

The STEMpathy Task Force:
Creating a Generation of
Culturally Competent STEM Professionals

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Summary

Science, technology, engineering, and mathematics (STEM) are powerful levers for improving the quality of life for everyone in the United States. The connection between STEM's transformative potential and its current impact on structural societal problems starts in the high school classroom.

Teachers play a critical role in fostering student cultural awareness and competency. Research demonstrates that [teachers](#) and [students](#) alike are eager to affect progress on issues related to diversity, equity, inclusion, and accessibility (DEIA). Educational research also demonstrates that DEIA and empathy enhance student sense of belonging and persistence in professional STEM pathways. However, formal STEM learning experiences lack opportunities for students to practice cultural competency and explore applications of STEM to social justice issues.

[Cultural Competency](#) is the ability to understand, empathize, and communicate with others as part of a diverse community.

The Biden-Harris Administration should establish the STEMpathy Task Force to aid high school STEM teachers in establishing cultural competency as an overarching learning goal. Through this action, the Administration would signal the prioritization of STEM equity—reflected in both the classroom and the broader community—across the United States. The program would address two pertinent issues in the STEM pipeline: the lack of momentum in [STEM workforce diversification](#) and STEM's [unfulfilled promise](#) to relieve our society of systems of oppression and bias. Students need to be taught not only the scientific method and scientific discourse, but also how to approach their science in a manner that best uplifts all people.

Challenge & Opportunity

In a [2017 survey](#), over 1,900 U.S. companies listed the ability to work effectively with customers, clients, and businesses from a range of different countries and cultures as a critical skill. Since then, the importance of cultural competency in the U.S. workforce has become increasingly apparent.

Culturally competent workers are more creative and better equipped to solve tricky problems. For example, foresters have managed wildfires by following the instruction and guidance of tribal nations and traditional ecological knowledges. Engineers have designed infrastructure that lowers the water bills of farmers in drought-stricken areas. Public health representatives have assuaged concerns about COVID-19 vaccines in under-served communities. STEM professionals who improve Americans' quality of life do so by collaborating and communicating with people from diverse backgrounds. When students can see these intersections between STEM and social change, they understand that STEM is not limited to a classroom, lab, or field activity but is also a tool for community building and societal progress.

Today's middle and high school students are increasingly [concerned](#) about issues around race/ethnicity, gender, and equity. Recent [college graduates](#) also share these interests, and many demonstrate a growing desire to participate in [meaningful work](#) and to pursue social careers. When students realize that STEM fields are compatible with their passion for topics related to identity and social inequities, they are more likely to pursue STEM careers—and [stick with them](#). This is the way to create a [generation of professionals](#) who act with STEMpathy.

To unite STEM subjects with themes of social progress, cultural competency must become a critical component of STEM education. Under this framework, teachers would use curricula to address systemic social inequities and augment learning by drawing from students' personal experiences (Box 1). This focus would align with ongoing efforts to promote project-based learning, social-emotional learning, and career and technical education in classrooms across the United States.

Box 1. Examples of Cultural Competency Outcomes.

American high school STEM students will demonstrate an understanding of and empathy for how people from varied backgrounds are affected by environmental and social issues.

- An environmental sciences student in California understands the risks posed by solar farms to agricultural production in the Midwest. They seek to design solar panels that do not disrupt soil drainage systems and financially benefit farmers.
- An astronomy student in Florida empathizes with Indigenous Hawaiians who are fighting against the construction of a massive telescope on their land. The student signs petitions to prevent the telescope from being built.
- A chemistry student in Texas learns that many immigrants struggle to understand healthcare professionals. They volunteer as a translator in their local clinic.
- A computer science student in Georgia discovers that many fellow residents do not know when or where to vote. They develop a chatbot that reminds their neighbors of polling place information.

With such changes to the STEM lessons, the average U.S. high school graduate would have both a stronger sense of community within STEM classrooms and the capacity to operate at a professional level in intercultural contexts. STEM classroom culture would shift accordingly to empower and amplify diverse perspectives and redefine STEM as a common good in the service of advancing society.

