Women in STEM: Realizing the Potential

WHITE PAPER
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As the Head of Workforce Effectiveness, Balaji oversees the functions of HR Business Consulting, Corporate Social Responsibility, and Diversity & Inclusion for over 25,000 employees of Tata Consultancy Services in North America. His primary responsibilities include coaching sales and business teams for business growth, driving talent management and employee retention initiatives, architecting the corporate sustainability strategy, and chairing the Diversity & Inclusion Council. Balaji serves as the Vice-Chair of STEMconnector®’s STEM Innovation Task Force (SITF), a high-level team of 28 leaders from industry, government and nonprofit sectors whose vision is to accelerate sustainable STEM careers and wealth through innovation science and excellence in tomorrow’s new economy. Under his stewardship, TCS is using its technology innovation, thought leadership and skill-based volunteering to impact the state of STEM education in North America, with a special focus on impacting women and girls, minorities and underrepresented groups. He also serves on the U.S. Chamber of Commerce Foundation’s Education, Employment, and Training Committee (EETC). This committee directs Chamber policy relating to all issues that affect education and workforce development policy, including workforce development preparation, Pre-K–12 education reform, postsecondary education, career and technical education, incumbent worker training and lifelong learning, among others.

Balaji has a proven track record of envisioning, leading and implementing strategic initiatives that impact business, people and communities. He has served as the Head of HR for Global R&D, where he was part of TCS’ Corporate Technology Board and spearheaded the mandate for institutionalizing a culture of innovation across the organization. As Head of HR for TCS’ Corporate Learning Center, he led a team responsible for onboarding and integrating over 12,000 campus hires. Before joining TCS, he co-founded and ran an entrepreneurial venture that provided process consulting services and leadership coaching to companies in the manufacturing sector. Balaji is a regular speaker at national forums, presenting a range of topics relating to business, human resources, corporate social responsibility, and the information technology industry. He is an active advocate of deriving social good through the confluence of public, private and non-profit partnerships.

Balaji holds a postgraduate degree in human resources management from Xavier Labor Relations Institute (XLRI), Jamshedpur, India, and a bachelor of technology from College of Engineering, Trivandrum, India.
Caitlin Olson
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Caitlin is a results-driven professional with entrepreneurial focus and extensive experience in creating social outcomes through program development, management, fundraising, communications and marketing. As CSR Program Manager focused on STEM Initiatives at Tata Consultancy Services, Caitlin is working to deliver science, technology, engineering and math (STEM) programs in North America. Mobilizing a volunteer workforce from TCS’ best IT professionals and other resources, the company is committed to supporting STEM learning in communities by expanding signature educational programs, leveraging core technology competencies, and creating cross-sector collaborations. Her work to build consensus through effective communications and clear implementation of best business practice is supported by more than 15 years of management experience, 10 of which have been in leadership positions for charitable organizations.

Caitlin previously served as the Executive Director of Project Rebirth, leading the organization’s educational activities and the strategic development of the organization’s programs around the release of the Peabody Award-winning film ‘Rebirth.’ Additionally, Caitlin was the Director of Program Partnership Initiatives at the National September 11 Memorial and Museum, where she built and managed critical partnerships to collect content that would be used in the future Memorial Museum’s educational programs and exhibitions. She earlier served the 9/11 community for five years at the Families of September 11, a national victim advocacy and service provider organization. She currently sits on the Board of Directors for Project Rebirth and the For Action Initiative (formally FOS11). Her prior corporate management experience was in global marketing and retail.

Caitlin has a BFA from the University of Massachusetts at Amherst and more recently completed the Grantmaking and Foundations certificate program from New York University. She enjoys cycling, scuba diving, photography and walking her dog, and has started to learn to paraglide.

Imani Davis
Senior Program Specialist, CSR and Diversity, Tata Consultancy Services

Imani joined Tata Consultancy Services in 2011 to help develop strategic community engagement and diversity and inclusion plans for North America. A key part of this role was building and scaling an Employee Volunteer Program for the U.S. and Canada. Since then, her responsibilities have grown and as a Senior Program Specialist, she now focuses on STEM initiatives and programs, including expanding TCS’ flagship goIT Student Technology Program to new cities in the U.S. and Canada.

Imani holds a master’s in communication and information studies from Rutgers, The State University of New Jersey. During her two years in this program, she completed a fellowship at Johnson & Johnson in the Worldwide Corporate Contributions team. Here, Imani managed the Volunteer Support Program, building strategic partnerships with local non-profit organizations. Imani holds a BA in communication from Rutgers as well.

In her free time, Imani enjoys full- and half-marathon training, traveling abroad and spending time in New York City.
Edie Fraser
CEO, STEMconnector® and Million Women Mentors

Edie Fraser is CEO of STEMconnector® and Million Women Mentors (MWM), and a vice chair of Diversified Search, LLC. Edie has worked with more than 250 Fortune companies and associations to champion women’s advancement. Edie has won 45 major awards for diversity and women’s leadership, STEM, entrepreneurship and communications. She is the recipient of the Mosaic Woman Award and Lifetime Achievement Award from Diversity Woman Magazine. She has been inducted into the Enterprising Women Hall of Fame and is a founding member of C200. Edie was on the cover of Women of Wealth Magazine for her philanthropy and mentoring. She is the first woman to serve as Chairman of the World Affairs Council of DC and served on the national board of SCORE. Edie has written or served as publisher of many books, papers and articles. Examples include the CEO Magazine, The Diversity Primer and The Diversity Officer. Edie wrote a book, Do Your Giving While You’re Living, with co-author Robyn Spizman, and another on women’s entrepreneurship called Risk to Riches: Women’s Entrepreneurship in America. Women and diversity support are at the core of Edie’s work and values.

Edie built STEMconnector® with a dedicated team, starting officially in spring, 2011. Since then, STEMconnector® has grown to link with some 6600 organizations. The mission is to bring education, research, resources, best practices, communications and outreach—and provide resources such as the web site, 100 CEO Leaders in STEM, 100 Women Leaders in STEM, STEMdaily, EdTech Weekly and STEM Results. STEMconnector® works with business, academia, government and nonprofit organizations, and media entities. Formerly, Edie built three best-practice initiatives: Diversity, Women and Corporate Communications. Edie is an entrepreneur having been president of a major PR Firm and a Public Affairs Firm and sold two companies throughout her career.

Julie Silard Kantor
Chief Partnership Officer, STEMconnector® and Million Women Mentors

Julie Kantor is a veteran leader and tireless ambassador of STEM education, entrepreneurship and building of America's skilled workforce, serving in CXO roles since 1992. As Chief Partnership Officer at STEMconnector® and Million Women Mentors (subsidiary of Diversified Search LLC), Julie and team bring together corporate America, government, higher education and national nonprofits as members to better convene key players in the STEM universe and consult around smart STEM investments.

Million Women Mentors, launched as an initiative of STEMconnector® in January 2014, will support the engagement of one million women (and men) in STEM to serve as mentors by 2018. The MWM team is working nationally with 52 lead partners (reach over 22 million girls) and 17 corporate sponsors is to serve at least one million girls and young women throughout the high school to work age continuum to increase the interest and confidence to persist and succeed in STEM programs and careers. Julie is known in the community as a people person, a brand-builder, a tech-savvy national thought leader, a writer for Huffington Post Business and a networked fundraiser with a proven track record.

Kantor was recognized by President Obama for her 20-year career in education in April of 2012 and honored this past year by the Center for Innovative Technology (CIT) as 2012 CIT GAP 50 Winner. Before joining STEMconnector®, Julie launched Network for Teaching Entrepreneurship (NFTE) in Boston, took over the Washington, D.C. Region of NFTE in 1995 and spent 20 years scaling youth entrepreneurship education to many U.S. cities raising $20 million. Julie was a catalyst in expanding NFTE programs in India, Baltimore, Philadelphia and Boston.

