The Case for the STEM Mentoring Movement

“You can’t be what you can’t see.”

Sally Ride, the first American woman in space, said this in an effort to explain how to recruit more girls to the sciences. “Young girls need to see role models in whatever careers they may choose,” Ride said, “so they can picture themselves doing those jobs someday.” Dr. Ride’s recognition is the basic tenet of our work at US2020.

At US2020 we work to dramatically scale the number of science, technology, engineering and mathematics (STEM) professionals mentoring and teaching students through hands-on projects, with a focus on serving underrepresented youth. We partner with companies, schools, nonprofits, government agencies, and communities across the country in an effort to reveal the promise and the possibility of STEM.

The United States has a long, proud history of excellence in STEM. Today more than ever before, America’s economic growth depends upon continued success in these fields. However, the country’s STEM talent pipeline is currently insufficient and lacks the diversity necessary to meet the challenges of the 21st century.

Demand for STEM Professionals

In the past decade, STEM occupations exhibited significantly higher job growth, higher wage growth, and lower unemployment rates than non-STEM occupations. From 2005 to 2012, STEM occupations grew by 16%, while non-STEM occupations exhibited no growth. By 2022, the U.S. will need more than nine million STEM professionals to fill projected job openings. With only 18% of bachelor’s degrees conferred in core STEM subjects - life and physical science, engineering, mathematics, and information technology - the United States is not projected to graduate enough STEM professionals to meet this demand.

Meanwhile, the majority of American students are neither prepared nor sufficiently engaged to become STEM-literate citizens or innovative STEM professionals. The U.S. News/Raytheon STEM Index – which tracks key indicators of STEM-related activities in the U.S. -- shows that since 2000, student interest and competency in STEM subjects have remained flat.

“US2020 is one example of the many public efforts and coalitions that can help to fundamentally change the STEM education landscape in ways that provide opportunities, excitement, engagement, inspiration, and training for more and more of our talented young people.”

John Holdren
Assistant to the President for Science and Technology, and Director, White House Office of Science and Technology Policy
The STEM Diversity Gap

A lack of diversity along racial and gender lines persists within the STEM workforce, despite strong job growth in the past decade and strong projections for continued growth. The country's STEM workforce remains 74% male and 85% White/Asian. Addressing this diversity gap is not only a social justice issue, but also a competitiveness issue.

It is not surprising to see which ethnicities are underrepresented in STEM after reviewing recent STEM education diversity data. In 2014 only 3.7% of the students taking the Advanced Placement (AP) Computer Science exam were African American. Interestingly, that number actually represents tremendous progress and was an increase of 33% from 2013. Similarly, only 8.4% of 2014 AP Computer Science exam takers were Hispanic.12

A Different Interpretation of the Data

A recent CBS News report reviewed U.S. Census Bureau data, which found that 74% of workers with STEM bachelor’s degrees are not employed in STEM occupations.7 This led to their conclusion that there is not a STEM talent shortage. However, the data reported by the Census Bureau did not take into account any STEM graduates employed in STEM-related occupations and therefore excludes the major employment fields of healthcare practitioners (physicians, surgeons, nurses, etc.) and healthcare technicians (genetic counselors, sonographers, etc.).8

The U.S. News countered the CBS report by explaining that STEM graduates select non-STEM occupations because their skills are in demand and applicable across a number of occupations.9 For example, as of 2012, 40% of legal professionals held STEM bachelor’s degrees.10 Additionally, a report from the National Science Foundation found that two-thirds of science and engineering graduates working outside their field indicate that their work is closely related to their degree,11 further supporting the assertion that STEM skills are in high demand across all industries.


8 U.S. Census Bureau, Employment in STEM Occupations by Field of Degree for the First Listed Bachelor’s Degree: 2012, July 2014.
Women have made huge strides in their pursuit of higher education and now earn more associate’s, bachelor’s, master’s, and doctor’s degrees than men. Yet they remain noticeably absent from STEM careers.