Plan of Action

Through an executive order, the Biden-Harris Administration should create a STEMpathy Task Force committed to building values of inclusion and public service into the United States' STEM workforce. The task force would assist U.S. high schools in producing college- and career-ready, culturally competent STEM students. The intended outcome is to observe a 20 percent increase in the likelihood of students of color and female- and nonbinary-identifying students to pursue a college degree in a STEM field and for at least 40 percent of surveyed

U.S. high school students to demonstrate awareness and understanding of cultural competence skills. Both outcomes should be measured by National Center for Education Research data 5–10 years after the task force is established.

The STEMpathy Task Force would be coordinated by the Subcommittee on Federal Coordination in STEM Education (FC-STEM) from the White House Office of Science and Technology Policy (OSTP). The interagency working group would partner with education-focused organizations, research institutions, and philanthropy foundations to achieve their goals (FAQ #6). These partnerships would allow the White House to draw upon expertise within the STEM education sphere to address the following priorities:

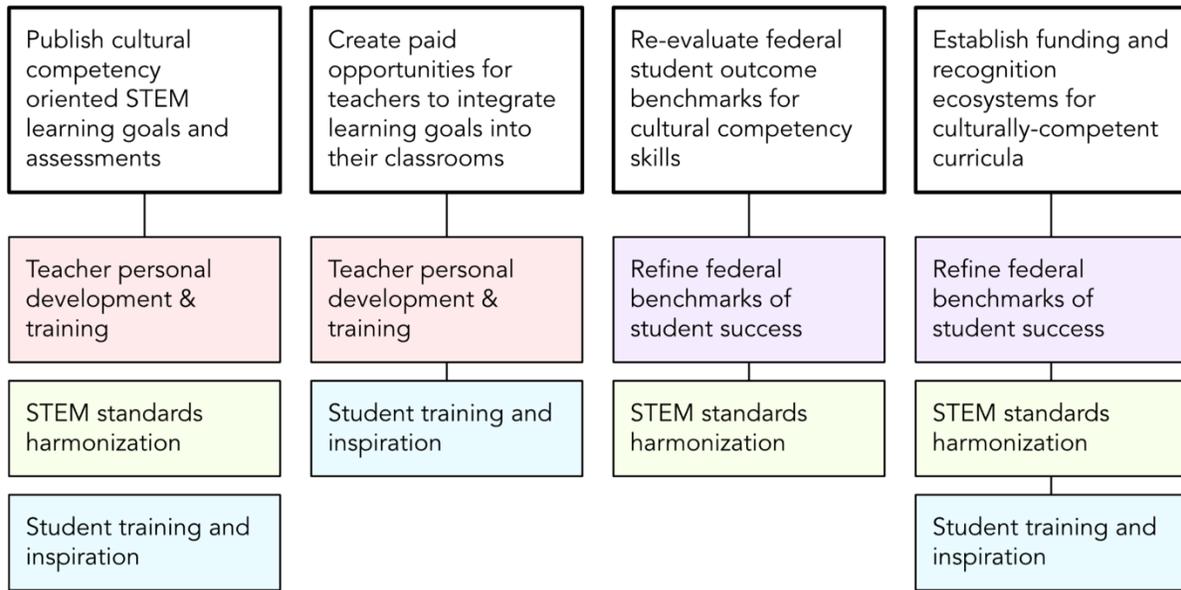
- Publish guides on cultural-competency-oriented learning goals for STEM students that comply with STEM curricula and standards frameworks, as well as on suggested assessments for measuring student achievement in cultural competency skills.
- Issue nonregulatory guidance on federal funding streams for paid teacher professional development opportunities that improve their ability to teach students to apply STEM concepts to public service projects.
- Consider adding cultural competency assessments and measures into federally funded programs such as the What Works Clearinghouse, Blue Ribbon Schools Program, and the [National Assessment of Educational Progress science questionnaire](#).
- Highlight and reward educators and schools that demonstrate high student achievement in science and cultural competence skills.¹

Working toward these priorities will equip the next generation of STEM professionals with cultural competence skills. The task force will form effective STEM teaching methods that result in measurable improvement in STEM major diversity and career readiness.

