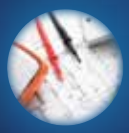
Pittsburgh
Quarterly Publication of the Engineers' Society of Western Pennsylvania
Spring 2012

ENGINEER



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SPRING 2012

In this issue...

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Guest Editor

Rebecca Lucore
Executive Director
Bayer USA Foundation

Rebecca Lucore

This issue of *Pittsburgh Engineer* focuses on a theme that may be a bit of a departure for the magazine, but one that nonetheless is important for our region – STEM (science, technology, engineering and mathematics) education outreach and why it matters.

It's well documented that the discoveries, inventions and advances made by the nation's STEM workforce are central to keeping the United States safe, prosperous and at the forefront of global innovation. What's good for countries is also good for communities. The strongest, most robust communities are those that are home to thriving STEM companies and industries.

That includes the Pittsburgh area. We're fortunate to have excellent research universities, promising start-ups and established medium-sized companies, as well as global Fortune 1000 STEM companies. And each and every one of them has a role to play when it comes to reaching out and ensuring the next generation of American scientists and engineers.

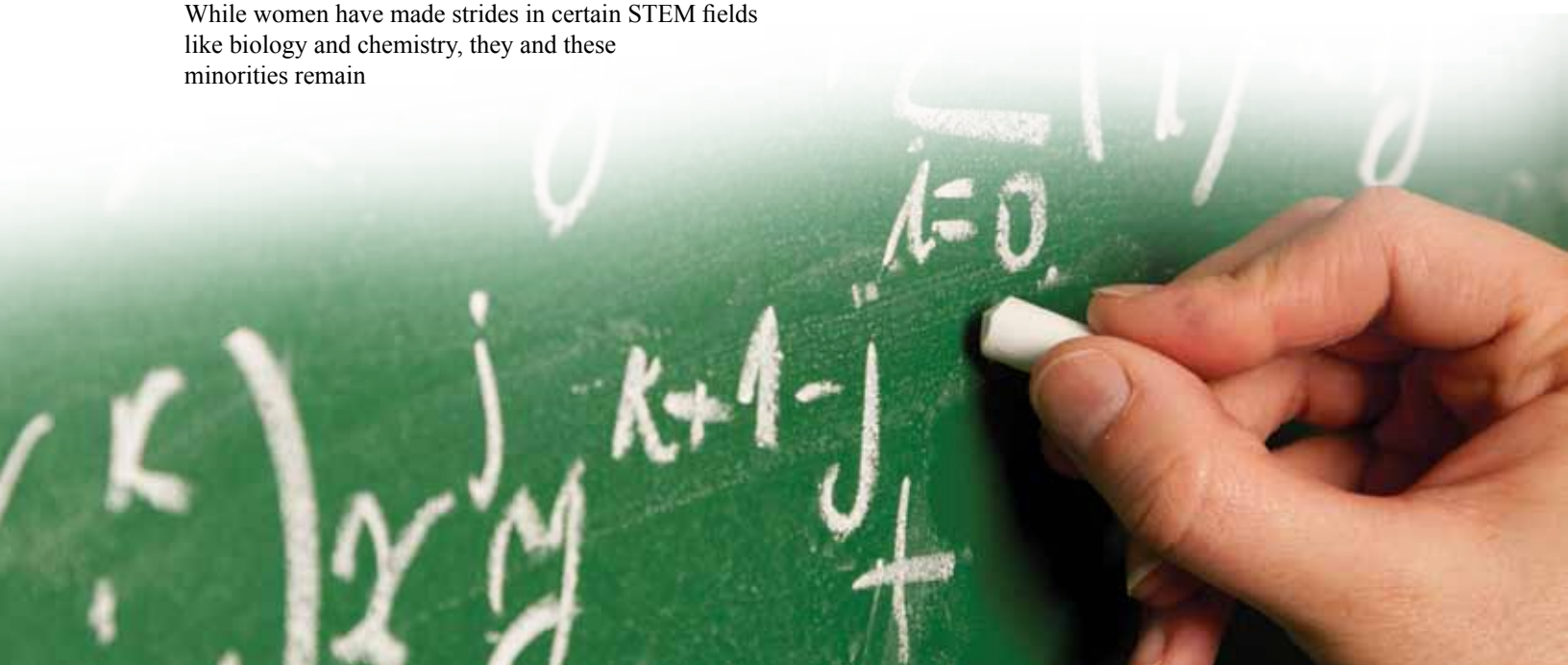
But it doesn't stop with industry. There is a common saying "It takes a village…" Equally important are the roles taken on by parents, teachers, students and community institutions. They all play an important part in outreach in different ways.

Outreach is particularly critical when it comes to women, African Americans, Hispanics and American Indians. While women have made strides in certain STEM fields like biology and chemistry, they and these minorities remain sorely underrepresented in engineering, physics, mathematics and computer science.

If our region and our country are to remain competitive, this is an unsustainable situation. Women and underrepresented minorities make up two-thirds of the nation's population but only one-quarter or less of its STEM workforce. As a significant portion of the traditional STEM workforce readies to retire, the minority population increases at an unprecedented rate and STEM jobs grow three times as fast as non-STEM jobs, we need to find ways to recruit and retain more women and minorities to fill those positions.

In my job, I get the opportunity to work with STEM professionals, industry executives, education think tanks and policy makers of all types. I also get to work with students – elementary, middle, high school and college students. In doing so, I find that many of them don't have a clue about what engineering is and what engineers do. That has to change.

And the best way to foster that change is through outreach.



I sometimes think that if someone – a professional – had reached out to me, or if I had more engaged science teachers in middle school, my career would have taken a dramatically different turn and I'd be a geologist today. I grew up fascinated with rocks and fossils and plate tectonics and often times imagined myself

"I sometimes think that if ...a professional had reached out to me...my career would have taken a dramatically different turn and I'd be a geologist today."

going on global expeditions and addressing earthquake concerns. However, there wasn't anyone around me who encouraged that love of science to keep me on track. My parents encouraged me in general, but they themselves weren't familiar with science and often times, didn't know what to do for me.

Students need role models and mentors to help them understand that they, too, can achieve their dreams of becoming scientists and engineers. And academic institutions and STEM companies have the role models and mentors to share to help make those dreams a reality. I didn't become a scientist, but lucky for me, I became an advocate for STEM education and couldn't be happier.

One of the articles in this issue is about Bayer's use of public opinion research in its STEM education outreach efforts. One of our surveys polled teachers who are members of the National Science Teachers Association. Almost all of them, regardless of grade level or level of experience, said it was important for students to be exposed to scientists and engineers, with one-third calling it "essential" and half "very important."

Among teachers who had had experience with these types of programs, there was overwhelming support. The teachers said having scientists and engineers work directly with their students provided them with positive images of scientists and engineers, peaked student interest in STEM and provided the kids with useful information about STEM careers. They teachers said the programs also helped them better understand science and engineering content.

Engineering outreach to female students is especially key. Women make up nearly 60 percent of the undergraduate college population, but only 40 percent of STEM majors and less than 20 percent of engineering majors.

Several years ago, Dr. Clemencia Cosentino de Cohen, formerly of the Urban Institute who is now at Mathematica Policy Research, led a team of researchers whose goal was to produce national retention estimates of college engineering majors, compare female and male graduation rates and female enrollment-to-graduation rates and find explanations for observed disparities.

Much to their surprise, the researchers found that overall, and in most (but not all) engineering disciplines, women earn engineering degrees at rates equal to or higher than those for men. However, the number of women enrolling in engineering is so small that even if all of them stayed with the major, there would still be serious female underrepresentation.