Born and raised in Washington, DC, Julie attended Sidwell Friends School and earned a BA from Simmons College in Boston. She is a Price-Babson Fellow and a member of the Leadership Washington - 2000. Kantor lives in Bethesda, Maryland with her husband and middle-school daughter.
Lorena Fimbres  
Chief Business Development Officer, STEMconnector® and Million Women Mentors

Lorena S. Fimbres serves as Chief Business Development Officer for STEMconnector® and leads the corporate strategy for Million Women Mentors. As a member of STEMconnector®’s senior team, Lorena oversees a portfolio of corporate members that includes several Fortune companies. Lorena has developed a unique corporate network as she works with over 200 companies through STEMconnector®’s several initiatives. Lorena is the mind behind STEMconnector®’s 100 Leaders in STEM series which includes 100 CEO Leaders in STEM and 100 Women Leaders in STEM. Lorena is passionate about supporting and advancing women and girls and prior to publishing 100 Women Leaders in STEM she Adecco’s Women’s Business Leadership Tribute. Both recognized and shared the stories of top women across industries that are actively working to advance more women to key leadership positions. Lorena’s publications include The American Institute of Architects’ Small Business Resource Guide: Contacts to Contracts. With a strong branding expertise, Lorena developed and continues to manage the STEMconnector® brand since its inception.

Prior to STEMconnector®, Lorena held several positions of increasing responsibility within the State of Sonora, Mexico’s Government including the Executive Office of the Governor. Her political acumen and expertise includes campaign management and political branding. Lorena served as a senior member of the team that oversaw 101 parallel campaigns at the federal, state and local levels. Lorena holds a BS in business administration from the internationally recognized Tecnológico de Monterrey. A native of Sonora, Mexico, Lorena resides in Washington, D.C. with her husband Francisco and newborn daughter Lorenza.

Yinka Robinson  
Manager, Communications and Partnerships, STEMconnector® and Million Women Mentors

Yinka Robinson is Manager of Communications and Partnerships for STEMconnector®, working closely with strategic partners by acting as a liaison, fostering outreach and managing internal/external communications. Her journey with STEM began at a young age with strong influences from her familial surroundings, which included mechanical and aeronautical engineering as well as computer science. Although she did not follow in these exact footsteps, her interest in STEM has come full circle as she works to advance the status of women and girls through STEM careers, pathways, and education via the Million Women Mentors initiative. Prior to STEMconnector®, Yinka worked as a Public Affairs Associate for FleishmanHillard PR and as a Research/Support Specialist for the Fratelli Group in Washington D.C. She has expertise in crisis management, public speaking, entertainment marketing, social media marketing and media relations. Yinka holds a master’s degree in corporate communications and public relations with an emphasis in crisis management from Georgetown University. She also holds a bachelor’s degree in sociology and a certificate in LGBT studies from the University of Maryland, College Park.
Giavanni Babb  
Associate, Special Projects, STEMconnector®  

Giavanni Babb is an Associate of Special Projects at STEMconnector®, with a particular role in the cultivation of Million Women Mentors. Giavanni is a recent graduate of Howard University, with her bachelor’s degree in biology/chemistry. She spent most of her time as an undergraduate doing genetic research on Arabadopsis thaliana. She plans on attending graduate school in the fall, to seek a master’s and Ph.D in public health, with a specific focus on epidemiology.

Arielle Gerstain  
Consultant  

Arielle holds a BS in Mathematics and a BA in Government and World Affairs from The University of Tampa. She also holds a dual master’s degree in international affairs from American University as well as a degree in natural resources and sustainable development from the University for Peace. She has previously worked as a mathematical statistician at the U.S. Bureau of the Census. She currently works as a research associate in the University of the District of Columbia’s environmental department as well as a contractor for STEMconnector®. She has expertise and an interest in data analysis and gender and the environment.
Executive Summary


Those four words contain the key to the United States holding its position as the innovation and technology leader of the world, given that 80 percent of the fastest growing occupations in the U.S. depend upon a mastery of mathematics and scientific knowledge and skills.¹

STEM is also the key to U.S. employment and prosperity, because it’s where the jobs are. Between 2010 and 2020, STEM-related employment is projected to increase by 16 percent to more than 8.5 million jobs.² And as early as 2018, the nation faces a skills shortage of 230,000 STEM employees.³

Now consider this figure: More than 75 percent of STEM workers are male. Just under 25 percent are female—even though women fill close to half of all jobs in the U.S. economy.

The gap between those numbers tells a story of squandered human potential—untapped talent that this country can ill afford to lose. Mentorship can be part of the solution. High-quality skills-based mentoring and sponsorship programs that connect girls and young women with STEM professionals can significantly increase the number of women who pursue and succeed in STEM fields.

This white paper brings together facts that illuminate the opportunity and the gaps for women in STEM education and careers. It ends with a call for action—to support Million Women Mentors as we seek one million women and men to serve as STEM mentors for girls and young women by 2018.

“Economically strengthening women—who are half the world’s workforce—is not only a means by which to spur economic growth, but also a matter of advancing women’s human rights. When governments, businesses and communities invest in women, and when they work to eliminate inequalities, developing countries are less likely to be plagued by poverty. Entire nations can also better their chance of becoming stronger players in the global marketplace... Where women’s participation in the labor force grew fastest, the economy experienced the largest reduction in poverty rates.”

– International Center for Research on Women

We need far-reaching and influential measures to curb the decline in number of women managers moving up the hierarchy, and to ensure greater representation of women in science and in leadership roles. Women must play to their full potential, and overcome barriers for growth, aspirational deficit, institutional and individual mindset issues. It is only through our collective effort as individuals and organizations that we can create impact and achieve true inclusion.”

– Ritu Anand
Vice President & Global Head, Talent Management, Diversity & Inclusion
Tata Consultancy Services

Join Million Women Mentors (MWM)—and Make a Difference in Helping Girls and Young Women Follow STEM Career Paths

Surya Kant
President, North America, U.K. and Europe, Tata Consultancy Services

As a company, TCS greatly values diversity and inclusion. We recognize that our clients represent many different industries and collectively serve millions of diverse consumers around the world. We also realize that the technology solutions we provide must reflect the global needs and business challenges of our clients, which can be best served through a diverse and global workforce—whether that’s experience, culture or thought process.

Hence, I am excited about our new partnership with Million Women Mentors (MWM), an engagement campaign and national call to action that mobilizes corporations, government entities, nonprofits and higher education groups around the imperative of mentoring girls and young women in science, technology, engineering and math (STEM) fields of study. Through MWM—as a symbol of our corporate commitment—TCS’ goal is to have thousands of its associates become mentors by sharing their passion and experiences in IT, inspiring mentees to pursue STEM education and careers.

Although women make up almost half of the workforce in the United States, they comprise less than 25 percent of workers in STEM fields, where they earn 92 cents for every $1 earned by men, compared to only 77 cents in other occupations. The issue, however, is not limited to North America. In the UK, as of 2012, women held on only 13 percent of STEM roles, and today in India women only make up about 28 percent of the IT workforce.

As a mentor, you can help close this gap. Mentorship provides young women and girls access to STEM professionals outside of their personal networks, and opens their eyes to education and careers they may not have previously known about or considered. We understand that this effort will require action from many people to achieve its desired impact, and I am encouraging you, both men and women alike, to sign up as mentors.

Together, our efforts at TCS can help close the STEM gender achievement gap. Pledging to be a MWM mentor will help get us one step closer.
Women in STEM careers will make a major contribution. For America to maintain its competitiveness, we need to focus on the future of human capital, K–J (Kindergarten through Jobs).

This white paper is about the facts. As we have shared in this insightful document, produced in collaboration with our founding partner, Tata Consultancy Services, STEM careers pay women 92 cents on a dollar, versus other careers that pay women 77 cents on a dollar. Let us all learn from these compelling facts with a mindset of collective action. Let us showcase female leaders as role models for girls, to show them well-paying and purposeful livelihoods.

In the future, 71 percent of jobs will require STEM skills, regardless of whether that job is viewed as a “STEM job.” Think about it: If a candidate came to you for a marketing position and also knew how to code and enhance your web portal with e-commerce, versus another candidate without strong digital skills, whom would you hire?

In 2012, STEMconnector® published “100 Women Leaders in STEM”, [http://www.STEMconnector.org/100women]. We heard from so many that they were ‘the only woman’ in their physics lab, one of two in their computer science jobs, and more. We heard at a White House conference on Digital Inclusion that at a young age girls feel ‘pushed out’ of STEM classes when they are in the minority, or ‘pulled out’ by their peers. Our friends at the National Girls Collaborative Project and MENTOR shared with us that one in three young people will graduate from college without a mentor.

We challenge every corporation, association and government entity to put a stake in the ground on how many young women you will mentor this year with STEM skills for at least 20 hours. Consider face-to-face mentoring, virtual mentoring, paid internships with a designated mentor, competition mentoring and establishing a mentoring program for the younger women in your own workplace.