Finding ways to encourage underrepresented groups to pursue STEM education and careers is an economic imperative. Engaging underrepresented demographics will drive the required numbers of new STEM professionals; more diversity will also bring new ideas, new creativity and new passion. A workforce with a diversity of backgrounds and experiences will be a more innovative one.

Declining Progress in Computer Science

Strikingly, there has been a recent and steady decline in the number of women studying computer science. As of 2011, only 17.6% of students who earned a computer science bachelor’s degree were women – the lowest percentage recorded since 1974.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total Workforce</th>
<th>STEM Workforce</th>
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</thead>
<tbody>
<tr>
<td>Male</td>
<td>52%</td>
<td>74%</td>
</tr>
<tr>
<td>Female</td>
<td>48%</td>
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The Case for STEM Mentorship

Research has shown that student interest in STEM has been found to be more strongly predictive of the pursuit of a STEM degree than academic achievement. Yet a Lemelson-MIT survey found that the majority of teenagers may be discouraged from pursuing STEM careers because they do not know anyone who works in these fields and they do not understand what people in these fields do.

A 2012 study by The Girl Scout Research Institute found that although the majority of girls are interested in STEM-related subjects, they are far less likely to choose a STEM career; this disparity is, in part, due to gender stereotypes and negative STEM associations. Minority girls in particular have had less exposure to STEM and less adult support for pursuing STEM fields.

Quality mentorship is uniquely positioned to address the barriers to pursuing STEM careers – the lack of exposure to STEM and the lack of connections to STEM professionals. Research has shown that having adult role models – specifically mentors – provides academic and emotional benefits for students, particularly at-risk youth. Additional studies concluded that students engaged with STEM professionals have more confidence in their STEM capabilities and more knowledge of STEM careers.

US2020’s education partners provide mentorship opportunities for students to engage with STEM professionals via hands-on activities and projects. Particularly within the sciences, multiple studies have shown that hands-on activities spark student interest in science, and greater motivation to do science. Perhaps most importantly, students’ interest persisted long after participation in the hands-on activities had ended.

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18 Ibid.
20 Ibid,4.
Citizen Schools, a US2020 National Education Partner, has engaged STEM professionals in hands-on, multisession apprenticeships with middle school students in low income communities for the past 20 years. In 2011-2012, Citizen Schools conducted a study and found that after participating in STEM apprenticeships, 80% of 8th grade students expressed interest in STEM fields and careers – more than double the national average of 33%.22 At US2020 we believe that if we can scale the number of STEM mentors engaging with students in high-quality, multi-session, experiential learning opportunities, we can significantly increase inspiration and achievement in STEM education and the pursuit of STEM careers. US2020 is proud to partner with best-in-class organizations in this effort, including Girl Scouts, Citizen Schools, Boys and Girls Clubs, MentorNet, 4-H, Spark, Project Lead the Way, and many others.

“Inspiring students through hands-on STEM projects is a key first step to building the STEM workforce – and the informed citizenry – that we need. It is a social justice and national competitiveness priority. US2020 aims to stimulate a movement – a cultural shift – that generates millions of moments of discovery for millions of underserved students. We hope you will join with us in bringing this vision to life.”23

Sanjay Mehrotra
Co-Founder, President and CEO of SanDisk

An Importance Beyond STEM

A stronger and more inclusive STEM talent pipeline is directly linked to our country’s broader challenge of unequal opportunity. Parental wealth now predicts adult success more than at any point in the last 100 years.24 Despite the narrative of the “American Dream,” the United States now trails most other developed nations, including France, Spain, and Canada, in social mobility.25

Meanwhile, opportunity abounds in STEM. Entry-level STEM jobs have a 26% wage premium over entry level non-STEM positions26 and the Bureau of Labor Statistics projects that the ten fastest growing occupations with the highest median wage will all be STEM careers.27 The overall job growth in STEM industries has been detailed above. If the country successfully addresses the STEM diversity challenge and builds a larger, more inclusive STEM workforce, we will in turn change the opportunity equation in America. US2020 and its partners are committed to achieving this vision.