"The real problem is not low retention, its low enrollment. There are simply too few women enrolling in engineering programs."

Bottom line – the real problem is not low retention, its low enrollment. There are simply too few women enrolling in engineering programs.

And that's where outreach comes into play. Businesses can reach out and support STEM education programs at the pre-college and college level. Universities can reach

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From the Mentors Perspective

By David Teorsky

There's something funny that happens when you ask engineers to volunteer as a mentor. They accept. Every time. For more than a decade, members of the Engineers' Society of Western Pennsylvania (ESWP) have answered the call in support of student mentoring programs? Why? That's a good question, and one that this issue of Pittsburgh Engineer sets out to answer.

Give Back

Today, more than ever, there are increasing demands upon our time. People are stressed wearing many hats, fitting more into a day than ever before. Doing 'more with less' seems to be the new norm. And yet, somehow, almost mysteriously, engineers seem more than willing to create time in their busy schedule to encourage the next generation to consider a career in engineering. And it's a good thing these individuals are willing to help. First and foremost, encouraging that next generation of engineering talent is truly needed, as has been well documented. Second, ESWP presents many programs to encourage the next generation, all of which are dependent upon member volunteerism. These volunteers come in all shapes and sizes–and disciplines, too; entry-level and senior, male and female, civil, chemical, structural and the like…they all answer the phone when "duty" calls (their words, not mine.) To help understand the reasons, I interviewed dozens of those who participate in programs such as Future City, Design Lives Here, ACE Mentoring and others.

Interesting is that many volunteers in ESWP student outreach programs did not benefit from the same experience. In fact, few of those could identify a true mentor while deciding to pursue engineering as a career choice. Most, however, did recall someone who influenced them, and these informal mentors looked like teachers, scout leaders, upper-classmen and more experienced co-workers.

So, if today's engineer isn't the product of a formal mentor-mentee relationship, what causes them to do it? It could be that the sheer number of opportunities to mentor has increased dramatically. Individuals of a certain generation can recall the annual science fair, but maybe not much more than that in the way of special programs, a fact supported by Cathy Huth, a teacher at St. Philip School. "There is no comparison. Students today have access to so many more learning tools and opportunities than I had." With new programs comes new opportunities to mentor; the need to mentor is greater, so the need for mentors is greater.

As abundant as these programs seem to be, today, most schools have a difficult time fitting the abundance of extracurricular activities into their curriculum. And this may not always be in the best interest of students who show an interest in STEM. Many mentors interviewed felt that school systems today do not do enough to encourage those students who demonstrate aptitude in science, technology, engineering and math subjects (STEM). "It is very apparent that current education system does not place enough emphasis on critical thinking, problem solving, and logical reasoning. These are the fundamentals of engineering."

"The brain is just like any other muscle in the body, you have to 'use it or lose it.' We, as mentors, need to encourage, promote, and challenge students who show interest and ability in these areas" said Mitchell. One survey suggests that nine out of 10 high school students agree that an understanding of science is important to an understanding of the natural world. However, this same survey goes on to state that nine out of 10 students are taught by science teachers who do not have a degree or certificate in the physical sciences.

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out to high school students, and high school students, in turn, can reach out to middle school students. And in Pittsburgh, leaders have reached out beyond our traditional borders to look at community issues such as education more broadly across 32 counties in four states.

And don't forget the roles parents have too. I know that I look at things differently now, and hope that my children will grow

> "Students need role models and mentors to help them understand that they, too, can achieve their dreams of becoming scientists and engineers."

up understanding the important role science will play in their lives no matter what career they choose.

In this issue of *Pittsburgh Engineer*, you'll find out all about important STEM outreach initiatives that are having a real and present impact on our region. And how you and your company might get involved.

Enjoy the read.

Rebecca L. Lucore is Executive Director of the Bayer USA Foundation and has directed Bayer Corporation's STEM education partnerships and flagship program Making Science Make Sense® (MSMS) since 2000, including working with several school districts across the United States to assist them in implementing systemic science education reform. She is Board President of Achieving Student Success through Excellence in Teaching (ASSET STEM Inc.) in Pittsburgh and serves as an advisory committee member for the National Governors Association's STEM Center and chairs the Diversity and Underrepresentation Committee for Change the Equation. PE

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Many see this as a problem, and if there is one thing engineers can do, it is fix problems.

"For those students who display motivation towards thinking critically, encouragement from teachers, family, and mentors is a must" states Mike Mitchell, a local engineer with CDM-Smith, and frequent volunteer mentor. Mitchell continues: "Otherwise, the development of this talent may not be utilized to its fullest in the current school system." Another frequent volunteer mentor, also from CDM Smith, is Environmental Engineer Joshua Jedlicka, who shares this opinion: "Teachers face enough pressures to do more with fewer resources. Therefore it is essential that professionals support teachers while reinvesting in their profession by encouraging students to consider a STEM career."

Addressing the shortcomings in school systems aren't the only reasons that engineers are active in mentoring students. "Mentoring is a way of 'paying it forward' in the hopes that I might inspire another student into engineering" said Karen Mueser, an engineer with AECOM. And with an almost-urgent need to increase the number of students entering college majors which lead to a career in engineering, the need is now. "I think that we have a duty to our profession to mentor to the next generation of engineers" states Charles Toran, owner of Sci-Tek Consultants and currently the 1st Vice-President of ESWP.

Get Back

There is also some payback to those who mentor. Jedlicka feels that he too benefits. "I also learn from the students I mentor, and I think that's something which is discounted a lot of the time when discussing mentoring."

And teachers can benefit from extracurricular programs that ESWP offers. "The students' enthusiasm for learning and the spark that programs like Design Lives Here ignite motivates me" said Huth. She goes on to say "I feel a real responsibility to our country to encourage students of ability to pursue work that will help our nation to sustain its leadership role in developing technology and using that technology to improve the quality of life for everyone."

It seems that no matter who is involved, everyone wins. "I'm encouraged when a student first makes the connection of how engineering and science play a role in their daily lives. I'm most proud when that student starts to consider the greater social impacts engineers and scientists can make in improving society" said Jedlicka. "Great things can be accomplished by individuals who have dreams, set goals, and persevere to accomplish them. Those that have special gifts have special responsibilities to use them to help move everyone forward" said Huth. PE

ASSET STEM Education –
Engineering Student Success for Tomorrow's Innovative Workforce

By Cynthia Pulkowski
Executive Director of ASSET STEM Education

The Need

Driving our nation's ability to compete and helping America 'win the future' through technological advances and ingenuity, requires a workforce that can think critically, discover and innovate. According to a 2012 study by the international Organization for Economic Co-operation and Development, research indicates that innovation in any economy depends on how many workers have STEM (Science, Technology, Engineering and Mathematics) degrees.

STEM education is a quality imperative and the foundation for creating new knowledge, evolving society and developing a workforce capable of realizing dreams and conquering challenges. STEM fields not only reinvigorate employment and economies, but rekindle the human spirit giving it hope that problems are solvable and that opportunities to strive, thrive and survive are possible. The STEM education wake-up call must be heralded nationwide to educators and business leaders, to parents and students to inspire and motivate youth, sparking interest in and understanding of STEM.

The Solution: ASSET STEM Education

The real power and strength of any pipeline starts at its source. From that point, the pipeline serves as a conduit. The same is true in education. For 18 years, ASSET (Achieving Student Success through Excellence in Teaching) has been successfully filling the STEM pipeline at its source, elementary and middle school.