We want to close by addressing the concept of sponsorship. We learned from Sylvia Ann Hewlett that men are 42 percent more likely than women to have a high-powered sponsor who can make professional introductions and valuable connections for jobs, raises, promotions, internships and more. Through this report, we want to encourage mentorship and sponsorship, and to escalate making things happen today for our girls, our families and our country.
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Overview: The State of Women in STEM

“STEM careers represent the best equal employment opportunities for women and minorities.”
– Nicole Smith, Senior Economist, Georgetown University

There’s a reason why closing the science, technology, engineering and mathematics (STEM) gap for women and minorities is so important. STEM is not just the place where most of the jobs, including some of the highest paying jobs in the country are. It’s also the place where the wage gap between men and women is much smaller: in STEM fields, women earn 92 cents for every dollar earned by men, compared to 77 cents for other fields.

And yet, even as STEM careers offer women their best chance of wage equity while pursuing interesting and challenging careers, the numbers stubbornly show that the state of women in STEM is discouraging:

- Men are much more likely than women to have a STEM job regardless of educational accomplishment.
- Women with a STEM degree are more than twice as likely as their male counterparts to work in non-STEM areas rather than in a STEM occupation (14 percent for women vs. 6 percent for men).
- Although 41 percent of highly qualified scientists, engineers and technologists on the lower rungs of corporate career ladders are women, only 11 percent of Fortune 500 tech company executives are women, and only 5 percent of technology startups are owned by women.

Women and minority groups represent about 70 percent of college students in the U.S., but receive only 45 percent of the undergraduate degrees awarded in STEM disciplines. Mentoring and support programs can help more women gravitate toward STEM fields.

The infographic that follows rounds out the picture on the current state of women in STEM. In this case, every statistic is worth a thousand words.

**STEM Facts on Women & Girls**

- **74%** of STEM workers are male. Only **26%** are female.

- Women comprise more than **20%** of engineering school graduates, yet only **11%** of practicing engineers are women.

- Women were **28%** of all workers in S&E occupations in 2010, up from **21%** in 1993.

- Women with STEM jobs earned 33 percent more than comparable women in non-STEM jobs, considerably higher than the STEM premium for men. As a result, the gender wage gap is smaller in STEM jobs than in non-STEM jobs.

- The wage gap between women and men is much smaller in STEM occupations than other occupations. In STEM fields, women earn $0.92 for every $1 earned by men, compared to $0.77 for other fields.

- Although women fill close to half of all jobs in the U.S. economy, they hold less than **25%** of STEM jobs.

*Info graphic courtesy of Tata Consultancy Services*
The Need for Mentoring

One key reason for the STEM gap is that girls and young women in STEM disciplines and women in STEM careers feel isolated and have few role models to inspire and motivate them. A special report from the National Science Foundation (NSF) found exactly this: a paucity of successful female role models and mentors reinforces women’s lack of “belongingness” in STEM fields.10

This is why government, corporate and nonprofit initiatives that provide education, coaching and mentoring pathways to students and youth are so central to addressing the shortage of women in STEM education and jobs. High-quality mentoring and sponsorship programs that connect girls and women with both STEM professionals and tangible opportunities can significantly increase the number of women who pursue, succeed and stay in STEM fields.

In school, mentoring and immersion activities create a fun and flexible environment in which students can think, explore and learn. At the college level, mentors and role models serve as evidence to female graduate students that achieving successful careers in science is possible.11 And as women embark on careers in STEM, mentors play a crucial role in motivating them to stay committed, aspire to higher achievements, leverage key opportunities and refuse to give up.

“The value of mentorship is irreplaceable. Finding a mentor early on can do wonders for the amount of satisfaction we find in our jobs, thus leading to a higher retention rate. ...Teaming with a mentor is a career strategy that can bring huge benefits, especially to women in unbalanced work environments like engineering. The majority of successful women time and time again credit their participation in some sort of mentorship for dramatically helping them reach their career goals.”

Karen Purcell, Founder, Owner, and President, PK Electrical

In September 2013, STEMconnector® and Tata Consultancy Services (TCS) released a white paper to capture core themes from the ‘100 CEO Leaders in STEM’ publication. The white paper presented the views of a cross-section of CEOs from many industries on the future of our national competitiveness and the need for a varied and robust STEM workforce. Representing companies with a combined revenue of more than $3.27 trillion and over 7.59 million workers, the CEOs showed strong consensus on the need to support education, mentoring and public-private partnerships to boost women and underrepresented minorities in STEM jobs.

We present a few quotes from the report, highlighting the value and criticality of mentorship and on-the-job support in bridging the STEM gap for women and minorities.

*We have found mentoring to be one of the most effective ways to encourage women and students of color to pursue math and science careers. Mentoring gives students a connection to someone in the field who can help with career-related questions.*

– Inge G. Thulin, 3M Company

*I am entirely confident that fielding a more balanced gender workforce, not to mention a more ethnically diverse one, will positively change the game. And not just for my company, but for all companies, for medicine, for education, for humanitarian efforts, for the advancement of the human race.*

– Ilene S. Gordon, Ingredion Incorporated

*I am particularly proud that from senior level to front line, our coworkers volunteer their time at area high schools to inspire girls in urban areas to seriously consider STEM careers. I think that it is important for these students to understand that problem-solving, logic and critical thinking skills are useful in any career field.*

– Thomas R. Voss, Ameren

*Many students, whether they’re young women or underrepresented minorities, don’t know what’s out there, or what they need to do to get there, especially those without mentors or contacts to get their foot in the door. Through our work with organizations like Year Up, NPower and PENCIL, and our Tech Girls Rock initiative with Boys & Girls Clubs of America, we hope to change that and help level the playing field.*

– Mike Gregoire, CA Technologies
Often, students, especially females and minorities, cannot envision themselves practicing STEM careers in the future. By engaging with role models, students have the opportunity to directly interact with successful STEM professionals, listen to interesting career stories and become excited to study in STEM subjects.

– Tom Lindebarger, Cummins, Inc.

A first step, I believe, lies in actively recruiting women and underrepresented minorities to STEM careers and providing the tools they need to advance. We have to create a network of mentors and role models. ... That is a big reason why GE’s Women’s Network joined MIT and other universities to create STEM camps. We give middle school-aged girls the opportunity to spend some of their summer working on fun technology projects, hopefully developing a lifelong interest.

– Jeffrey R. Immelt, GE

The Girl Scouts National STEM hands-on learning program, Imagine Your STEM Future, is one of the most impressive initiatives I’ve seen. The program is designed to inspire high school girls to pursue STEM studies and careers. ... And we found that girls who participated showed increased interest in science and math courses and STEM activities outside of school. They also improved their confidence, along with their critical thinking and problem-solving skills.

– Randall Stephenson, AT&T

It’s vital that we increase the numbers of women and minorities in STEM fields, because without their contributions, we will never reach our potential economically and as a society.

– Indra Nooyi, PepsiCo

To read more views and insights from CEOs, visit www.MillionWomenMentors.org.
Jobs: The Untapped Potential and Sobering Reality

“In a world where countries are competing like companies, the best educated and most talented workforce is a critical factor for success.”

— Andrew Liveris, CEO, the Dow Chemical Company12

It’s a statistic that has remained stubbornly resistant to change: According to the U.S. Department of Commerce, women hold less than 25 percent of STEM jobs—although they fill close to half of all jobs in the U.S. economy.13

That figure represents a huge untapped potential of talent and diversity for a country that expects to have more than 1.2 million STEM-related occupations and a shortage of 230,000 skilled STEM employees by 2018. Innovation is critically dependent on diverse human experiences, and a diverse, STEM-trained workforce can be a significant competitive asset—not just to a corporation looking to fill crucial STEM skills, but to the U.S. as a whole.

Key Insights: The STEM Imperative White Paper14

- The economy of the future will be driven by knowledge and ideas.
- Innovation in STEM-related fields is driving national economic policies.
- A highly educated and skilled labor force is what drives innovation and production.

