

## 'Quiet crisis' puts spotlight on bad math teachers

I had a conversation recently with a young woman about to graduate from one of New York's state universities with a liberal arts degree.

We were reflecting on her entry into the workforce and how her choice in majors would affect her future.

This young woman had left her suburban Capital Region high school with no fear of math. She had always excelled in math. She took advanced math classes, posted high math scores in her Regents and SAT exams, good enough to be recruited into an engineering and science program in college. She started her college career full of ambitions that centered around science and engineering.

She knew all the statistics. She knew that engineering and science graduates had more job offers with higher salaries than the typical graduate with an English degree could ever expect. She knew that today's world prizes engineering and science skills, especially in women.

What happened?

She told me about a calculus course where her classmates were dropping out in droves after the first series of almost-impossible-to-pass tests. She did fine on the tests and the mid-term, so she persevered. But after that early success, she struggled the rest of the semester and experienced mathematical frustrations she had never known. The instructor never reached out to her, never offered any encouragement, never asked if there was a problem. From her description of her instructor, he reveled in driving out the wannabes who dared to enter his classroom. And he was very good at that.

When I asked why she didn't go to the instructor for help, she said his foreign accent was too thick to comprehend. She said she was dealing with a textbook that also seemed to be written in a foreign language and the person who was supposed to help her lacked the language skills to communicate with her.

Three years later, the **State University of New York** has produced one more liberal arts graduate and one less engineer.

That is just the anecdotal experience of one student, but it mirrors what is going on in many ways throughout our nation's educational system.

### WEEDED OUT

I told the story to Abbe Herzig. She is an assistant professor of mathematics education at the University at Albany who is studying why women and minorities drop out of math and science programs



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at the post-graduate level.

Herzig has a \$635,000 **National Science Foundation** grant to spend six years studying the question. She is concentrating on looking at what a very few successful post-graduate programs are doing to inspire minorities and women to stick with mathematics.

It is a serious issue, especially now that China and India are producing engineering doctorates in numbers that dwarf the number of Americans earning Ph.Ds. And with those Asian economies on the fast track, the Chinese and Indian students no longer have to come to the United States for opportunities and quality of life.

Herzig is familiar with the weeding-out process going on in math classes. She says there are professors who, rather than inspire their students to the power of math, take it upon themselves to determine who has the mettle to succeed. Their students are hearing the message from these educators that their teachers are not going to pay attention to them until the student proves that they are worth their attention.

Herzig has graduate degrees in mathematics and statistics and grew up thinking of herself as a math person. Herzig left math herself four separate times during her college education.

Herzig says students with natural mathematical talent get overlooked in favor of kids who may have less aptitude, but come from better, suburban high schools whose parents sent them to science camp over summers.

### HOSTILE ENVIRONMENT

Herzig says study after study shows that students leaving mathematics are not leaving because of poor grades. It is not about ability or lack of passion for the subject. It is more likely the culture of the classroom.

Educators are not connecting with the students. Teachers are not making math relevant to their students.

And too many students find the college math classroom culture to be hostile, unfriendly and unnecessarily competitive. Many, especially minorities and women, do not see how they are going to fit in.

Shirley Ann Jackson, the president of **Rensselaer Polytechnic Institute**, has been at the forefront of this discussion. Jackson calls it a "quiet crisis."

In graduate science programs in the United States, fewer than half the students are Americans. Applications to graduate engineering school from international students are on the decline for a lo

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of reasons, including the tougher line the federal government has taken since 9/11.

In her speeches on the subject, Jackson says America's technological strength depends on its ability to produce the best science and engineering work force. Jackson says it is a crisis that could threaten America's place as a world power and the well-being of its people. The crisis has been growing quietly for decades.

### BAD TEACHERS AS ENEMIES OF THE STATE

Jackson's quiet crisis is creating a gap between America's growing need for scientists, engineers and other technically skilled workers, and its production. It is even a threat to national security.

Engineering and science all start with math and the responsibility lies with our educators. And Shirley Ann Jackson is right, those math teachers who drive promising engineers out of the field before they get started in the name of weeding out the chaff are not only damn poor teachers, but they are undermining the future of our country.

It is an important issue. How well our schools are doing preparing our children is key to their employability, our community's economic future and also the well-being of our country.

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