As a nationally recognized STEM education improvement nonprofit, ASSET STEM Education was established by Bayer Corporation and several corporate and community partners in 1994. It inspires innovation and excellence by providing highly effective educator professional development, hands-on, minds-on classroom materials and consulting services to schools, universities and organizations. All of its programs are results-oriented, research- and inquiry-based and align with national and state standards.

"Research shows that students need to be engaged in science early—by age 11, in order to spark interest"

Research shows that students need to be engaged in science early—by age 11, in order to spark interest and self-efficacy. By middle school, students often become disengaged with their science classes because they don't see the real world connections. Furthermore, substantial evidence indicates improved science education during the K-12 years leads to more college-bound students selecting STEM majors, as well as improved overall performance.

By tapping into the natural wonder of hands-on, inquiry-based science at an early age, students can be inspired to be scientists and engineers rather than turned away from it due to traditional lecture learning and hands-off teaching. ASSET empowers students in elementary and middle school with the critical-thinking skills needed to be successful now and through high school and higher education, careers and in life. These skills are essential to improving the quality of life for these students, their families and the communities where they live.

In an independent study of student achievement, ASSET 4th-grade students outperformed their peers on the science Pennsylvania System of School Assessments. Research validates that these successes begin with highly-skilled and effective teachers. By focusing on teachers as the targets and agents of classroom change, ASSET is changing the culture of teaching to an inquiry-based method that sparks student interest and fuels learning.

Its professional development model not only provides teachers with basic science skills, it leads to the continuous improvement of teaching practices and a deeper understanding of the scientific inquiry process.

ASSET is an organization rooted in research and best practices. It learned its model of science education reform through the National Science Resources Center's model for exemplary STEM education programs. ASSET's teacher-focused enhancements to the national model make the program uniquely its own.

During interviews with college seniors who were entering first grade when ASSET began its pilot program in their schools, each remarked that their early ASSET science classroom experiences have made a difference in their lives—from influencing their career choices and work ethic to world outlook.

Now a senior Chemical Engineering major at Washington University in St. Louis, Will S. stated, "I remember ASSET's Rocks and Minerals module, where we categorized gems and fossils. That—and a field trip to the Carnegie Museum to see the dinosaurs—made me want to be a paleontologist when I grew up. Today, though, my focus is on energy solutions—I'm preparing for a career in the nuclear industry."

Athena H., another former ASSET student and a Supply Chain Management graduate from Penn State University commented, "I remember ASSET making science class exciting because of all the sensory aspects to it. It was all very visual which I believe helped me to relate the things I was learning to the 'real world.' Throughout high school, I remained interested in science taking advanced Chemistry and Physics classes."

The Power of Partnerships:

Fueling STEM's driving engine—local corporations, businesses and community members must realize that they are the ultimate benefactors when the regional workforce can think creatively, collaborate and successfully develop and implement new ideas and processes.

David L. Porges, President and CEO of EQT Corporation remarked, "EQT supports the ASSET team because its innovative techniques help teachers and their students experience learning in a new and creative way, especially in the areas of science, technology, engineering and math."

As part of its philanthropic community outreach, EQT

is funding the ASSET program in Greene County elementary schools. Through this commitment, more than 1,900 students are experiencing ASSET's hands-on, inquiry-based approach to learning that will spark their interest and fuel their learning while helping grow future scientifically-literate workers and the regional economy.

In an effort to help school districts who have been impacted by statewide education budget cuts, hundreds of volunteers from corporations, businesses and social service agencies donate more than 6,000 work hours annually to ASSETs Materials Support Center refurbishing nearly 16,000 hands-on science modules for distribution statewide.

In 2006, ASSET was selected to design, implement and manage Pennsylvania's Science: It's Elementary initiative in partnership with the Pennsylvania Department of Education. Other recent accomplishments include: recipient of a 2010 federal Investing in Innovation Grant; named a Pittsburgh Business Times Best Place to Work; and honored as the 2011 Carnegie Science 'Catalyst for Education' award winner.

Fueling the STEM Career Pipeline:

While ASSET's roots are in science, the organization is actively addressing STEM education. New initiatives are being introduced that focus on Engineering, Online Learning and an expanded Early Childhood program that addresses the unique learning needs of students ages four to seven.

Most recently, ASSET was recognized for its work nationwide to spark student interest and understanding in STEM related subjects. In light of that effort, ASSET was awarded the 2012 Engineers' Society of Western Pennsylvania's (ESWP) President's Engineering Excellence Award. The announcement came as part of the ESWP's activities scheduled during National Engineers' Week. This award was created in 2010 to recognize individuals or organizations that have made significant contributions to advance the practice of engineering, or the engineering profession.

In partnership with the Museum of Science in Boston, ASSET is launching a new engineering initiative called Engineering is Elementary®. This research-based, standards-driven and classroom-tested curriculum integrates engineering and technology concepts and skills with elementary science topics, fostering engineering and technological literacy among children in Kindergarten through 6th grade.

Engineering is Elementary® will significantly increase student exposure to and understanding of engineering at an early age and will help fuel engineering workforce development. We hope to tap into the ESWP's engineering expertise in partnership as we expand the Engineering is Elementary® program into middle school.

"ASSET is poised to play a significant role in meeting the needs of the region's emergent economy by sparking the excitement and understanding of STEM at an early age," said Mr. Thomas Donatelli, President of the ESWP. "Recently ASSET announced plans to develop an engineering program that will significantly increase student exposure to and undertanding of engineering at an early age. We are pleased about that and as an organization, ESWP pledges our support to ensure the success of this new endeavor."

Winning the Future:

With international assessments continuing to show that U.S. student performance in science is declining, it is clear that future American innovation in scientific and technological areas is jeopardized without vastly improving K-12 science education.

ASSET is committed to reversing that trend. Today, ASSET is the science curriculum in more than 100 Pennsylvania school districts, private, charter and resource-challenged schools, impacting 125,000 students and 4,000 teachers. The organization has begun work in New Mexico, North Carolina and Texas and has consulted with schools and organizations in Louisiana, Missouri, New York, Ohio and West Virginia to initiate STEM education reform and build capacity.

ASSET STEM Education is igniting and fueling STEM learning. It is moving America's students towards STEM preparedness one school at a time. It is empowering every student to enter high school with the skills and self-confidence they need to tackle higher level learning. It is creating scientifically literate citizens who can successfully navigate through life because they learned—through the ASSET program—how to think, inquire, problem-solve, analyze and work collaboratively.

Our very future depends on our ability to educate the next generation of talented and skilled individuals who can face the complex challenges and opportunities of the future with leadership and confidence. Innovation cannot happen in isolation. Together, we can prepare the next generation to "win the future!"

For more information on how you can partner with ASSET in this important work, please visit www.assetinc.org or contact me at cpulkowski@assetinc.org. PE

STEM to STEAM

By Jim Denova, Claude Worthington Benedum Foundation

Ever since the National Academies issued "Rising Above the Gathering Storm," a wake-up call to America's loss of a competitive edge in technology and economic growth, educational systems across the country have accelerated efforts to recruit and prepare students in courses of study that came to be known as STEM–Science, Technology, Engineering, and Mathematics.

