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Science, technology, engineering and math careers are growing at a faster rate than many other careers. Help your students, especially girls and minorities, explore this valuable career path.

STEM CAREER LAUNCH PAD

BY RICH FELLER PH.D.

Every school counselor can describe the students who took off. Those youth who rejected expectations that said "post-secondary education isn't for you," "you're not a science or math kid" or "tech classes are for those guys." In today's schools and workplaces, technology removes time, distance and space barriers to opportunities. School counselors hold the keys to opening the doors to the science, technology, engineering and math (STEM) jetway to courses, programs, informal learning and careers shaped by the global knowledge economy. As President Obama says, "An educated workforce is essential for America to compete and win. Without a workforce trained in math, science, technology and other skills of the 21st century, our companies will innovate less, our economy will grow less, and our nation will be less competitive."

Labor projections suggest an urgent need to build a talent pipeline to replace the more than 50 percent of the current science and engineering workforce approaching retirement. School counselors understand the need to prepare technologically empowered workers and must focus on showing students how STEM subjects connect to the real world.

School counseling came about as a result of Sputnik. Today, a new energy, commitment and resources are gathering. The time to encourage and train school counselors to inspire students to solve problems in alternative energy, climate change, nanotechnology and space exploration via STEM careers has arrived. A 2009 Public Agenda study found just half of students felt strong math, science and technology skills are "absolutely essential" to their future. Nearly one in four indicated they'd be "really unhappy if I ended up in a job or career that required doing a lot of math and science."

Students may not be getting much encouragement about exploring STEM from their parents either. While educators, policymakers and business leaders express concern about the United States falling behind on science and technology, the parents surveyed are complacent about the STEM education their children were getting. Most parents (62 percent) say students need advanced math like algebra and calculus to succeed in life. But majorities also say "things are fine as they are" when it comes to the amount of math their children get in school (57 percent). Seventy percent of high school parents say their children's school is teaching the right amount of math and science.

In fact, fewer parents worry about math and science education than in the 1990s. When Public Agenda surveyed parents in 1994, 52 percent said not enough math and science was a "serious problem" in their child's school. By 2006,

that number had fallen to 32 percent. In "The World is Flat," Thomas Friedman states, "The education in American junior high schools, in particular, seems to be a black hole that is sapping the interest of young people, particularly young women, when it comes to the sciences."

Despite continuous advances in science the general public is not as awed about science as it was a decade ago either. A new poll by the Pew Research Center found that 27 percent of Americans see advances in science, medicine and technology as the nation's greatest achievement of the past 50 years, down sharply from the 47 percent who gave a similar response in 1999.

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What Are STEM Careers?

Larry Shatkin, a leading labor market information expert and author of "200 Best Jobs for College Graduates" defines STEM occupations as those requiring knowledge of or skill with science, technology, engineering or math with at least two years of post-secondary study or training. Driven by the disciplines of chemistry, computer science, engineering, geosciences, life sciences, mathematics, physics/astronomy and social sciences, May 2008 average STEM earnings were $60,664 compared with $32,390 for all occupations. With jobs predominately in aerospace, energy, biosciences and information technology, the Bureau of Labor Statistics reports that STEM job growth between the years 2006–16 will be 15.6 percent compared with 10.3 for all occupations.

Employment in health and education services and jobs requiring post-secondary education will grow the most between now and 2016. Although the decline in manufacturing employment is expected to moderate, aerospace and pharmaceuticals are projected to create many jobs. Occupations requiring only an associate's degree or a post-secondary vocational award will likely grow faster than jobs requiring a bachelor's or higher degree. However, not all community college degrees or certificates (ranging from engineering technician or nursing assistant to bricklayer or auto technician) have the same value.

Research suggests that the most valuable credentials are those in the quantitatively oriented fields requiring math and science courses related to health care and other technical fields.

Workers currently earn a 10 percent premium for each additional year of schooling completed. Considering the dynamic nature of the U.S. labor market and continuous technological change, worker flexibility gained from additional skills may prove even more valuable. In 2003, a quarter of American workers were in jobs that were unlisted among the Census Bureau's Occupation codes in 1967, and technological change has accelerated since then. Environmental-related occupations not cataloged prior to 2000 are expected to experience tremendous growth over the next decade.

