

Question:

An education leader asked about other states' initiatives targeting girls and women in STEM, including best practices.

Our Response:

While states have undertaken a variety of initiatives to increase girls' and women's interest and performance in STEM, there is a relatively small research base documenting state-level approaches with a strong likelihood of increasing participating female students' STEM interest and performance.

That said, data does indicate that female students participating in the following programs may see better STEM outcomes in terms of academic performance and interest in pursuing a STEM credential or career than their peers.

Project Lead the Way

Project Lead the Way (PLTW) offers sequences of high school courses in Engineering, Biomedical Sciences, and Computer Science, as well as K-5 and middle grades modules and units in STEM disciplines.

[Research](#) suggests that PLTW students outperform their peers in STEM subjects, are more likely to major in STEM disciplines, and are better prepared for higher education, among other findings.

According to this PLTW [fact sheet](#):

- The Biomedical Sciences curriculum enrollment is roughly 70% female
- The Biomedical Engineering course enrollment is 38% female
- Females comprise about 24% of all PLTW students.

In a 2013 [Iowa study](#), females made up 31.8% (n=27) of PLTW students.

While Project Lead the Way is primarily established by individual schools or districts adopting and paying a modest fee for access the PLTW curriculum, teacher training, and instructional supports, some states have established state-level supports to incentivize adoption of PLTW curricula.

Washington 2015 [S.B. 6052](#) provides a \$250,000 appropriation for fiscal year 2016 and \$250,000 appropriation for fiscal year 2017 for advanced PLTW courses at 10 high schools. The 2016 and 2017 funds are available only to high schools that offered foundational PLTW

Additional data & links

The 2010 report [Why So Few?: Women in Science, Technology, Engineering, and Mathematics](#) by the American Association of University Women (AAUW) recommends research-based approaches that may enhance girls' performance and interest in science and engineering. The following may be most relevant to a state-level initiative, supported by collaboration with colleges of education and PSAs :

- **“Spread the word about girls’ and women’s achievements.”** This may include exposing students to women role models in STEM, and discussing the larger proportions of girls and women performing at higher levels in STEM subjects than ever before.
- **“Teach girls that intellectual skills, including spatial skills, are acquired.”**
- **“Teach students about stereotype threat and promote a growth-mindset environment.”**
- **“Encourage children to develop their spatial skills.”** Spatial skills developed in the elementary and middle grades by taking objects apart and putting them back together, drawing, working with their hands, etc. can enhance student interest in math, physics and other areas.
- **“Help girls recognize their career-relevant skills.”**
- **“Encourage high school girls to take calculus, physics, chemistry, computer science, and engineering classes when available.”**

courses in the previous school year, and are intended for one-time start-up costs for advanced PLTW courses. The legislation directs the office of the superintendent of public instruction and the education research and data center at the office of financial management to track student participation and long-term outcome data.

This appropriation mirrors a similar appropriation made for the 2014 and 2015 fiscal years, to increase the number of advanced PLTW courses being offered in 10 high schools already offering foundational PLTW courses the previous academic year.

Minnesota 2015 [H.F. 1](#) specifies that a PLTW course may fulfill a math or science credit for high school graduation provided the course meets state academic standards in math or science.

Mentorships

Mentorships offer structured opportunities for students to gain real-world experience in STEM subjects and occupations, and learn first-hand from STEM professionals the academic and “soft” skills needed to pursue a STEM credential or career. US2020, an organization created pursuant to an announcement by President Obama at the 2013 White House Science Fair, is aimed at significantly increasing the number of STEM professionals mentoring and instructing students, with an emphasis on outreach to girls, low-income students and underrepresented minorities.

According to US2020, “[high-impact STEM mentoring is](#)”:

- “Experiential”: Involving solving real-world problems with hands-on activities
- “Sustained”: Occurring over weeks or months
- “Focused on underrepresented students”, including girls
- “Measurable”: Quantified by student and mentor feedback
- “Led by STEM professionals”: According to US2020, “Multi-session engagements with STEM professionals allow students to envision pathways for themselves to pursue STEM careers. Studies have shown that students engaged with STEM professionals have more confidence in their STEM capabilities and more knowledge of STEM careers.”

A number of states in recent years have adopted policies to provide supports for student work-based learning opportunities, including mentorships. While these work-based learning opportunities are by and large not specific to STEM or increasing girls’ engagement in STEM, state policy could be crafted to provide a girls-in-STEM focus to these efforts.

Advanced Placement Computer Science

A 2011 College Board [report](#) found that students who took an AP Computer Science exam were eight times more likely than their peers who had taken no AP Computer Science exam to major in computer science. Yet for the [Class of 2013](#), only 19% of AP Computer Science test-takers were female.

In 2015, Arkansas Governor Asa Hutchinson successfully pushed for [legislation](#) requiring all high schools to offer computer science. As a result of this initiative, the number of girls enrolled in computer science – including AP Computer Science – in Arkansas has increased substantially in the 2015-16 school year.

Additional data & links

The same AAUW report suggests the following approaches may create college environments that attract and retain more women students in science and engineering:

- **“Actively recruit women into STEM majors.”**
- **“Send an inclusive message about who makes a good science or engineering student.”**
- **“Emphasize real-world applications in early STEM courses.”**
- **“Teach professors about stereotype threat and the benefits of a growth mindset.”**
- **“Make performance standards and expectations clear in STEM courses.”**
While low average test scores are not unusual in many postsecondary science and engineering courses, female students may be more deterred by low grades than their male counterparts. Clarifying performance expectations can help students more accurately gauge their performance.
- **“Take proactive steps to support women in STEM majors”.**
 - “Sponsor seminars, lunches, and social events to help integrate women into the department.
 - “Ensure that no student clique dominates or becomes the ideal way of ‘being’ in a STEM major.
 - “Provide a welcoming student lounge open to all students to encourage interaction outside of class.
 - “Sponsor a ‘women in (STEM major)’ group.”

The report also makes recommendations to attract and retain female faculty, and counteract bias against women in STEM fields.