Traditional STEM disciplines, however, do not always address two important ingredients to improved educational outcomes and workforce readiness – creativity and inspiration. Educators recognize that students learn by discovery, design, and assembly; not by rote recitation. Students learn by being engaged and inspired to master a task or solve a problem. The arts are natural media for inspiring student creativity and honing complex problem-solving skills, so many educators are integrating the arts into traditional STEM coursework. The transition from STEM to STEAM (STEM+Art) is evident in such programs as a Carnegie-Mellon University robotics curriculum that enables students to design and construct animatronic robots that represent animals, plants, and fantasy characters. Game design curricula also are growing in popularity because students are challenged to apply computer programming, graphic design, and music composition skills to problem-solving scenarios related to course content.

Examples of STEAM education are popping up in schools, universities, neighborhood centers, and museums. There is no one source of innovation. To capture these ideas and advance best practices in STEAM education, the Grable Foundation organized the Kids+Creativity Network, a very diverse consortium of teachers, researchers, community-based agencies, artists, and commercial entertainment/educational technology experts. The Grable Foundation proceeded to host meetings with local and national speakers, post resources and upcoming events, and encourage partnerships among organizations that would not otherwise cross paths. Beginning as a Pittsburgh-centered convening, Kids+Creativity now has over 300 members from Western Pennsylvania and Northern West Virginia.

The regional scope of STEAM outreach took another step forward through the Power of 32, a visioning effort that encompasses a four-state, 32-county region surrounding Pittsburgh. Through 156 community conversations across the entire region and several professional advisory meetings, STEAM education emerged as a regional priority, and the Kids+Creativity Network was recommended by the Power of 32 Education Team as the agent for STEAM outreach. The Network's geographic reach continues to expand, resulting in new interstate partnerships and projects. Through Kids+Creativity, Carnegie Mellon University and Marshall University in Southern West Virginia set up a rural CREATE lab to bring the newest educational technologies to geographically isolated schools. A group of Kids+Creativity members were connected to a Youngstown Ohio technology commercialization company, Applied Systems Technology Transfer (AST2), which developed a new manufacturing design curriculum that combines simulation software with in-class prototyping and construction. AST2 now plans to introduce this program to Pennsylvania and West Virginia schools. Regionalism is critical to STEAM outreach, and the Power of 32 made it possible for the Kids+Creativity Network to broaden its scope of collaborative idea sharing and peer learning.

You may learn more about The Kids+Creativity Network by going to www.sitehoover.com/june30. PE

Public Opinion Research Helps Bayer Chart a Course for Science Education Investment

By Mark A. Ryan
Chief Communications Officer, Bayer Corporation

Public opinion research has been an important tool for public policy experts since The Harrisburg Pennsylvanian conducted the first straw poll in 1824 that accurately predicted Andrew Jackson's victory over John Quincy Adams for U.S. President.

For Bayer, public opinion has been a key component of its Presidential award-winning Making Science Make Sense® (MSMS) program since its establishment in 1995. Right from the start, the Bayer Facts of Science Education public opinion surveys were built into the program's public education campaign which is led by longtime MSMS spokesperson, former astronaut, Dr. Mae C. Jemison.

Just as other national polls tap Americans' opinions about politics and national issues, the Bayer Facts surveys have taken the pulse of Americans' attitudes over the last 17 years about timely issues related to science and technology, science education, science literacy and STEM (science, technology, engineering and mathematics) diversity and underrepresentation.

The surveys have polled various audiences, including the nation's Ph.D. scientists and K-12 science teachers; Fortune 1000 STEM company CEOs, corporate human resources directors and other business leaders; deans of colleges and universities, as well as parents, students and the general public. In doing so, the research has examined virtually every phase of the STEM continuum from elementary school through undergraduate/graduate education and the STEM workplace.

The surveys have been important for a number of reasons.

First, by reaching out to various stakeholder audiences, we've been able to share their voices with those who set policy at the country's major science organizations and help them keep the national conversation about STEM education and science literacy on the front burner.

Bayer, too, has used the survey findings to continually inform the MSMS program. In fact, they've helped us shape, direct and grow the program over the years, keeping it relevant, focused and at the forefront of the issues.

15 Universal Beliefs

An analysis of all the Bayer Facts of Science Education surveys reveals some universal beliefs.

#1: Science literacy is critical for all Americans young and old, scientist or non-scientist.

#2: U.S. global economic leadership and competitiveness are intrinsically linked to a robust science and technology innovation pipeline and workforce.

#3: America's future STEM leadership is dependent on the country's ability to recruit and retain more women, African-Americans, Hispanics and American Indians (underrepresented minorities) in STEM fields

#4: Improving science education for all students – especially girls and underrepresented minorities (URMs) – should be a national priority and begin at the earliest possible elementary school level since that's where the STEM workforce truly begins.

#5: Science interest and ability are color-blind and gender-neutral: from an early age, boys and girls of all races and ethnic backgrounds are interested in science.

#6: Parents and teachers are critically important to nurturing children's science interest, even if they themselves are not scientists or don't have all the answers.

#7: In elementary school, science should be the "4th R" and given the same emphasis as reading, writing and mathematics.

#8: A hands-on, minds-on approach to science education is the best way for students to learn science and build crucial science literacy skills, such as critical thinking, problem solving and the ability to work in teams.

#9: The nation's colleges and universities should revitalize pre-service teacher education in science.

#10: The nation's in-service teachers should be given the tools and ongoing professional development required to be the best science teachers they can be.

#11: Students and teachers benefit from having direct access to scientists and engineers on a regular basis in the classroom.

#12: America's leading research colleges and universities should rethink how they define academic success when it comes to undergraduate STEM students.

#13: For corporate America, STEM workforce diversity benefits the corporate bottom line by bringing a range of thought, skills and problem solving to the table.

#14: America's STEM industries and communities need to more effectively communicate with all of today's students about a range of issues including job opportunities and the fact that they are wanted and needed in these jobs.

#15: It will take a village to improve science education in this country and all stakeholders have a responsibility and role to play

Now, Bayer has re-examined those 17 years of research and compiled a new report. In mapping nearly two decades of public thought, STEM Education, Science Literacy and The Innovation Workforce in America: Analysis and Insights from the Bayer Facts of Science Education Surveys: 1995 – 2011 reveals 15 universal beliefs about science education, STEM diversity and science literacy.

Hands-Down Support for Hands-On Science

In 1983, the National Commission on Excellence in Education report "A Nation At Risk" sounded a warning shot across the country about the state of education, touching off a wave of national, regional and local education reform. Major national science organizations, such as the National Science Foundation and the National Academy of Sciences began advocating for a total overhaul of American science education, beginning with elementary school.

Their rationale was that children need a firm grounding in science starting in kindergarten in order to continue loving and studying it through junior high, high school and beyond. And the best way for students to learn science is not through traditional textbook/memorization methods, but through an inquiry-based, hands-on instructional approach that uses experimentation, observation, problem solving, team working and critical thinking, allowing students to learn science by doing it -- the way scientists do.

The stakeholders agree.

Bayer, too, has used this information to spearhead seven science education reform programs in communities around the country where we have local business operations. This is perhaps the most prominent example of how Bayer has used the surveys to inform the growth and direction of Making Science Make Sense. Our investments in science education reform programs are benefiting students and teachers in places like Kansas City, Missouri, Charleston, South Carolina, and New Haven, Connecticut, among others.

And students, it seems, appreciate it. The Bayer Facts III found that nearly half of all U.S. 10-17 year olds polled put science at the top of their list of favorite subjects. In fact, of all subjects, they said science was the coolest and lets them be very creative.

Kids' Perspective

In 1997, the *Bayer Facts III* asked American students, ages 10 to 17, how they, themselves, felt about science. Their answers help to dispel some long-held myths about kids and science.