It’s a mixed picture for women on salaries and wages in STEM professions: On the one hand, the wage gap in STEM is much smaller than in non-STEM professions, with women earning 92 cents for every $1.00 earned by men, compared to only 77 cents in other fields. Obtaining a STEM degree and choosing to work in a STEM field nets women 29 percent higher hourly earnings, on average, than their peers who have neither a STEM degree nor a STEM job.15

But if that sounds like good news, consider some of these facts:

- Women with a science or engineering degree working full-time make $58,000 a year compared to $85,000 for men.16
- Female doctors make $50,000 a year less than male doctors.17
- Nearly 1 in 5 women with a science or engineering degree are out of the labor force, compared to less than 1 in 10 male graduates.18
- Women, underrepresented minorities, first-generation students and those from low-income backgrounds leave STEM fields at higher rates than their counterparts, according to multiple studies conducted by the American Council on Education.19 Of 100 female bachelor’s degree students, 12 graduate with a STEM major, but only three continue to work in STEM fields 10 years after graduation.20

### WAGE GAPS BY STEM PROFESSION

- Female engineers earn 7 percent less per hour than their male counterparts.
- For physical and life sciences, the wage gap is 8 percent.
- Women STEM managers earn 9 percent less an hour than their male counterparts.
- Among STEM professions, the wage gap is the highest for women in computer and math-related jobs, with women earning 12 percent less than men in these professions.21

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20. Anthony Carnevale, Nicole Smith, and Michelle Melton. STEM. Georgetown University: Center on Education and the Workforce, as retrieved from http://cew.georgetown.edu/stem/
When we examine data on women in each of the STEM fields, they tend to show great disparity, with gains in one field offset by continuing struggles, or even setbacks from year to year in others:

In 2011, women were 41 percent of life and physical scientists (the “S” in STEM), 27 percent of computer professionals (the “T” in STEM), 13 percent of engineers and 47 percent of mathematical workers. But women outnumbered men in the social sciences, with a participation level of 61 percent.  

These data shows that women in STEM tend to be concentrated in different occupations than men, a fact borne out by other statistics.

For instance, just 17 percent of chemical engineers and 22 percent of environmental scientists are women. Only a little more than 30 percent of doctors are women. In the field of computer science (which, according to a U.S. Census Bureau report, accounts for 50 percent of all STEM workers), women are lagging seriously, with a participation rate of only 27 percent. And there is a reason for that: Women’s quit rate in technology exceeds that of other science and engineering fields. An inexplicably high proportion of women (56 percent) in technology companies leave their organizations at the midlevel point (10–20 years) in their careers.

We end with another sobering statistic—Although women are well-represented in the lower rungs of corporate career ladders, accounting for a full 41 percent of highly qualified scientists, engineers and technologists, that picture changes rapidly when one looks at executive and managerial positions. In the U.S., only 11 percent of Fortune 500 technology company executives are women, and only 5 percent of technology startups are owned by women.

Industry Examples

Data in specific STEM industries sheds further light on both STEM advances made by women and the continuing gender gap in STEM.

Computer and Mathematical Sciences

The number of women working in computer and mathematical sciences has increased more than in any other broad occupational area. Yet in 2011, only 25 percent of computer scientists were women. Tom Emrick, executive director at the Smithsonian Education Center, sums it up: “Computer science has the largest diversity gap of almost any profession.”

Clearly, this is a major sector for our economy and a huge opportunity for our next generation of employment. (For an in-depth analysis of the future of computer science, including ways to boost women’s participation in this field, read the STEMconnector®-TCS white paper: Education and Careers in the U.S.: The Future of Computer Science.)

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Energy
The diversity gap can be seen in the energy industry, too, where substantial gains only serve to highlight how far we still need to go. Between 2000 and 2007, for example, the percentage of women executives at British Petroleum (BP) more than doubled; at ExxonMobil, the number of women executives grew by 33 percent during the same period. Yet, in absolute numbers, the figure is still very small: 12 percent of ExxonMobil executives were women in 2007, compared to 9 percent in 2000.30

At StatoilHydro, some 23 to 24 percent of managers are women, but they are concentrated in staff management positions, where women fill half of all positions, and are much less visible in the asset management lines of business, where women managers account for only 11 percent of the total.31

Shell’s numbers show a similar picture of rapid advances while still pointing to the distance that remains to be covered. The company’s 2007 annual review reported that women represented 31 percent of all professional hires and 20 percent of recruits for technical roles. Women in management actually increased from 8.9 percent in 2000 to 17.1 percent in 2007, while the percentage of women in senior positions rose from 7.2 to 12.1 percent during the same period, toward the company’s stated global goal of 20 percent.32

Healthcare
According to the U.S. Department of Labor’s Bureau of Labor Statistics (BLS), occupations and industries related to healthcare will add the most new jobs to the economy between 2012 and 2022, with this single sector alone accounting for 5 million of the projected 15.6 million jobs that will be added during this period. Keeping this in mind, the following figures take on even greater significance:

- Even though women now make up 44 percent of all new medical school graduates,34 in 2012, only 34.3 percent of all physicians and surgeons were women.35

- 91 percent of registered nurses are women, while 78 percent of clinical laboratory technologists are women.36
Gateway with Model Programs

In each of the STEM segments and major industry areas highlighted above, what the numbers show is a difference between potential and actuality. That difference is sometimes very large (as in computer science); other times, it is smaller, but still significant.

Gateway programs help bridge the gap, translating this potential into millions more girls in STEM fields of study, and millions more women choosing STEM careers over lower-paying, lower-profile jobs in education or healthcare. These programs include traditional mentorships and internships, but often go beyond them to tap the power of social media, the web and multimedia. The WomenSphere Nuclei Media project, highlighted on the right, is one such innovative example.

Gateway programs often include “immersion” and hands-on activities, which allow girls and young women to experience a STEM field of study or a STEM career first-hand. One such program is WISE, short for Women in Science and Engineering. Established at the University of Arizona in 1976, WISE offers a wide range of programs for both students and professionals, including a conference for middle and high school students, academic and career preparation programs for college students, mentoring, internships, scholarships, a living-learning residential community and much more.38

Some gateway programs encourage minority students and women to take the next step in STEM. The Mickey Leland Energy Fellowship (MLEF), sponsored by the U.S. Department of Energy’s Office of Fossil Energy, is a 10-week summer internship program that provides opportunities to students who are pursuing degrees in STEM majors. The goal of the program is to improve opportunities for minority and female students in these fields, but all eligible candidates are encouraged to apply.39

Often, such programs represent a partnership between corporations and nonprofit agencies. The American Physical Society and IBM, for example, cosponsor a research internship program for undergraduate women to encourage them to pursue graduate studies in science and engineering.40

We take a more detailed look at mentorship, internship, crossover, and other STEM support programs in the U.S. in two upcoming sections of this white paper: ‘Mentorship and Internship Programs’ and ‘Women in STEM Support Programs Nationwide.’

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“When it comes to math and science, Americans think those subjects were done by dead Greek guys 1,000 years ago.”

—Glen Whitney, Founder of the Museum of Mathematics

(For Reuters Interview)

It all begins in school. And where STEM is concerned, girls face multiple hurdles, with the general weakness of STEM education in American schools compounded by misconceptions and doubts about the potential of girls and minorities in these traditionally male-dominated fields, a paucity of good teachers and lack of support from parents.

In a country where only 17 percent of 12th graders are both proficient and interested in STEM careers, these additional hurdles often prove unsurmountable for girls.

### K to 12th Grade

The numbers here show a jumble of encouraging news mixed with disheartening figures, which point to fundamental failures to lay the basics for a robust STEM education at the foundational K–12 level. Many of these failures (see box) do not affect only girls, but do have a disproportionate impact on them.

For example, in 2012, the mean math SAT scores for women for every ethnicity were lower than for men from the same ethnic groups. Yet girls are taking many high-level mathematics and science courses at similar rates as their male peers, with the exception of physics and engineering, and are performing well overall. However, gaps in mathematics and science achievement persist for minority and low-income students.

Again, even though women represented 56 percent of all Advanced Placement (AP) test takers in 2011, only 19 percent of AP test takers in computer science were women—a steep drop that cannot be explained by lack of potential. An equal percentage of men and women (17 percent) took calculus, for instance. And the percentage of women taking pre-calculus/analysis (37 percent) was higher than that of men (34 percent), as was the percentage of women taking algebra II (78 percent compared to 74 percent for men).

Yet men were six times more likely to have taken engineering than women (6 percent vs 1 percent)—again, an inexplicably large gap. More women than men took advanced biology (50 percent vs 39 percent), but women took physics at a lower rate than men (36 percent vs 42 percent).