Growth occupations require a greater intensity of non-routine analytic and interactive tasks, such as frequent use of math and high executive functioning, than jobs in decline. While many good middle-class jobs formerly required only proficiency in well-defined tasks, a greater number of future jobs require skills enabling workers to flexibly complete uncertain and interactive tasks. As workplaces become more global and characterized by unprecedented technological change and mobility, competition will cross international borders. Speed, innovation and learning agility are keys to competitive success. Current and future workers are learning that "business-as-usual" means integrating cultural differences when creating and marketing all products and services. As school counselors advise students for anticipated economic growth in the 21st century, all students will be better prepared for ever-changing opportunities if they have strong analytical and interpersonal skills.

Your Role

Advising students about STEM opportunities and careers requires you to have equitable, high-quality career information. This is especially important since women constitute 26 percent of the STEM workforce compared with 47 percent of the overall workforce. African-Americans make up 6 percent of the STEM workforce compared with 11 percent of the workplace, and Hispanics account for 5 percent of the STEM workforce, which is less than half of their share of the overall workforce. Men outnumber women (73 percent to 27 percent overall) in all sectors of employment for science and engineering.

By not engaging women and minorities in the engineering enterprise, 40 percent of America's intellectual talent is ignored and denied opportunities within STEM courses, programs and careers. School counselors know this is morally wrong and against all principles of a just society.

Sometimes situations exist in which applying the same rules to unequal groups can generate unequal results. As a result, you need to challenge advising strategies limiting informal and rigorous experiential STEM opportunities. Using a strength's-based perspective and "empowerment-focused" counseling strategies decrease ethnic and gender group differences. Doing so identifies a

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ASCAway podcast with former astronaut Sally Ride, founder and CEO of Sally Ride Science, on how school counselors can encourage students to pursue STEM careers. Access from *www.ascaway.podbean.com.*

Ride Into the FUTURE

America's first female astronaut Sally Ride, Ph.D., experienced first-hand the career opportunities available to students who focus on STEM education.

Throughout our nation's history, science and engineering have been the engines driving the American economy. Examples of the innovations they generate range from the steamboat to the refrigerator and from the laser to the cell phone.

That economic engine is now at risk. The United States is losing its competitive advantage in today's global economy, and we have work to do to restore it.

Training today's students in science, technology, engineering and mathematics (STEM) is critical if we are to produce tomorrow's innovators. The U.S. Bureau of Labor Statistics reports that the demand for scientists and engineers is expected to grow four times faster than all other professions over the next decade; yet only 5 percent of U.S. undergraduates earn degrees in science or engineering. In China, 42 percent of undergraduates earn degrees in those fields.

Mathematics, science and technology skills are also increasingly important for basic, living-wage jobs in today's economy. According to the National Science Foundation, 80 percent of new jobs in the next decade will require some form of technical training. Further, these jobs are growing five times faster than other careers.

Encouraging student interest in science and mathematics has never been more important. STEM plays a greater role in our lives than ever before, and students who have a solid foundation in science and mathematics are prepared to pursue a wide range of opportunities in high school, college and the workplace. Yet many students, particularly girls and students from diverse cultural backgrounds, are leaving school without the confidence or preparation they need in these subjects.

In elementary school, most students report an interest in science. Interestingly enough, girls report the same level of interest as boys. Surveys by the National Center for Education Statistics (NCES) consistently show that 68 percent of fourth-grade boys and 66 percent of fourth-grade girls "like science." However, starting in fifth grade, students begin to drift away from science, and girls drift in numbers greater than boys. Studies show that girls and boys have equal aptitudes for STEM subjects and demonstrate this by performing equally well in class and on standardized tests. Yet in spite of that, girls are less likely to express an interest in STEM careers and less likely to pursue STEM majors in college. By eighth grade, boys are twice as likely as girls to express interest in a career in science; by 12th grade, boys are five times more likely than girls to express interest in a career in engineering.

These data show it isn't necessary to increase students' interest in science; in fourth grade, fully two-thirds of them like the subject. It is necessary, however, to develop strategies to sustain and support that interest through upper elementary, middle and high school. Several factors combine to influence students. Girls and underrepresented minorities, in particular, are affected by the subtle misconceptions and stereotypes that surround them – misconceptions of science and mathematics and stereotypes of what scientists and engineers look like.

Students in middle school and high school may know, in the abstract, that science and engineering are important, but many don't believe those subjects are exciting or relevant to their world. This is particularly true for girls and minorities, who often picture science as dull and dry, done by people working alone. Ask an 11 year old to draw a scientist, and he or she is likely to sketch an old wild-haired male who looks like Einstein wearing a white lab coat and pocket protector. This is not an image that most 11-year-old girls (or boys, for that matter) aspire to. Society surrounds kids with outdated misconceptions and stereotypes like this.