Kids Shatter Science Education Myths*

MYTH #1: Kids hate taking science in school these days.
REALITY: Not! Half–50 percent–of 10-17 year olds put science... at the top or near the top of their list...of favorite subjects.

MYTH #2: Kids think that science is dull and boring.
REALITY: Not! 42 percent of 10-17 year olds say science is the subject they are most curious about.

"I think it's more fun because it gets you thinking about things, and it could help solve other problems... you can use a strategy."
Andrea, Age 13

MYTH #3: Kids think science class doesn't relate to the real world.
REALITY: Not! 94 percent of 10-17 year olds say that science isn't just in the classroom, it's part of everyday life in the world around you.

MYTH #4: Kids think learning science is mostly about memorizing facts.
REALITY: Not! 89 percent of 10-17 year olds say science lets them be very creative. And 89 percent also say the best way they can learn science is to observe things and do experiments themselves.

MYTH #5: Kids grow up believing that science is more for boys and not for girls.
REALITY: Not! 89 percent of all 10-17 year olds say "no" – science is NOT more for boys than girls.

MYTH #6: Kids think science is for nerds.
REALITY: Not! 93 percent of all 10-17 year olds say "no" – science is NOT for nerds. In fact, of all subjects, science ranked the coolest.

MYTH #7: Most kids are turned off to science in school.
REALITY: Not! When 10-17 year olds were asked for positive and negative things about science, things they like best about science won hands down (91 percent) over things they don't like about science (32 percent).

*Source: Bayer Facts of Science Education III: A U.S. Student Report Card on Science Education (1997)

"In science, when you're doing a project, you have to think about what you are doing. In other classes they are telling you what to do. In science, they don't. You have to do it on your own." Maureen, Age 11

ESWP Member News

More than 80 firms are represented in the Corporate Member program of the Engineers' Society of Western Pennsylvania (ESWP). Memberships are available at 3 levels: Gold, Silver and Bronze. Gold members are entitled to 14 memberships that can be exchanged by employees; Silver, 9; and Bronze, 5 — annual dues are $2400, $1700, and $1000 respectively. In addition, ESWP Corporate Member Firms may add 2 additional individuals in our Under-35 age category at no additional cost. More information can be found at eswp.com. Please contact the ESWP Office (412-261-0710) for additional details.

NEW! For Government Agencies, Corporate and Individual Memberships are available at a 50% discount!

Membership in ESWP comes with a long list of benefits! From our continuing education opportunities earning you Professional Development Hours (PDHs), to the business networking events in our fine dining city club, there is something for everyone in your organization. Also, ESWP is helping the next generation of engineers with student outreach programs, giving you the opportunity to participate in many rewarding programs.

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KVAERNER

KVAERNER NORTH AMERICAN CONSTRUCTION INC.

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Baker

GATEWAY

On Call. On Time. On Target.

CDM Smith

USS

ESWP Silver Corporate Member Firms

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KU Resources, Inc.

POINT PARK UNIVERSITY

CEC

Civil & Environmental Consultants, Inc.

Lennon, Smith, Souleret Engineering, Inc.

SIEMENS

HDR

PJ DICK TRUMBULL LINDY PAVING

Uhde Corporation

ESWP Bronze Corporate Member Firms

Hats Off To Science Literacy

The Bayer Facts surveys have invariably defined science literacy as "a general knowledge of science, math and technology in order to understand information, think critically and solve problems." Almost without exception, science literacy is recognized by stakeholders as being critically important for all Americans, young and old alike, regardless of whether or not they choose to pursue a STEM or non-STEM career.

Likewise, virtually all stakeholders polled in the surveys believe in a similar recipe for elementary school science education success. Yet, while they concur that science should be the "fourth R" and given the same or greater priority as reading, writing and mathematics and taught using hands-on, inquiry-based methods, many stakeholders also believe elementary and secondary science education has and continues to miss the mark.

"Very few of the audiences polled in the Bayer surveys have ever assigned an "A" to pre-college science education," said Dr. Mae C. Jemison. "At best, it gets a "B." But the wake-up call truly comes when we look at how the nation's professional scientists and engineers perceive the quality of American science education for elementary, middle and high school students. "C's" and "D's" simply will not produce the kind of world-class STEM professionals this country will need to remain the global science and technology leader."

Their feelings, it appears, are justified, particularly about elementary school where, according to a number of studies including Horizon Research Inc.'s Status of Elementary School Science Teaching, the Lawrence Hall of Science and WestEd's The Status of Science Education in Bay Area Schools and the Bayer Facts X survey, science is consistently given short shrift. More recently, the national CEO-led organization Change The Equation reported "54 percent of the nation's fourth graders and 47 percent of its eighth graders 'never or hardly ever' write reports about science projects; and, 39 percent of eighth graders report that they 'never or hardly ever' design a science experiment."

Why should we care about this?

"Every child is born with a love of science. Children are innately curious. They pick up the bugs, the fuzz in the couch, the mud outside, they inspect it, they want to know about it. That sense of wonder, that questioning is the basis of science. And, it's up to us, as adults, to keep that curiosity and that creativity alive in all students," said Dr. Jemison.

Making Science Make Sense® Spokesperson Mae Jemison works with STEM students

Indeed. Two separate Bayer Facts surveys have found this is particularly important for those who grow up to become professional scientists and engineers, with the majority of Ph.D. scientists and female and minority chemists and chemical engineers reporting they first became interested in science before the age of 11.

"That means they were using experimentation, before they entered school," said Dr. Jemison. "That's why it's so important to take advantage of this tremendous natural behavior. We need to introduce students to hands-on science as early in elementary school as possible."

Those surveys also revealed the most important activities and individuals that stimulated their youthful interest in science. School science classes, teachers and parents came out on top.

Important Influences in Nurturing/Sustaining Interest in Science*

	Female and Minority Chemists/Chemical Engineers	Ph.D. Scientists
TOP ACTIVITIES		
School Science Classes	84 percent	82 percent
Visits to Science Museums	63 percent	76 percent
Science in Media	62 percent	78 percent
Science Field Experiences	56 percent	61 percent
Science Toys/Equipment	53 percent	81 percent
Science Experiments at Home	44 percent	69 percent

	Female and Minority Chemists/Chemical Engineers	Ph.D. Scientists
INFLUENTIAL INDIVIDUALS		
Science Teachers	70 percent (Elementary School) 88 percent (High School)	71 percent (Elementary School) 91 percent (High School)
Mother	46 percent (Elementary School) 47 percent (High School)	60 percent (Elementary School) 58 percent (High School)
Father	54 percent (Elementary School) 53 percent (High School)	68 percent (Elementary School) 65 percent (High School)
Professional Scientists	26 percent (Elementary School) 38 percent (High School)	23 percent (Elementary School) 36 percent (High School)
Other Relatives/Adults	26 percent (Elementary School) 25 percent (High School)	33 percent (Elementary School) 35 percent (High School)
Non-Science Teachers	21 percent (Elementary School) 28 percent (High School)	28 percent (Elementary School) 35 percent (High School)

**NOTE: Multiple responses allowed.*

Well Trained Teachers = Student STEM Success

One key to student success in science, according to experts, is proper teacher preparation.

Thus, teacher professional development is one of the pillars of the reform movement. It ratchets up the quality of science education by providing teachers with ongoing professional development in both science content and experiential teaching methods. In fact, elementary school teachers polled in the Bayer Facts X who gave their science education training high marks were much more likely to teach science every day and feel very qualified to do so. They were also very confident that their students were getting a good science education.