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In 2009–10, women made up less than 25 percent of participants in STEM programs nationally: 21 percent at the secondary level and 24 percent at the post-secondary level.

A WIDER FAILURE:

STEM IN U.S. SCHOOLS

- Computer science is not encouraged in schools in 36 of 50 U.S. states.
- 30 percent of STEM teachers did not major in the field that they teach.
- 50 percent of U.S. schools do not have a focused STEM program.
- 50 percent of the nation’s schools do not offer calculus and 37 percent do not offer physics.
Higher Education

The disparities evident in the K–12 numbers gain strength in higher education, as the top-level numbers on the right show.

In 2009, for instance, women earned 62 percent of all associate’s degrees, a painful climb up from 60 percent in 2000. Yet their share of science and engineering associate’s degrees fell during the same period, from 48 percent in 2000 to just 40 percent in 2009.

Most of this decline is attributable to a decrease in women’s share of computer science degrees, which fell steeply from 42 percent in 2000 to 25 percent in 2009. By 2010, that number had fallen to 19 percent, and by 2012 it had declined still further, to 12 percent of the total 57 percent of bachelor’s degrees earned by women. This means that in a span of just 12 years, women, instead of gaining ground, have gone from earning 42 percent of computer science degrees to 12 percent of them—even though 71 percent of STEM jobs will be in computer science by 2018.

The numbers are not much better for physics: in 2010, women earned only 21 percent of bachelor’s degrees in the subject.

At the master’s level, the percentage of master’s degrees obtained by women in engineering remained at 22.6 percent for 2010 and 2011, while the percentage of doctoral degrees actually decreased by a whole percentage point, from 22.9 percent in 2010 to 21.8 percent in 2011.

Finally, women currently earn 41 percent of PhDs in STEM fields, but make up only 28 percent of tenure-track faculty in those fields (in engineering, that figure is only 13.8 percent).

The disparity continues to be stark when women move from undergraduate or higher education to a career. Men are employed in STEM occupations at twice the rate of women: 31 percent versus just 15 percent. And the drop-off is even more precipitous for engineering: Women comprise more than 20 percent of engineering school graduates, yet only 11 percent of practicing engineers are women.

Scholarship Programs

One way to boost the skewed numbers evident in STEM fields of study is scholarships. Scholarships can play a critical role in encouraging economically disadvantaged women and minority groups to opt for, and continue to stay in, STEM courses, especially at the undergraduate level. We profile a few such examples of outstanding scholarship programs that support women in pursuing STEM degrees.

**NSF Scholarships in STEM (S-STEM):** Sponsored by the National Science Foundation (NSF), S-STEM makes grants to institutions of higher education to support scholarships for academically talented students demonstrating financial need, enabling them to enter the STEM workforce or STEM graduate school following completion of an associate, baccalaureate or graduate-level degree in STEM disciplines.

**Society of Women Engineers (SWE):** SWE scholarships support women pursuing baccalaureate or graduate programs accredited by the Accreditation Board for Engineering and Technology (ABET) in preparation for careers in engineering, engineering technology and computer science in the U.S. and Mexico. In 2013, SWE disbursed over 200 new and renewed scholarships valued at $550,000.
The BlackBerry Scholars Program: A global four-year scholarship program for outstanding women entering their first year of undergraduate study at an accredited college or university. The program is designed to help increase the number of women studying and influencing the future of mobile computing, including STEM.59

Alpha Omega Epsilon National Foundation (A.O.E.): The A.O.E. National Foundation promotes academic excellence by awarding scholarships in varying amounts to women who promote engineering and technical science by exemplifying high standards of character, conduct, integrity, academic achievement, community involvement and extracurricular activities.60

Gamers in Real Life (G.I.R.L.) Scholarship Program: The G.I.R.L Scholarship Program was established to encourage women to pursue careers in the video game industry in the areas of development and design. The winner is awarded a $10,000 scholarship to use toward her tuition and other educational expenses.

More information about STEM scholarships for women can be found at: http://www.collegescholarships.org/women.htm
Mentorship and Internship Programs

“We believe there are three aspects to encouraging women and underrepresented minorities to continue pursuing STEM studies. First, focus on generating interest with this population, particularly through engaging learning opportunities that appeal to their interests. Second, provide more minority and women STEM mentors and highlight role models for these young people. And finally, make them aware of the tremendous opportunities to make a significant impact on our world, which in turn will lead to tremendous economic opportunity for themselves and their families.”

– Francisco D’Souza, CEO, Cognizant

If all the data assembled in this white paper so far point to one thing, it is this: We cannot rely on formal education alone to close the STEM gap for women and minority groups. Instead, educators, teachers, nonprofit organizations, government agencies and public policy leaders must all work together in a concerted effort to:

- **Boost out-of-school programs for girls and women at every stage**: Such programs include internships, apprenticeships and other hands-on learning/career programs that create a fun and flexible environment in which girls can learn about STEM fields of study and women can explore STEM careers.
- **Provide mentors and role models that girls, women and minorities can identify with**: Role models and mentors play a powerful role in inspiring, encouraging and supporting students and young women at every stage of their STEM education and career.

Initiatives such as these, which provide informal education, coaching and mentoring pathways to girls and women, are central to boosting their numbers in STEM fields and careers. By stepping outside the confines of the formal classroom, internship and mentoring programs can create innovative and exciting ways in which girls and young women can get a better understanding of their field of study, or gain real-world experience from a role model whom they admire and can connect with easily.

In other words, instead of narrowly confining our efforts to schools alone, we need to look at the whole pipeline of talent, including apprenticeship programs for high-school students or GED graduates, internship programs for undergraduate students and development opportunities for mid-career professionals—all framed by mentors who can provide encouragement and support at the key transition points when students tend to drop off from STEM studies, or professionals to opt out of their current STEM careers. We also need to explore the entire gamut of learning avenues, from multimedia and the web to film, social media and more.

By investing the resources and the time to provide mentorship and guidance to women of all ages, we can curtail the steep fall in the numbers of women who are taking computer science courses, for example, or boost the numbers of women taking engineering courses—thereby ensuring that we build a robust pipeline of talent to supply the STEM skills the nation needs.

“**We know women have the intelligence, creativity and ability, but areas of STEM continue to be male-dominated. I believe much of our future success will hinge on doubling the number of students interested in STEM-related areas of study, and that means a focused effort on programs to engage girls and women.”**

– Dr. Chris Nelson, CEO, Kemin Industry

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In Focus: Programs that Work

Career development. Coaching and mentoring. Avenues to immerse oneself and explore a STEM line of study or a STEM career. Online programs that inspire and encourage students to think like scientists.

From the spectrum of experiential learning, internship and mentorship programs that support young girls and women as they dream of STEM careers and struggle to make those dreams come true, we profile a few that show how well such support programs can work.

Perhaps it’s fitting to start with NASA, the agency that has done so much to popularize science in the public imagination. Continuing its efforts to inspire the next generation of scientists, engineers and innovators, NASA, through Women@NASA, has created a mentoring project called G.I.R.L.S, short for NASA Giving Initiative and Relevance to Learning Science. This program offers middle school girls one-on-one mentoring from women working at NASA. Using a virtual connection, participants complete online lessons in STEM fields with their mentors, learning what it feels like to be an engineer, a scientist or an astronaut at America’s premier aerospace agency.62

Another innovative program comes from Tech Savvy, which provides diverse, hands-on workshops for girls as well as opportunities to meet and interact with female role models in STEM fields. The day-long conference also offers a chance for parents and families to learn about the value of women’s inclusion in STEM and to explore the paths that girls can follow to college and a career.63

Thinking Smart, another successful program from Girls Inc., links girls ages 12 to 14 with professionals (particularly women) in STEM fields. These ‘SMART Partners’ help plan and deliver the program, encouraging girls to “think like scientists by thinking with scientists.”

Many individual organizations also offer support programs for their female professionals. The College of Natural Sciences (CNS) at the University of Massachusetts Amherst has a program called the Women in Science Initiative (WISI). Through a coordinated set of programs and resources, WISI focuses on increasing the success of women scientists at all stages of their academic careers. Among many other resources, WISI holds an annual lecture and other forums and events to encourage networking, mentoring and educational opportunities for CNS women faculty and students.64 At the University of Wisconsin in Platteville, the Women in Engineering, Mathematics and Science (EMS) Mentor Program matches freshman and sophomore women with upper-class women in small peer mentor groups to offer a supportive, interactive network of women and a welcoming, collaborative environment in which to learn about the challenges and rewards encountered by women in STEM.65

The next section of this white paper provides information on other successful internship, mentorship and support programs in STEM from around the country.