It is critical to change students' perceptions of science and engineering, and scientists and engineers, because otherwise they will not choose to enter those fields – no matter how well they do on tests. Here is where school counselors can play a critical role.

Research has shown that connecting science to the real world is an effective strategy for engaging students and keeping them interested in the subject. Research also shows that it is important to expose students, even as early as upper elementary and middle school, to the wildly diverse things scientists and engineers do and the diverse group of people in technical fields.

Many teachers and administrators do not appreciate how important math and science skills will be to today's students. And those that do may not appreciate the importance of introducing students to the people who work in STEM occupations as a way of making the subject more meaningful to them. Students are deciding at an early age that careers in science or engineering are not interesting and that the skills they learn in science and math are not necessary. You can provide key information to students to help them identify possible STEM careers.

Sally Ride Science is an innovative science content company dedicated to supporting girls' and boys' interests in science, math and technology. Sally Ride, Ph.D., best known as America's first woman in space, founded Sally Ride Science in 2001 to create quality programs and products that educate, entertain, engage and inspire. For more information, visit *www.sallyridescience.com.*

Fortunately school counseling can play a greater role in promoting the pursuit of STEM options. AS YOU AND OTHER SCHOOL COUNSELORS PROMOTE STEM OPTIONS THE STRENGTH AND DIVERSITY OF THE STEM WORKFORCE WILL GROW.

greater range of analytical, creative, practical and wisdom-based abilities and reduces differences in performance expected of different racial, ethnic and gender groups. Until such efforts are commonplace too few students will naturally explore the science and math courses needed to prepare them for STEM careers. And of those who do complete the requisite coursework, too few enter STEM professions upon graduation. Fortunately school counseling can play a greater role in promoting the pursuit of STEM options. As you and other school counselors promote STEM options the strength and diversity of the STEM workforce will grow.

Reasons for low enrollment, completion and interest in STEM learning options, programs and careers are many. Yet you can play a significant role in guiding students through the often overwhelming process of course selection from an array of unrelated options. Clarifying pre-requisite courses, identifying STEM career pathways and shaping policy to reduce overcrowding, which results in the students' inability to register for required courses) may be a most equitable strategy. SC

Rich Feller, Ph.D., is professor of counseling and career development and University Distinguished Teaching Scholar at Colorado State University. A former guidance, vocational and admissions counselor he is author of *www.stemcareer.com* and a consultant with NASA.

STEM Growth Strategies

Connect students with role models in STEM fields, especially women and ethnic minorities in nontraditional programs and careers, or college students working toward STEM degrees.

Promote STEM in tangible and real-life oriented ways. Connect academic courses with career and technical education programs, such as teaching geometry through construction.

Visit *www.stemcareer.com,* a clearinghouse of resources, materials and programs on STEM careers for students, teachers and school counselors. Promote fun ways to explore STEM interests through Space Camp (*www.spacecamp.com*), Camp Kennedy's Space Center (*www.kennedyspacecenter.com/educatorsParents/camp.asp*), NASA's Kid's Club (*www.nasa.gov/audience/for students/index.html*) and local STEM career fairs within educational settings.

Provide guidance curriculum efforts such as No Boundaries *www.usatoday.com/educate/nasa/index.html*, which helps students explore STEM careers in a game simulation.

Explore materials offering insights about STEM such as NASA's Web sites, *www.nasa.gov* and *http://education.nasa.gov/edprograms/core/home/index.html*; The Gender Clip Project, *www.genderchip.org*; and the Sloan Career Cornerstone Center *www.careercornerstone.org/diversity.htm.*

Contact College Summit, *www.collegesummit.org*, to help raise college-going rates by promoting a college-going culture. Contact the ITEST Learning Resource Center, *http://itestlrc.edc.org*, about resources to increase the numbers of students pursuing STEM careers.

Hold parent, teacher and student information sessions about "What it takes to be successful in today's workforce."

Contact your state Space Grant, which funds fellowships and scholarships for students pursuing STEM careers in colleges and administers pre-college and public service education projects, *www.nasa.gov/offices/education/programs/national/spacegrant/home/Space_Grant_Directors.html*

Utilize O*NET to focus on education plans and obtaining the necessary knowledge, competencies and training for success in a particular STEM careers, *http://online.onetcenter.org/find/career?c=15&g=Go*

Visit *www.cdminternet.com* to assess and stimulate student interest and exploration of STEM careers.