Figure 1. Roadmap of STEMpathy Task Force priorities, including reinforcing elements.

¹ Current cultural competence skill assessments focus on the skills required for effective work within healthcare fields (see [Transcultural C.A.R.E. Associates' library of assessment tools](#)). However, some assessments are generalized to explore any individual's cultural competence (see [American Veterinary Medical Association Self-Assessment Checklist](#)). Part of the task force's priorities, prior to rewarding educators and schools, will be to define cultural competence skills that can and should be expected of high school students.

DAY ONE PROJECT



This approach meets the objectives of existing federal STEM education efforts without imposing classroom standards on U.S. educators. In the Federal STEM [Education Strategic Plan](#), the Committee on Science, Technology, Engineering, and Math Education (Co-STEM) aims to (1) increase work-based learning and training, (2) lend successful practices from across the learning landscape, and (3) encourage transdisciplinary learning. The [Department of Education](#) also prioritizes the professional development of educators to strengthen student learning, as well as meet students’ social, emotional, and academic needs. In these ways, the STEMpathy Task Force furthers the Administration’s education goals.

Conclusion

Current national frameworks for high school STEM learning do not provide students with a strong sense of belonging or an awareness of how STEM can be leveraged to alleviate social inequities. The STEMpathy Task Force would establish a rigorous, adaptable framework to address these challenges head-on and ensure that the United States provides high school students with inclusive, hands-on science classrooms that prepare them to serve the diverse communities of their country.

Following the implementation of the STEMpathy Task Force, the Biden-Harris Administration can expect to see (1) an increase in the number and diversity of students pursuing STEM degrees, (2) a reduction in race/ethnicity- and gender-based gaps in the STEM workforce, and (3) an increase in STEM innovations that solve critical challenges for communities across the United States.

Frequently Asked Questions

1. What cultural competence skills would students learn and apply?

In any team setting, students will function effectively and with empathy. They will interact respectfully with people from varied cultural backgrounds. To achieve these behavioral goals, students will learn three key skills, as outlined by the [Nebraska Extension NebGuide](#):

1. Increasing cultural and global knowledge. Students understand the historical background of current events, including relevant cultural practices, values, and beliefs. They know how to ask open-minded, open-ended questions to learn more information.
2. Self-assessment. Students reflect critically on their biases to engage with others. They understand how their life experience may differ from others based on their identity.
3. Active Listening. Students listen for the total meaning of a person's message. They avoid mental chatter about how they will respond to a person or question, and they do not jump directly to giving advice or offering solutions.

2. Would this task force incentivize, influence, or coerce states into adopting standards or curricula?

No. Although the task force will conduct research on STEM- and cultural-competency-related learning standards and lesson plans, the OSTP will not create incentives or regulations to force states to adopt the standards or curricula. The task force is careful to work within the existing, approved educational systems to advance the goals of the Department of Education and Committee on Science, Technology, Engineering, and Math Education (Co-STEM).

3. What are the associated risks with teaching cultural competency?

As observed during recent efforts to teach American students about structural racism and systemic inequality, some parents may find topics pertaining to diversity, equity, inclusion, and accessibility sensitive. The STEMpathy Task Force's cultural competency-focused efforts, however, are primarily related to empathy and public service. These values are upheld by constituents and their representatives regardless of political leaning. As such, the STEMpathy Task Force may be understood as a bipartisan effort to advance innovation and the economic competitiveness of U.S. graduates.

Another associated risk is the burden created for teachers to incorporate new material into their already-packed schedules and lesson plans. Many teachers are leaving their jobs due to the stressful post-pandemic classroom environment, as well as the imbalance between their paychecks and the strain and value of their work. These concerns may be addressed through the STEMpathy Task Force's objectives of paid training and rewards systems for educators who model effective teaching methods for others. In these ways, teachers may receive just compensation for their efforts in supporting both their students and the country's STEM workforce.

