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Math Skills Suffer in U.S., Study Finds

By [SARA RIMER](#)

The United States is failing to develop the math skills of both girls and boys, especially among those who could excel at the highest levels, a new study asserts, and girls who do succeed in the field are almost all immigrants or the daughters of immigrants from countries where mathematics is more highly valued.

[The study](#) suggests that while many girls have exceptional talent in math — the talent to become top math researchers, scientists and engineers — they are rarely identified in the United States. A major reason, according to the study, is that American culture does not highly value talent in math, and so discourages girls — and boys, for that matter — from excelling in the field. The study will be published Friday in [Notices of the American Mathematical Society](#).

“We’re living in a culture that is telling girls you can’t do math — that’s telling everybody that only Asians and nerds do math,” said the study’s lead author, Janet E. Mertz, an oncology professor at the [University of Wisconsin](#), whose son is a winner of what is viewed as the world’s most-demanding math competitions. “Kids in high school, where social interactions are really important, think, ‘If I’m not an Asian or a nerd, I’d better not be on the math team.’ Kids are self selecting. For social reasons they’re not even trying.”

Many studies have examined and debated gender differences and math, but most rely on the results of the SAT and other standardized tests, Dr. Mertz and many mathematicians say. But those tests were never intended to measure the dazzling creativity, insight and reasoning skills required to solve math problems at the highest levels, Dr. Mertz and others say.

Dr. Mertz asserts that the new study is the first to examine data from the most difficult math competitions for young people, including the USA and International Mathematical Olympiads for high school students, and the Putnam Mathematical Competition for college undergraduates. For winners of these competitions, the

Michael Phelps and Kobe Bryants of math, getting an 800 on the math SAT is routine. The study found that many students from the United States in these competitions are immigrants or children of immigrants from countries where education in mathematics is prized and mathematical talent is thought to be widely distributed and able to be cultivated through hard work and persistence. The International Olympiad, which began in Romania in 1959, is considered to be the world's toughest math competition for high school students. About 500 students from as many as 95 countries compete each year, with contestants solving six problems in nine hours. (Question 5 from the 1996 test was famously difficult, with only six students out of several hundred able to solve it fully.) The United States has competed in the Olympiad since 1974. Its six-member teams are selected over years of high-level contests, and trained during intensive summer math camps.

One two-time Olympiad gold medalist, 22-year-old Daniel M. Kane, now a graduate student at [Harvard](#), is the son of Dr. Mertz and her husband, Jonathan M. Kane, a professor of mathematics and computer science at the University of Wisconsin, and a co-author of the study. The other two co-authors are Joseph A. Gallian, a math professor at the [University of Minnesota](#) and president of the Mathematical Association of America, and Titu Andreescu, a professor of math education at the University of Texas at Dallas and a former leader of the United States Olympiad team.

All members of the United States team were boys until 1998, when 16-year-old Melanie Wood, a cheerleader, student newspaper editor and math whiz from a private school in Indianapolis, made the team. She won a silver medal, missing the gold by a single point. Since then, two female high school students, Alison Miller, from upstate New York, and Sherry Gong, whose parents emigrated to the United States from China, have made the United States team (they both won gold).

By comparison, relatively small Bulgaria has sent 21 girls to the competition since 1959 (six since 1988), according to the study, and since 1974 the highly

ranked Bulgarian, East German/German and Soviet Union/Russian IMO teams have included 9, 10 and 13 girls respectively. “What most of these countries have in common,” the study says, “are rigorous national mathematics curricula along with cultures and educational systems that value, encourage and support students who excel in mathematics.”

Ms. Wood is now 27 and completing her doctorate in math at [Princeton University](#). “There’s just a stigma in this country about math being really hard and feared, and people who do it being strange,” she said in a telephone interview. “It’s particularly hard for girls, especially at the ages when people start doing competitions. If you look at schools, there is often a social group of nerdy boys. There’s that image of what it is to be a nerdy boy in mathematics. It’s still in some way socially unacceptable for boys, but at least it’s a position and it’s clearly defined.”

Ms. Miller, who is 22 and recently graduated from Harvard, and Ms. Gong, 19 and a Harvard sophomore, both cite Ms. Wood as their role model. Ms. Wood and Ms. Miller helped coach the United States girls’ team that began competing in the Girls’ Math Olympiad in China two years ago. Thirteen girls from the United States have competed in the last two years, according to the study, and all are of Asian descent except one, Jennifer Iglesias.

The leader of those two teams, and of the United States Olympiad team is Zuming Feng, who grew up in China and teaches math at Phillips Exeter Academy in New Hampshire.

Dr. Feng says that in China math is regarded as an essential skill that everyone should try to develop at some level. Parents in China, he said, view math as parents in the United States do baseball, hockey and soccer.

“Here everybody plays baseball,” Dr. Feng said. “Everybody throws a few balls, regardless of whether you’re good at it, or not. If you don’t play well, it’s O.K. Everybody gives you a few claps. But people don’t treat math that way.”

A big part of the problem, Dr. Mertz and others say, is that while the young math Olympians are wooed by elite colleges like Harvard and the [Massachusetts](#)

[Institute of Technology](#), as well as the country's leading hedge fund firms, they are mostly invisible to the public.

"There is something about the culture in American society today which doesn't really seem to encourage men or women in mathematics," said Michael Sipser, the head of M.I.T.'s math department. "Sports achievement gets lots of coverage in the media. Academic achievement gets almost none."

Ana Caraiani, 23 and a graduate student in math at Harvard, is a two-time Romanian International Olympiad gold medalist. "In Romania, math is not considered as something you need to be a nerd to do," Ms. Caraiani said. "Math is about being smart. It's about having intuition. It's about being creative."

Still, she says, it was not easy excelling in mathematics as a girl in Romania. In 2001, in fact, she was the first girl to make the country's Olympiad team in 25 years.

This article has been revised to reflect the following correction:

Correction: October 14, 2008

An article on Friday about a study asserting that the United States is failing to develop students' math skills referred incorrectly to the high school education of Melanie Wood, a member of the United States Mathematical Olympiad team in 1998. She graduated from a private, not a public, school — Park Tudor in Indianapolis.