This is simply more evidence that the road to student science achievement is paved by quality teacher preparation – and strong validation of Bayer's continued support of standards-based science education reform.

U.S. Competitiveness & STEM Diversity

A decade ago, the national conversation about science education took a new turn. The Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development's Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology posited that the continuing underrepresentation of women, African-Americans, Hispanics and American Indians in the nation's STEM fields was detrimental to the country's long-term global competitiveness.

"Growing the American talent pool requires a nationwide call to action and a major shift in how we educate, train and recruit citizens in the fields of science, engineering and technology," the report's authors argued. "Barriers exist today throughout the [STEM] pipeline that limit the number of women [and]

underrepresented minorities...seeking and retaining these jobs. If we are to compete effectively in the global marketplace, we must advance the full and equitable participation of all Americans in [STEM] fields."

Framing STEM underrepresentation as one of national competitiveness made "Land of Plenty" a watershed report. For Bayer, the continuing lack of a significant pool of female and minority scientists and engineers from which to draw was an ongoing concern that required further scrutiny.

In 2005, the Bayer Facts surveys began examining these issues by polling parents of school-age children about their children and science. The following year, CEOs running some of the fastest-growing STEM companies in the United States, were asked to weigh in. More established STEM company chief executives, those leading Fortune 1000 STEM companies, were surveyed a year later in 2008.

The Bayer Facts XI-XIII surveys revealed a consensus that those leading STEM companies haven't done enough, both in terms of communicating to today's female and URM students that they are wanted and needed in STEM and in supporting STEM education programs that are successfully helping these students to careers in the fields.

Armed with this information, Bayer has hosted national forums designed to introduce STEM company leaders to best practice STEM education diversity programs and has also published and made widely available a compendium of these programs. It is now in its second edition.

Another area of consensus revealed by these later surveys was the benefits of diversity, itself. Across the board, stakeholders believe diversity in STEM is one solution to the U.S. sustaining long-term economic competitiveness and innovation, while maintaining a talented workforce pool.

Yet, despite this acknowledgement, underrepresentation still exists. In an effort to better understand its roots, the Bayer Facts XIV went straight to those who know best – female and underrepresented minority (URM) scientists and engineers, and more specifically, chemists and chemical engineers. One of the most alarming findings was that four out of 10 of them said they had been discouraged from pursuing a STEM career at some point in their lives. The majority of those pointed to college and college professors as the place and people responsible for the discouragement.

Unfortunately, the following survey—Bayer's latest—found that for women and URM students studying STEM in college today, things haven't changed that much. The Bayer Facts XV, which polled faculty who chair STEM departments at the nation's top 200 research universities, found that discouragement from STEM is still a significant problem for women and URMs.

"When it comes to careers in STEM, college is a key chokepoint – one that quite literally makes or breaks the next generation of American scientists and engineers," said Dr. Jemison. "If we're serious about expanding the participation of women and URMs in all of our STEM fields, then every part of the STEM pipeline needs to be looked at closely and reformed accordingly."

Bayer's latest national forum, based on these survey results, held this spring in Washington, D.C., has led Dr. Jemison to reflect on the last 15 years of research.

"The Bayer Facts surveys have served an important public service. They continue to help discover and shed light on many of the critical issues impacting STEM education in our country. And, I am extremely pleased to be a part of them."

For a copy of STEM Education, Science Literacy and The Innovation Workforce in America: Analysis and Insights from the Bayer Facts of Science Education Surveys: 1995 – 2011 or any of the Bayer Facts surveys, please visit www.BayerUS.com/msms. PE



Making Plans

Most readers of Pittsburgh ENGINEER will recall that in 2004 the Pittsburgh regional winners of our Future City competition went on to capture the national title, from more than 1,100 participating teams. The team, from Riverview Junior/Senior High School was comprised of three girls, pictured above. Pittsburgh ENGINEER takes a look at where these (now) young ladies have advanced.

Cara Hartz (photo, left), the former mayor of Avenir, will graduate from DePaul University in June 2012 with degrees in Clarinet Performance and Performing Arts Management. She will continue on at DePaul University to get her graduate degree in Clarinet Performance.

Natalie French (photo, center), the former scientist of Avenir, graduated from Carnegie Mellon University in May 2012 with a dual degree in Civil Engineering as well as Engineerig and Public Policy. She will be moving out to San Jose, California to work part-time at a civil engineering consulting company, VER Consultants. She will also be getting married August of 2013.

Allison Garda (photo, right), the former city planner of Avenir, graduated from the University of Pittsburgh in December 2011 with a degree in neuroscience, a minor in chemistry, and a certificate in conceptual foundations of medicine (ethics and social issues in medicine). She will be enrolled in the University of Virgina's medical program in the fall of 2012.

Since being elected as the 2011-12 National Youth of the Yea by the Boys & Girsl Clubs of America, Nick Foley has done some amazing thing in the past six months – met President Obama, addressed the PA Senate, attended the World Series, appeared on TV and radio stations, and visited New York, Los Angeles, Atlanta, Boston and Ft. Worth. How could a kid from Pittsburgh do all these amazing things? It all started when he walked into Sarah Heinz House Boys & Girls Club ten years ago.

Nick overcame a rough childhood with help from his adopted parents, who brought him to Sarah Heinz House in 2002. The next ten years brought him many opportunities, culminating with Nick being named National Youth of the Year by the Boys & Girls Clubs of America. Over 4,000 youth across the country compete for this prestigious honor which is based on leadership and community and club service.

Nick has been accepted to Pennsylvania State University where he will study civil engineering next year. The scholarships he's received through the Youth of the Year competition will allow him to realize his dream. "I've always had an interest in bridges, and support systems, so when I began the Pre-engineering program at Taylor Allderdice High School, I was able to use those interests to narrow down my interest to civil engineering," Foley said.

When asked what he hopes to accomplish with an engineering degree, Nick said, "One day I hope to possibly own my own firm that is well known, to me that is one of the signs of success in this field. With an engineering career I believe I will have a great and consistent job that I will enjoy; one that allows me to provide for my family and also have good standing in the community." PE

Why Industry Reaches Out

STEM industries drive innovation and the nation's prosperity. And, for individuals working in those industries, STEM jobs are among the fastest growing, most lucrative and most rewarding one can have.

The U.S. Department of Commerce reports that growth in these jobs over the last decade has been three times greater than that of non-STEM jobs and in the coming decade they are projected to grow by 17 percent, compared to just 9.8 percent for non-STEM occupations.

These jobs have financial benefits as well. Compared to their non-STEM counterparts, STEM workers earn 26 percent more on average and are less likely to experience joblessness.

Here's a well-kept secret. The lion's share of STEM positions require a bachelor's degree. It's true. Roughly 70 percent of all those working in STEM occupations today have a four-year college degree, which throws cold water on the myth that to work in these fields, you need an advanced degree, such as masters and doctorates. But we have a problem in the United States. Only about one-third of the undergraduate degrees earned are in a STEM field, compared with more than half earned in China and two-thirds in Japan. In fact, only 40 percent of American students entering college today who plan to major in STEM actually graduate with a STEM degree.

That means many of the rewarding, high-paying jobs available today and in the future will remain unfilled, if things don't change. And that is precisely why industry leaders are increasingly getting involved and investing in STEM education. In doing so, they're securing their companies' futures by helping to ensure they have a trained workforce that will keep their businesses vital and vibrant in the long-term.

"Only about one-third of the undergraduate degrees earned are in a STEM field, compared with more than half earned in China and two-thirds in Japan."