Women in STEM Support Programs Nationwide

“Sharing best practices about STEM-related partnerships and programs is key to helping grow mentorships and apprenticeships in the STEM pipeline.”
– Key Insight Identified by 100 CEOs in STEMconnector®-TCS White Paper: The STEM Imperative

In this section, we highlight a variety of STEM support programs for women and underrepresented minorities. The programs range from internships and mentoring projects to public-private partnerships, role-modeling, immersive experiences and others from across the country. By showing what has already been done and how much it has helped, our goal is to inspire more such efforts, and to light a spark of service and mentorship that can spread across the country.

Middle and High School Examples

**Tech Trek** is a week-long STEM summer camp for rising eighth-grade girls. Through Tech Trek, girls are immersed in a world that empowers and encourages them to think about themselves as future scientists, engineers, mathematicians and computer specialists.

**Expanding Your Horizons Network Programs** provide STEM role models and hands-on activities for middle and high school girls. The ultimate goal is to motivate girls to become innovative and creative thinkers ready to meet 21st century challenges.

**Girls Dig It** is an innovative program from Girls Inc. that enables girls ages 12 to 14 to build their analytical and interpretive skills while they work alongside archaeologists, making exciting discoveries that unveil the past and present of their communities and their culture.

**Coastal Studies for Girls (CSG)** is a semester-long science and leadership school for tenth grade girls located in Maine. Through community and experiential learning, CSG nurtures girls’ intellect, curiosity, confidence, and individual strength.

The **SciGirls** brand has grown into a far-reaching transmedia enterprise, serving girls, families and educators in both English and Spanish. Evidence-based practices in STEM education for girls, SciGirls videos, online resources, hands-on activities and professional development work together to address a singular but powerful goal: to inspire, enable and maximize STEM learning and participation for all girls, encouraging greater interest in STEM careers.

**SCITECH:**
FROM SOLAR CARS TO COSMETICS

SciTech is an after school program developed by the Reuben H. Fleet Science Center for fourth through sixth grade girls at San Diego elementary schools. Participants meet twice a week to engage in hands-on science investigations on everything from solar car design to the chemistry of cosmetics. Through project-based learning, the girls make concrete connections to everyday life while developing creative thinking and problem solving skills that they will use throughout their lives.
Undergraduate and Graduate Level Examples

The Career Equity Resource Center, funded by the New Jersey Department of Education, seeks to provide greater access to and success in high-skill, high-demand careers for students in marginalized populations. This includes underrepresented groups, such as women, students of color and those from low socioeconomic backgrounds.73

Ohio State University’s Women in Engineering (WiE) Program fosters a supportive learning environment and culture within the College of Engineering and beyond. In partnership with corporations, faculty, students, alumni and educational and community organizations, WiE’s mission is to work as a change agent to increase the number of women pursuing engineering degrees and entering the workforce as engineering professionals.74

The Douglass Project for Rutgers Women in Math, Science & Engineering is an award-winning program that provides support and encouragement for undergraduate women pursuing degrees and careers in mathematics, science, engineering and technology, with the ultimate goal of increasing the participation of Rutgers women in STEM.75

The Chicago Collaboration for Women in STEM is a joint initiative of Northwestern University and the University of Chicago. It is aimed at enhancing the recruitment and advancement of women faculty in STEM disciplines at the two universities, as well as women researchers at two Department of Energy (DOE) national laboratories, Argonne and Fermilab.76

The Women in Stem (WiSTEM) Learning Community provides academic and social support for women in community colleges who are considering a STEM major.77

Women in STEM Excelling Mentor Program is a program for first-year women students majoring in a STEM area. Its goals are to support the overall retention of first-year women students in general and specifically to support the retention and success of women students in STEM majors.78

The Association for Women in Mathematics (AWM) has a mentor network for women and girls of all ages who are interested in mathematics. Mentors are located at colleges and universities throughout the country. Women can mentor or be mentored by submitting a request form to determine specific needs and interest, and may choose a female or male mentor from their mentoring network.79

Women in Careers Examples

The **Anita Borg Institute for Women and Technology’s Systers Initiative** is an online interactive forum for women in technology to privately seek advice and discuss career development. According to their site, the Systers list has more than 3,000 members in more than 54 countries participating. This initiative is open to women of all ages and stages in their careers.  

The **Gender Equity Collaborative** offers a step-by-step list of how to build and market a mentoring program. The Gender Equity Collaborative is a two-year project that hopes to disprove myths about girls in science and encourage girls’ participation in emerging technologies.  

The **National Institute for Women in Trades, Technology & Science (IWITTS)** offers valuable resources to women in the technology and trade fields. A component of their site is WomenTechWorld, which offers e-mentoring to senior and entry-level technicians and scientists. The site also provides resources such as e-training, job postings and other links for women in technology and trades.  

More information on some of the top-ranked support programs for girls and women in STEM fields can be found at: [http://www.underthemicroscope.com/top-10-mentoring-resources-for-women-and-girls-in-science-engineering-and-math/](http://www.underthemicroscope.com/top-10-mentoring-resources-for-women-and-girls-in-science-engineering-and-math/).

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The Impact of Mentorship

“Mentors play a critical role in bringing new people—and particularly women—to careers in STEM. Female leaders must be role models to advocate for the possibilities of STEM education and support programs that inspire more of our best and brightest students, especially those from underrepresented or disadvantaged groups, to study in STEM fields. ... Industry mentors—particularly women in positions of influence—are one important link to increasing the pipeline of talent.”

Heidi Kleinbach-Sauter, Senior Vice President, Global Foods R&D, PepsiCo

Mentoring works.

This fact has been proven, with supporting statistics, by many studies. It has also been demonstrated at the experiential level by thousands of mentors and their protégés.

“When employees experience firsthand the joy of engaging a student in a field that could affect his or her future, they can’t help but get excited,” says Greg Brown, CEO of Motorola. “Ongoing mentorship programs and after-school activities are a good way to do this, but one-day classroom volunteer events can have an immediate impact too.” He continues, “Our employees volunteered more than 55,000 hours in their communities last year. Many of those hours were spent working with students on STEM projects. This inspired the students to enter STEM careers, and also inspired many of our employees to believe in the importance of the work we do.”

The reason mentoring works is simple: Mentors and role models serve as evidence to students that achieving successful careers in science is possible. This is particularly true for individuals who haven’t historically participated in these areas—such as young women and underrepresented minorities. As Linda D. Hallman, executive director and CEO of the American Association of University Women, puts it, “We need to do more than just tell young girls that they can be engineers, rocket scientists or computer programmers. Mentors can inspire girls and give them an insider’s view of what it’s like to work in STEM. ... Career options in STEM disciplines are endless, but we won’t reach our full potential as a nation until women and underrepresented groups are fully included.”

Inspiration, education, retention—these are the top focus areas for boosting the number of women in STEM education and careers. And mentorship plays a crucial role in all three. In the words of Balaji Ganapathy, head of Workforce Effectiveness at TCS, “We need to pool our efforts, sharpen our focus, maximize our results and build STEM pathways from education to careers for our students.”

Mentorships and sponsorships are two such “STEM pathways” that can take young women from a successful STEM education to a STEM career without losing interest, being discouraged and dropping out in the interregnum. In an article in the New York Times titled “Mentors are Good. Sponsors are Better,” Sylvia Ann Hewlett writes: “A sponsor can lean in on a woman’s behalf, apprising others of her exceptional performance and keeping her on the fast track. With such a person—male or female—in her corner, the Center for Talent Innovation’s data shows, a woman is more likely to ask for a big opportunity, to seek a raise and to be satisfied with her rate of advancement.”
Since its founding in 2000, Techbridge has served approximately 10,000 girls in grades 5-12, offering after-school and summer programs with hands-on projects, role model pairing, and academic and career guidance. A 2011 evaluation found that:

- 83 percent of Techbridge participants surveyed were more interested in STEM careers because of role models and field trips.
- 87 percent felt more confident trying new things.
- 90 percent said they believed engineering is a good career for women.