4. What would be the outputs and milestones of the STEMpathy Task Force over its first four years?

In its first two years, the STEMpathy Task Force would complete the following:

- Revise FC-STEM's "Best Practices For Diversity and Inclusion in Stem Education and Research" guide to include information on evidence-based or emerging practices that promote cultural competence skills in the STEM classroom.
- Train 500+ teachers across the nation to employ teaching strategies and curricula that improve the cultural competence skills of STEM students.

In the next two years, further progress would be made on the following:

- Measure the efficacy of the teacher training program by assessing ~10,000 students' cultural competence skill development, STEM interest retention and performance, and classroom sense of belonging.
- Reward/recognize 100 schools for high achievement in cultural competency development.

5. Why approach cultural competency goals through STEM classes?

STEM subjects and professionals have the greatest potential to mitigate inequities in American society. Consider the following examples wherein marginalized communities would benefit from STEM professionals who act with cultural competency while working alongside or separate from decision-makers:

- [Native Hawaiians aim to protect their land from a telescope that may be built elsewhere](#)
- [Women and non-binary people who require precision medicine face built-in biases from biomedical technologies](#)
- [Defendants of color are more likely to be *wrongly* labeled as "high-risk" than white defendants at bail hearings](#)
- [Low-income neighborhoods aim to promote healthy eating and skill building by designing an urban farm](#)
- [Transgender individuals require specialized, destigmatized healthcare](#)

Furthermore, although the number of STEM jobs in the United States has grown by 7.6 million since 1990, the STEM workforce has been very slow to [diversify](#). Over the past 30 years, the

proportion of Black STEM workers increased by only 2 percent and that of [Latinx STEM](#) workers by only 3 percent. [Women](#) hold only 15 percent of direct science and engineering jobs. [LGBTQ male students](#) are 17 percent more likely to leave STEM fields than their heterosexual counterparts.

Hundreds of professional networks, after-school programs, and nonprofit organizations have attempted to tackle these issues by targeting students of color and female-identifying students within STEM. While these commendable efforts have had a profound impact on many individuals’ lives, they are not providing the sweeping, transformative change that could promote not only diversity in the STEM workforce but a generation of STEM professionals who actively participate in helping diverse communities across the United States.

7. How much funding would the STEMpathy Task Force and its programming require?

Based on the [president’s budget for ongoing STEM-related programming](#), we estimate that the agency task force would require approximately \$100 million. This amount will be divided across involved agencies for STEMpathy Task Force programming.

6. Who are potential experts to include in the STEMpathy Task Force?

The STEMpathy Task Force must combine interagency expertise with nongovernmental organizations such as educational nonprofits, research institutions, and philanthropy foundations.

Government actors	<ul style="list-style-type: none"> • National Center for Education Research • National Research Council of the National Academies • Department of Education, Blue Ribbon Schools Program
Industry professionals	<ul style="list-style-type: none"> • National Science Teachers Association • Learning for Justice • Collaborative for Academic, Social, and Emotional Learning • International Society for Technology in Education
Research institutions	<ul style="list-style-type: none"> • Harvard Graduate School of Education • Berkeley Centers for Educational Equity and Excellence • Peabody College at Vanderbilt University • National Association for Research in Science Teaching
Philanthropy	<ul style="list-style-type: none"> • Richard Lounsbery Foundation • Chan-Zuckerberg Initiative • Burroughs Wellcome Fund • Alfred P. Sloan Foundation

About the Authors



Anjika Pai received her B.S. in environmental sciences from UC Berkeley in 2022. Her areas of expertise include environmental justice and communications. She is an incoming law student at Northeastern University, where she will pursue public interest law.

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Pai and Swartz co-founded [STEM Redefined](#), which integrates diversity, equity, and inclusion into STEM high school lesson plans using an interactive multimedia library of resources aligned with national science standards. Their passion for STEMpathy combined with their policy experience motivates them to address gaps in the STEM pipeline and promote the use of STEM for the public good.