Pittsburgh Engineer recently talked to a number of local STEM industry leaders in our area, asking them about their support of STEM education and what they expect from their investments.

Here's what they had to say:

Randy Dearth, President and Chief Executive Officer, LANXESS

"Many times we see the impact of our efforts first-hand. Our employee volunteers engage students while conducting hands-on experiments and see the spark of excitement as the students learn something new and inspiring about science. Will those students go on to become chemical engineers, chemists and lab technicians, and future LANXESS employees? We hope so. But what we do know for certain is that they gained insight into the interesting world of science and how much fun learning can be. My advice to students and future STEM workers: Do not put any constraints on your career path. The ever-evolving STEM world offers a multitude of opportunities that you are not even aware of or may not even be available yet."

Joe Beck, Senior Vice President, Baker

"Our hopes are that the education process produces individuals with the knowledge and skills that meet the needs of the environment at that time. We can give them the experience and refine their competencies, but if they do not have the foundation to build upon, we are all wasting our time. This is a very rapidly changing environment that we work in today and I expect it to be the same in the future. Technological development is accelerating at pace never seen before in engineering."

Michael A. Fedorenko, General Manager - Engineering, United States Steel Corporation

"Science, technology, engineering and math are critically important disciplines to many industries today, including the steel industry. Industries like ours need to take an active approach to ensuring that today's students build strong fundamentals in these critical areas so that they can grow to become the scientists, mathematicians, engineers and steelmakers of tomorrow. By actively encouraging students in the STEM fields, we believe students in this region will be better prepared to meet the increasing needs of our industry and industries like ours that are technology driven and participate in globally competitive markets."

Charles F. Kahle, Vice President of Science & Technology, PPG Industries:

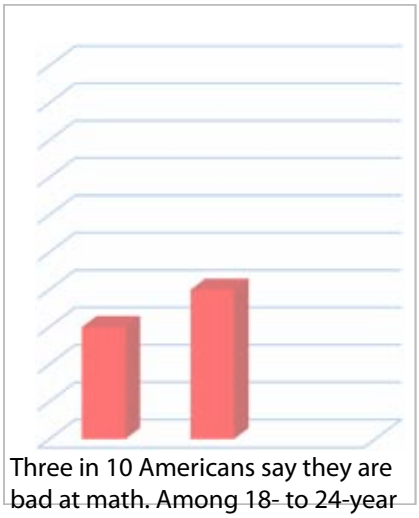
"Every scientist or engineer I have encountered throughout my 25 year career can cite an experience with someone from their past who inspired them to become who they are today. Obviously parents are important, yet many will mention a mentor, a teacher, someone they read about in the press, or a scientist they met growing up who sparked a long term interest in discovering new things and turning those discoveries into something beneficial to humanity and the world. Those role models provided the tools or insights at a critical moment in their lives that transformed them. Supporting STEM education ensures that every interested student will hopefully have that moment of inspiration that encourages them to pursue further education and hopefully a career in science or engineering."

Leigh Pogue, Vice President, Human Resources, Westinghouse Operations and Nuclear Fuel

"Westinghouse has a long history of technology and innovation excellence. The success of our industry, customers and company is contingent upon having technically skilled resources ready to effectively address the world's energy needs – now and into the future. To enable growth in this area, we have invested in programs and organizations promoting STEM education for elementary through high school levels. Westinghouse employees are supported and encouraged to reach out to local schools and universities as speakers, educators and technical leaders to encourage students in STEM related fields. Through these connections, we are hoping to interest students in accepting the challenge to make a difference in the world. Our future depends on it! PE

STEM Statistics

Student Achievement[1,2,3]



Three in 10 Americans say they are bad at math. Among 18- to 24-year olds, it's almost four in 10.

In an international exam given in 2006, U.S. high school students ranked 21st out of 30 industrialized nations in science and 25th in math.

In 2009, just 34 percent of U.S. 8th graders were rated proficient or higher in a national math assessment, and more than one in four scored below the basic level.

Only 43 percent of U.S. high school graduates in 2010 were ready for college work in math, and 29 percent were ready in science.

Teacher Qualifications[4]

The World Economic Forum ranks the United States 48th in the quality of mathematics and science education.

93%

Ninety-three percent of United States public school students in fifth through eighth grade are taught the physical sciences by a teacher without a degree or certificate in the physical sciences.

69%

Sixty-nine percent of United States public school students in fifth through eighth grade are taught mathematics by a teacher without a degree or certificate in mathematics.

U.S. Competitiveness[1,4]

In 2009, 51 percent of United States patents were awarded to non-United States companies.

In 2009, only four of the top 10 companies receiving United States patents were United States companies.

In 2000 the number of foreign students studying the physical sciences and engineering in U.S. graduate schools surpassed the number of American students.

China has now replaced the United States as the world's number one high-technology exporter.

The United States ranks 27th among developed nations in the proportion of college students receiving undergraduate degrees in science or engineering.

In 2009, the largest number of students receiving STEM-related Ph.D.s in the United States were Chinese nationals.

Work Force Demands[1,4]

For individuals in 21st century America, skills in math and science will be ever more important for self-sufficiency, because a technology-driven economy increasingly demands an educated and globally competitive workforce. The fastest growing economic clusters include biotechnology (biomedicine), information technology, environmental technology, and to some extent advanced manufacturing. All depend on a workforce skilled in math and science.

According to the U.S. Bureau of Labor Statistics, of the 10 fastest growing occupations nationally, eight are science, math, or technology related.

The labor force needed to support STEM industries is in short supply, both nationally and regionally. As of 2010, national jobs in science and engineering had increased by 2.2 million.

Almost one-third of U.S. manufacturing companies responding to a recent survey say they are suffering from some level of skills shortages.

The Pittsburgh Region

Approximately 11,600 green energy jobs will be added by 2015. (Pennsylvania Department of Labor and Industry, 2010)

More than 100,000 manufacturing employees needed just to replace the existing retiring workforce.

More than 2,000 STEM positions remain unfilled locally. (Pittsburgh Technology Council Job Postings, 2010)

Large numbers of STEM employees in health care (nurses, medical technicians, medical researchers, scientists, and doctors) are retiring.

Growing technology sectors in alternative energy, biotechnology, entertainment technology and IT, robotics, and more require a skilled workforce. (Pittsburgh Technology Council, 2010)

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Audience Soars With Astronaut Presentation

By Chriss Swaney

No one better personifies the vitality of the American Dream in the second half of this century than Catherine "Cady" Coleman. A scrappy, bright-eyed dynamo who has flown aboard the NASA space shuttle twice and orbited earth nearly 3,000 times, the astronaut shared her experiences, dreams and wisdom with more than 500 engineers at the 128th annual engineering awards banquet of the Engineers' Society of Western Pennsylvania (ESWP).

After considering what the past century has brought us, the temptation to speculate about the future is almost irresistible. And that's exactly what Coleman did.

NASA Astronaut Catherine Coleman, guest speaker at ESWP's 128th Annual Banquet

"When I was in high school, nobody ever thought that I was going to be an astronaut. I didn't know I was going to be an astronaut," said Col. Coleman, 51, a research chemist and Air Force officer with a doctorate in polymer science and engineering from the University of Massachusetts.

Her mission as a representative of NASA is to spread the message that despite the end of the space shuttle program last year, America is still involved in the business and science of space.

"It's a magical place," she said, telling ESWP members and guests about tasks during her stay aboard teh International Space Station, that ranged from working on experiments to washing her hair in zero-gravity. She also focused on the lighter aspects of her job, such as playing a flute duet with Ian Anderson of Jethro Tull – with her in space and him in Russia.