Investing the resources and time to provide mentorship and guidance to women of all ages is the most powerful way to redress the gap in STEM skills that the nation is facing today. A 2004 study on the impacts of mentoring in the *Journal of Applied Psychology* showed that across the board, women with mentors did better than women who tried to make it on their own:

- Compensation and number of promotions were higher among mentored than non-mentored individuals.
- Mentored individuals were more satisfied with their careers, more likely to believe that they would advance in their careers and more likely to be committed to their careers than their non-mentored counterparts.
- Mentored individuals were more satisfied with their jobs than were non-mentored individuals.
- Mentored individuals had greater intentions to stay with their current organizations than did non-mentored individuals.

The National Mentoring Partnership sums up the value of mentoring as follows:

- Mentors help young people set career goals and start taking steps to realize them.
- Mentors can use their personal contacts to help young people meet industry professionals, find internships and locate job possibilities.
- Mentors introduce young people to professional resources and organizations they may not know.
- Mentors can help their mentees learn how to seek and keep jobs.

In an article in the Chicago Tribune, Kristyn Schiavone tells the story of Julie Gill, a Pace University computer science graduate who now does web development and tutoring for Mathnasium, a math learning center for kids. Schiavone talks about how Gill’s father, who was a programmer, would encourage her to learn:

“When I was a little kid, he sat me down in front of a computer and said, ‘Why don’t you learn how to program?’” [Julie Gill] says. “Throughout school I did various programming languages, never in a class but just on the side."

“Her aptitude eventually led to a scholarship for computer science, but she says that if her father hadn’t been a programmer, it’s unlikely that she would have pursued the field.”
83. STEMconnector® and TCS; “The STEM Imperative: 100 CEO Leaders Discuss the Importance of STEM in U.S.” September 2013. http://www.tcs.com/SiteCollectionDocuments/ceostem/01.htm
84. STEMconnector® and TCS; “The STEM Imperative: 100 CEO Leaders Discuss the Importance of STEM in U.S.” September 2013. http://www.tcs.com/SiteCollectionDocuments/ceostem/01.htm
87. Million Women Mentors; http://www.millionwomenmentors.org
Women of color (defined as Asian, African American, Hispanic and American Indian women) face a double bind in STEM education and careers, encountering the challenges and stereotypes faced both by women and by people of color. U.S. census figures indicate that in 2000, African American women made up 6 percent of the population, Hispanic women made up another 6 percent, Asian women 2 percent, and Native American women less than 1 percent of the population. Keeping this in mind, we present some statistics for women of color in various STEM areas.

According to the National Science Foundation, minority women comprise fewer than 1 in 10 employed scientists and engineers, with only 5 percent of Asian women, 5 percent of African American women, and 2 percent of Hispanic women represented in the science and engineering labor force in the U.S. This compares poorly with women as a whole, who made up 28 percent of all workers in science and engineering occupations in 2010.

The disparity seen in the labor force begins with education: the National Academy of Sciences estimates that in 2007, only 18 percent of bachelor's degrees in science and engineering were awarded to people of color, even though they represent 33 percent of the college-age population. Among women of color as a whole, underrepresented minorities (URM), defined as African American, Hispanic and American Indian women, tended to fare significantly worse. For example, the percentage of bachelor's degrees in engineering awarded to underrepresented minorities grew only minimally over more than 30 years, rising from 0.31 percent in 1977 to 2.94 percent in 2011. With so little representation in engineering programs, it's not surprising that underrepresented minorities make up only 1.76 percent of the engineering workforce.

When we turn to higher education, the numbers fall even further: as of 2006, for example, African American women earned only 0.34 percent of Ph.Ds. in computer science and 0.58 percent in engineering.

“In our science classrooms each year there are women of color seeking role models who look like them, but in most cases they will not find them. From the data above it is apparent that students can go through an entire science program and not have been taught or supervised by a URM professor. Students who lack role models face significant barriers in science and deleterious effects on self-esteem…”

—Marcy H. Towns, ‘Where are the Women of Color?’

Underrepresented women are nearly invisible on science and engineering faculty, with studies finding they are less likely to attain tenure than white women or men of any racial group. A 2013 study by the Institute of Women’s Policy Research shows that “the proportion of faculty positions held by underrepresented minority women with STEM doctorates decreases with each step up the ladder: in the United States, underrepresented minority women are 3.2 percent of assistant professors at four-year colleges, universities and affiliated centers and institutes; 2.9 percent of associate professors and 1 percent of full professors. Among Asian American women—who are the best represented minority female group at each level of the STEM professoriate—the same pattern holds true. Asian American women hold 7 percent of assistant professorships, 4.2 percent of associate professorships and 1.5 percent of full professorships.”

For women of color and minority groups, mentoring, internships and other forms of support become even more important. Without such support, they face the danger of dropping out because of isolation, discouragement and the absence of role models who look like them. We conclude with the words of Marcy Towns: “These data are a call to action. If we value diversity and excellence at our institutions, we must consider how we recruit, advance and retain URM faculty and also how we recruit, retain and graduate the URM students who could one day join us in the faculty ranks.”

“Through mentors and sponsorship we can not only show these women what the STEM opportunities are, but we can make sure they become leaders, become successful, and that they contribute to our society and our future.”

Patrice D’Eramo- Flack
Vice President, Americas Marketing, Cisco

Top 10 Recommendations: Moving the Needle

We’ve marshaled the facts. We’ve looked at the numbers. But what are the actions we need to take—as individuals, as members of various communities and as a nation—to bridge the STEM gap for women? We present our top 10 recommendations.

1. **Boost STEM programs in U.S. schools and universities.**
   - Currently, 50% of U.S. schools do not have a focused STEM program.
   - Computer science is not encouraged in schools in 36 of 50 U.S. states.
   - 30% of STEM teachers did not major in the field that they teach and STEM-qualified teacher candidates are often heavily recruited for jobs in corporate America.

2. **Inject real-world problems into STEM school curricula to inspire girls and minorities toward STEM careers.**
   - Although there are more girls than boys in school at all levels, only 13% of them express an interest in STEM fields.
   - Make STEM learning more relevant with role models and hands-on applications that include where the STEM jobs are and what they pay.
   - In 2009–10, women made up less than 25% of participants in STEM programs nationally: 21% at the secondary level and 24% at the post-secondary level.

3. **Support grassroots campaigns to increase computer education for girls.**
   - By 2018, STEM jobs are expected to grow 17%. More than 71% of these high-paying jobs will be in computer science.
   - Between 2000 and 2012, women have gone from earning 42% of computer science degrees to only 12% of them.
   - Among STEM fields, the wage gap for women is the smallest in computer-related jobs, 95 cents for every $1 earned by men, vs. 92 cents for STEM professions as a whole.

4. **Boost industry participation in STEM support programs for women, including mentorship, sponsorship and paid internship programs.**
   - We cannot fill the looming skills shortage of 230,000 professionals in STEM fields by the year 2018 if industry continues to ignore one half of the U.S. population.
   - 40% of jobs today require STEM competencies; almost all of the 30 fastest-growing occupations in the next decade will require STEM skills.
   - The tent must be opened to accommodate new demographics.

5. **Step up collaboration among government agencies, educational institutions, corporations and community organizations.**
   - No real progress can be made without close collaboration among these key players.
   - A skills-investment approach must be encouraged across America.
   - Industry and academia must join forces to develop the STEM skills that the nation needs in the future.
6. Increase formal support for a range of informal STEM programs for girls and women.
   - Informal programs include mentorships, apprenticeships, internships and other hands-on programs to teach girls about STEM fields of study and women about STEM careers.
   - Change the perception that STEM professionals are “geeks” or “nerds.”
   - Establish fun and flexible environments in which girls can think, explore and learn first-hand how compelling STEM careers can be.

7. Engage women of color and underrepresented minorities.
   - In 2007, only 18% of bachelor’s degrees in science and engineering were awarded to people of color, even though they represent 33% of the college-age population.
   - Only 5% of Asian women, 5% of African American women, and 2% of Hispanic women are represented in the science and engineering labor force in the U.S.

8. Allocate state funding to create STEM pathways—‘K to J (Jobs)’—for women and minority groups.
   - STEM pathways take young women from a successful STEM education to a STEM career without losing interest, being discouraged and dropping out in the interregnum.
   - Such informal pathways appeal to girls who may not be as motivated in formal classroom settings.
   - It is critical to develop innovative approaches to technology skills development that give students opportunities to invent, explore and discover.

