealing key disconnects.

For example, the chairs say there is no underrepresentation of female students in their STEM department courses and that, indeed, their female students arrive at college best prepared academically to hit the books and successfully graduate with STEM degrees. Yet, at the same time, they say their departments will grant significantly more STEM degrees to male students than female students this year and that female students still grapple with persistent stereotypes that say STEM isn't for women.

On the other hand, stereotyping does not exist for underrepresented minority students in the eyes of the chairs. Still, they view such students as the least well-prepared when they enter college to study STEM and also the least likely to succeed -- even if they come to college with exactly the same academic credentials as everyone else.

Could it be that the colleges themselves are partly responsible for the failure of these students to succeed? After all, they give their institutions a C or below for how well they recruit and retain underrepresented minority students as STEM undergraduates.

Other issues also have an impact, such as the way STEM is taught in introductory college courses. These courses traditionally

have been very rigorous, often "weeding out" students early on in the academic process. A significant number of chairs admit this approach is harmful to students and more so to female and underrepresented minority students than majority students. But they see no need to change their methods.

Discouragement also remains a problem, the research reveals. Sixty percent of the chairs believe female and underrepresented minority students are dissuaded from pursuing STEM studies and careers today. And, it appears the discouragement is happening on college campuses, with the vast majority of chairs saying it is common practice for their faculty to counsel students to consider studies other than STEM if they believe the students don't have what it takes.

At a time when we need all of our STEM talent at the table, discouraging students and weeding them out of STEM are probably not the soundest strategies.

On the positive side, there are a number of universities that have worked to fix the problem and can serve as models for other institutions looking for solutions.

The Meyerhoff Scholars Program at the University of Maryland in Baltimore County, Harvey Mudd College in California and the Bayer Scholars Program at Duquesne University are all examples of college STEM programs that are successfully recruiting and retaining women and underrepresented minority students in demanding STEM disciplines such as computer science, engineering, chemistry and environmental sciences.

It's true the United States has the finest higher education system in the world and our research universities are the best of the best. But no institution is above change when change is necessary. College STEM departments are critical chokepoints in education, a point where students make important decisions about their careers -- and a place where many decide to drop out of STEM.

That has to stop.

If the United States is to remain competitive, then the priority of higher education must be on making -- not breaking -- the next generation of diverse scientists and engineers.

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First published on February 1, 2012 at 12:00 am

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