Coleman, an amateur flutist, and Anderson played a portion of the song "Bourree," an arrangement of which Anderson and Jethro Tull performed during their 1969 U.S. tour as Neil Armstrong and Buzz Aldrin stepped on the moon. Their performance saluted 50 years of human spaceflight and the anniversary of the first launch of a human to space.

Coleman is an avid fan of Anderson's and carried one of his flutes with her for a six-month stay aboard the station, along with her own instrument. She also carried a penny whistle and Irish flute from members of the musical group The Chieftans.

"It was really different to play up there," Coleman said. "A lot of times I just played with my eyes shut," she said.

Coleman also managed a special message to her freinds and family in the Pittsburgh area when she waved a makeshift "Terrible Towel" aboard the Space Station.

On a more serious note, Coleman admonished her audience to continue to lead when it comes to the importance of science and facing challenges.

She also emphasized those same points on her visits to area Pittsburgh schools, including Carnegie Mellon University where more than 50 mechanical engineering students greeted the astronaut with questions and rounds of applause for her many space treks.

The Pittsburgh Steelers should be pleased to know their fan base has reached the outer limits!

"Women are different, and women bring different skills to solving the world's problems and solving engineering problems, And we need all of you. We need a workforce that is inclusive and includes all these skills," said Coleman, who would enjoy taking a trek to Mars one day.

Already, there are disturbing signs that the skilled labor

force so essential for creating new jobs and innovative products is hitting some speed bumps in the U.S. A recent national report shows that as a percentage of the labor force, science and engineering jobs accounted for 4.9 percent of the workforce in 2010 compared with 5.2 percent in 2000.

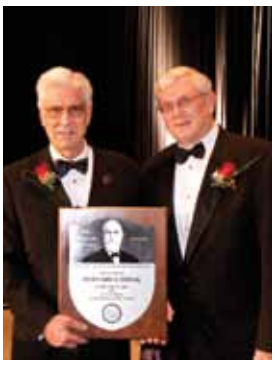
Even U.S. President Obama has demanded that the government help produce an additional 10,000 engineers a year.

"One of our goals at the ESWP is to encourage students to think about engineering as a career option" said ESWP President Thomas E. Donatelli of the Michael Baker Corporation.

Finalists of the George Washington Prize meet with Swanson School Dean Gerald Holder. Pictured are Robert Kosarowich (L), Julianne Fatula (C) and Michael Krajcovic (R).

And to that end the University of Pittsburgh's Swanson School of Engineering honored three of its outstanding students for engineering excellence. The Pitt awardees included: Michael Krajcovic from Civil and Environmental Engineering; Robert Kosarowich from Bioengineering and Julianne Fatula from Chemical and Petroleum Engineering.

Not only were student engineers honored, but a cache of professional engineers and dynamic projects received recognition from the ESWP.



ESWP President Tom Donatelli (left) presents the Metcalf Award to Bernie Fedak

The prestigious William Metcalf Award was presented to Bernard J. Fedak, P.E. The Metcalf Award has been presented annually by ESWP since 1963, and is the highest award presented by the Society. Fedak commented that this was the sixth time the Award was presented to a U.S. Steel alimni. His acceptance comments included the importance of effective planning and project management on all projects, big and small.

Range Resources Ray N. Walker, Jr, was named 'Engineer of the Year.' The President's Engineering Excellence Award went to Asset, Inc. and a handful of awards were announced for outstanding engineering projects.

ASSET Executive Director Cynthia Pulkowski accepts the President Engineering Excellence Award from ESWP President Tom Donatelli

The Pennnsylvania Turnpike Reconstruction project from Irwin to New Stanton was named the Transportation Project of the Year; the David Lawrence Convention Center Riverfront Plaza Project garnered the Commercial Project of the Year accolade; the Industrial Project of the Year was the Whitley Substation Mine Subsidence project owned by West Penn Power and First Energy while ENEL was awarded the Sustainable Design Project of the Year for zero liquid discharge for FGD wastewater.

Gala host Rick Sebak, an award-winning broadcast journalist, praised the ESWP annual award gala as one of the longest running events in U.S. history. PE

Master of Ceremonies Rick Sebak delighted the audience with is appreciation of the engineering profession

SCIENCE CENTER LAUNCHES CHEVRON STEM CENTER

By Ronald J. Baillie and Ann M. Metzger, Co Directors, Carnegie Science Center

The region and the nation face an ever-growing need for a workforce skilled in STEM fields.

National data has shown that STEM occupations have grown three times as fast as non-STEM occupations over the past 10 years—a pace that is expected to accelerate in the future. It is estimated that one million additional graduates with STEM degrees will be needed over the next decade to fill jobs that require these skills.

So Carnegie Science Center parlayed the strengths it has always had—informal science education and the power to convene industry, educators, and students—into the Chevron Center for STEM Education and Career Development, backed by strong financial support from Chevron and founding partners California University of Pennsylvania, Duquesne Light, Eaton Corporation, LANXESS Corporation, NOVA Chemicals, and PPG Industries Foundation.

Students explore nanotechnology with scientists of RJ Lee Group, Inc. at SciTech Days held annually at Pittsburgh's Carnegie Science Center

Research has shown the power of hands-on interactive science experiences to bolster and underscore the lessons learned in the classroom and to kindle the flame of passion for the sciences. And those are the experiences Carnegie Science Center engenders day after day for schools on field trips and families out for fun.

Additionally, the Science Center offers many opportunities for face-to-face interaction with real life scientists, to awaken students to the breadth of careers available and to allow them to project themselves imaginatively into a future as a scientist. For instance, at the annual Engineer the Future and ChemFest weekends, local corporations bring dozens of activities to engage students in hands-on science; twice yearly, SciTech Days follows the same model for four-day periods that serve 6,000 students annually. Tour Your Future brings girls to meet women scientists in their workplaces. Every spring, the Pittsburgh Regional Science and Engineering Fair celebrates the scientific achievements of today's youth.

CMU scientists encourage middle schoolers to dip their hands in water-absorbing polymers at SciTech Days—a twice-yearly Science Center event that serves 6,000 students annually

Built on collaboration, the Chevron STEM Center convenes various STEM stakeholders throughout the region to coordinate efforts for the greatest impact.

A Teacher Education Center is in development, with Science Center staff working with their longtime colleagues at ASSET, the Math & Science Collaborative, and California University of Pennsylvania, particularly drawing on its master's program in STEM Education. Partnerships with Pine Richland and Upper St. Clair school districts as well as PA Cyber are under way, with the STEM Center helping enhance math and science curricula with a vibrancy that will inspire students to embrace STEM studies for the long haul.

The Chevron STEM Center—in pursuit of its goal of a committed community—is preparing to launch a public awareness campaign this spring to carry the message of the importance of STEM education to parents, students, and the general public.

Our modern society is built on science and technology. In order to be educated and engaged citizens of the world in the 21st century, everyone needs strong preparation in STEM. The Chevron STEM Center will help guarantee that our children are ready and able to face the challenges, and seize the opportunities, of the century ahead. PE

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The IWC is dedicated to advancing new developments in the treatment, use, and reuse of water for industrial and engineering purposes and to the training of best practice principles to those new in the industry.

- **Learn about the latest developments in water treatment technologies**
- **Network with manufacturers, suppliers and industry experts**
- **Gain exposure, knowledge and a multitude of new ideas that can be put to practical use in your plant to solver your water treatment problems**