9. Scale up winning STEM programs for women and share best practices among states.
   - Instead of a fragmented approach, companies, local governments and the academic community must work more closely to bridge skills, education and career readiness gaps among women.
   - Creating an annual “Leaders and Laggards” report card is a powerful way to motivate change while spotlighting STEM support programs that do work.
   - To identify and share successful initiatives, states must set up metrics and grading systems to track programs and measure their effectiveness.

10. Boost mentoring programs at every level.
    - Mentoring is a proven strategy to increase the number of girls in STEM disciplines and the number of women opting for and staying in STEM careers.
    - Techbridge, which offers out-of-school and summer programs, quantified the value of mentoring with the following figures (2011):
      - 83% of participants were more interested in STEM careers.
      - 87% felt more confident trying new things.
      - 90% said they believed engineering is a good career for women.
Conclusion: National Call to Mentoring

“I encourage all Iowans to consider becoming a mentor; mentoring is one critical way to improve opportunities for girls and young women, so they can see firsthand they can be successful in a STEM career. Mentors can send the message that investing time in studying STEM subjects in school will pay off by building the foundation for post-secondary training or education in STEM fields.”

– Kim Reynolds, Lt. Governor of Iowa

We end this white paper with a strong national call for mentors, both men and woman, to join us, so we can reach our goal of one million mentors for girls and women in STEM by the year 2018. By helping a million girls and young women, from high school through careers, persist and succeed in STEM careers, we can contribute significantly toward redressing the STEM gap in employment that the nation faces.

If you have skills in any of the STEM fields and are willing to mentor a girl or young women (middle school to early career) for a minimum of 20 hours annually (under two hours a month), please let your commitment count officially as part of the Million Women Mentors initiative.

We recommend five pathways of mentoring: face to face (can include competition mentoring); online (including Skype, text, Google chats and more); offering paid internships for high school or college age young women with a designated mentor; workplace mentoring to engage and support younger and newer employees; and/or sponsorship (championing a young woman for internships, jobs, promotions and more).

We already serve more than 18 million girls. With your help, we can make an even bigger difference, and ensure that the talent, intelligence and energy of our young women is not squandered.
About Million Women Mentors

Million Women Mentors, launched as an initiative of STEMconnector® on January 8, 2014, will support the engagement of one million women (and men) in STEM to serve as mentors by 2018. MWM is an engagement campaign and national call to action that mobilizes corporations, government entities, non-profit and higher education groups around the imperative of mentoring girls and young women in STEM fields. In the first month alone, over 45,000 pledges have been made to mentor girls and young women in STEM skills.

The web portal (www.MillionWomenMentors.org) was launched in partnership with Tata Consultancy Services. Available online is a nationwide call to action to capture pledge commitments from individuals, organizations and companies that have an interest in mentoring. In the second and third phases, the website will be enhanced with matching capabilities to pair organizations and educational institutions in need of mentors in STEM fields with STEM professionals and corporations. Additionally, the site will recognize those with model STEM mentoring programs and share timely learning resources for all.

Founding sponsors include: Accenture, Cisco, Sodexo and Tata Consultancy Services, in addition to ADP, Alpha Corporation, Diana Davis Spencer Foundation, FleishmanHillard, Microsoft Research, Diversified Search and Walmart. Silver sponsors include: Adecco Group North America, Freescale, General Motors, Discovery, Intellectual Ventures, UST Global and Reston Limousine.

To date, MWM is the collective action of 52 national partners. The four founding partners are STEMconnector®, National Girls Collaborative Project (NGCP), MentorNet and NPW. Lead partners include The National 4-H Council, Girls Inc., The Manufacturing Institute, MENTOR, Teach for America, AAUW, Great Minds in STEM, American Institute of Architects (AIA), Association of Science-Technology Centers (ASTC), Business and Professional Women’s Foundation (BPW), National Center for Women and Information Technology (NCWIT), YWCA, Center for Women in Business/U.S. Chamber Foundation, Junior Achievement, Sally Ride Science, Skills USA, Girl Scouts of the USA, Lean In, U.S. News & World Report, Diversity Woman, Diplomatic Courier, Enterprising Women, Discovery Communications, National Utilities Diversity Council (NUDC), National Women’s Political Caucus, eWomen Network, Girlstart, Global WIN, Innovate+Educate, My College Options, National Alliance for Partnerships in Equity (NAPE), US 2020, Women in Engineering ProActive Network (WEPAN), Computer Clubhouse Network, LATINAStryle, Society of Hispanic Professional Engineers (SHPE), Success in the City, Arizona State University, The Public Leadership Education Network (PLEN), The American Geophysical Union (AGU), The Association of Women in Energy (AWE), FIRST Robotics, Thinking Media, TechBridge, and Nepris.
About STEMconnector®

STEMconnector® is a consortium of companies, nonprofit associations and professional societies, STEM-related research and policy organizations, government entities, universities and academic institutions concerned with STEM education and the future of human capital in the United States. STEMconnector® is both a resource and a service, designed to link “all things STEM” through a comprehensive website that connects national, state and local STEM entities. The STEMconnector® website contains profiles of more than 20 categories of STEM-related entities and details ‘Who is Doing What’ on over 6000 STEM-related organizations all 50 states.

As a free service from STEMconnector®, the STEMdaily newsletter provides nearly 17,000 diverse thought leaders in STEM education with a daily newsletter that increases connectivity across the nation and reaches over a million people through social media. STEMconnector® convenes its members and stakeholders through both physical and virtual events, through STEM Councils and virtual STEM Town Halls, and Google Hangouts that regularly reach more than 500 thought leaders. Finally, STEMconnector® recognizes leadership through its annual “100 Leaders in STEM” series. This year, STEMconnector® recognized 100 CEO Leaders in STEM at the U.S. News STEM Solutions Conference in Austin, TX.

STEMconnector® focuses on the STEM workforce and jobs, with a particular emphasis on diversity and women. Our work spans the entire pipeline (K-J—Kindergarten to Jobs) and how STEM education experiences translate into careers. Products also include EdTech Weekly, briefings and events, research reports, data mapping, events, special products and counseling on how to maximize STEM resources. The STEMconnector® team advises and counsels our members and partners to ensure the best STEM practices and scalable investments. STEMconnector® helps other organizations determine programs whose outcomes meet their desired objectives and needs.
About Tata Consultancy Services (TCS)

Tata Consultancy Services (TCS) is an IT services, consulting and business solutions organization that delivers results to global business, offering a consulting-led, integrated portfolio of IT, BPS, infrastructure, engineering and assurance services. TCS generated consolidated revenues of U.S. $11.6 billion for the 2013 fiscal year, and has over 277,000 of the world’s best consultants in 44 countries. TCS has a diverse workforce comprised of over 118 nationalities and 32 percent women. As a company, we value diversity and inclusion, encouraging women and girls to pursue technology careers worldwide. Research shows that women in the U.S. have a lower wage gap at 92 cents per dollar in STEM careers, versus 77 cents per dollar for all careers. The need for transforming STEM education in the U.S. is urgent, and we recognize the importance of ensuring women and girls are included in these opportunities by creating pathways from education to careers. We build a strong, diverse and inclusive pipeline of future talent through cross-sector collaboration, partnering with our clients and industry leaders to jointly address STEM issues by creating local solutions for regional and national problems. TCS’ national level partnerships and program initiatives leverage our IT expertise and core competency to:

- Build capability in schools and job readiness by advocating for implementation of common core standards across the U.S.
- Increase capacity in STEM careers and education by creating more awareness about STEM careers and inspiring innovative STEM education
- Enhance quality of education by improving student performance, increasing teacher confidence, and influencing STEM curriculum for future employability
- Improve employability by supporting skill development at all levels of employment.

TCS is a proud founding sponsor of Million Women Mentors, led by STEMconnector® and in partnership with the National Girls Collaborative Project, NPower and MentorNet. Together we will increase girls and women’s interest in STEM education and careers, focusing on minorities and underserved populations. TCS believes that MWM can create career pathways for women and girls and understands that this effort will require action from everyone, men and women alike. Our employees worldwide participate in mentorship programs to improve employability of women and girls in STEM careers. Additionally, we realize that technology is a great enabler for MWM, and are proud to lead the creation of a dynamic online mentoring platform, raising the visibility of STEM careers among girls and women, and providing accessibility to STEM internship and career opportunities.