

BRIDGING THE TALENT GAP IN THE U.S. TECHNOLOGY SECTOR
EXPANDING PARTICIPATION
FOR A STRONGER FUTURE

THE CHALLENGE:
ACCELERATING NEEDS FOR A
TECHNICAL WORKFORCE THAT
ARE OUTPACING SUPPLY

Sustaining U.S. leadership in science, technology, and innovation (STI) requires bold action to expand the nation's STEM talent pipeline and ensure global competitiveness. Although the U.S. currently leads in R&D investment and groundbreaking discoveries, global competition is accelerating. Even within the U.S., temporary visa holders earn more than half of doctoral degrees in computer and information sciences (59%), engineering (60%), and mathematics and statistics (54%)—all fields crucial for national security and economic prosperity¹. Similarly, 60% of computer science master's degrees awarded in 2022-2023 went to international students, underscoring the nation's increasing dependence on global talent to sustain its high-tech workforce. In 2022, the U.S. Patent and Trademark Office awarded 47% of patents to domestic inventors, and 53% to foreign inventors. Meanwhile, the U.S. R&D system relies heavily on international talent, leaving critical gaps in domestic STEM capacity and opening potential security risks.

1. <https://nces.nsf.gov/pubs/nsb20243/talent-u-s-and-global-stem-education-and-labor-force>

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FOR MORE THAN 20 YEARS, NCWIT has pioneered strategic initiatives that strengthen and expand the nation's technology talent pool (K-12 through career) to ensure continued leadership in an increasingly competitive global landscape. These initiatives are built on the highest research-backed standards, ensuring our work is impactful and sustainable. Given the global trends mentioned above, such approaches are more important now than ever. It is imperative that educators and employers know the most effective ways to educate students with a wide range of backgrounds for the technical workforce, ensuring the nation's innovation ecosystem remains strong, dynamic, and forward-looking.

The need for tech talent extends beyond economic considerations—it carries significant geopolitical weight. Technological leadership enables countries to set global standards, influence international markets, and secure strategic advantages. The U.S. risks being surprised by the speed at which other nations are developing their capabilities. If the U.S. does not accelerate its efforts to cultivate its own workforce while attracting foreign tech talent, especially in rapidly advancing technology fields such as quantum computing, it could face diminished influence in international innovation networks, potentially affecting national security and economic prosperity.

ADDRESSING THE TALENT GAP

The demand for skilled professionals in technology continues to outpace supply, creating a growing talent gap in critical fields such as software development, cybersecurity, artificial intelligence, quantum computing, and engineering. Some of the factors that contribute to the talent gap include:

EDUCATIONAL PIPELINE CHALLENGES: Many traditional education systems struggle to keep up with the rapidly changing technology landscape. Curricula in K-12 and higher education often lag behind industry needs, leaving graduates underprepared for modern tech roles.

LACK OF ACCESS AND OPPORTUNITY: Broadening participation in technical education strengthens the overall talent pool. Women, people from underrepresented racial and ethnic groups, and individuals from low-income backgrounds often lack equal access and opportunity for technical education and employment.

GEOGRAPHIC AND ECONOMIC BARRIERS: Training opportunities are often concentrated in major urban areas with robust tech ecosystems, leaving rural or economically disadvantaged regions with limited possibilities. This geographic concentration further exacerbates the talent disparity and local economic strength across the country.

Filling these gaps requires engaging and supporting more individuals who demonstrate engineering and computational thinking skills that allow them to solve unexpected problems. These engineering principles need to be introduced from an early age, as research has shown an achievement gap begins building between racial and gender groups in STEM subjects during elementary school.

THE SOLUTION:

BROADEN PARTICIPATION TO FILL THE GAP, DRIVING INNOVATION AND ECONOMIC GROWTH

EXPANDING PARTICIPATION IN TECHNOLOGY FIELDS IGNITES AN ECONOMIC ENGINE

Diverse teams bring together a wide range of experiences, perspectives, and cognitive approaches, all of which are critical for creative problem-solving and innovation. Research consistently shows that groups with broader participation outperform their peers in innovation and financial performance. For example, a 2017 report by the Boston Consulting Group found that companies with diverse management teams generate 19% higher revenues from innovation compared to companies with less diverse leadership. This figure underscores the transformative economic potential of tapping into underutilized talent pools to further enhance productivity, spur innovation, and drive sustainable economic growth. In the fast-paced tech sector, where rapid innovation is key to maintaining a competitive edge, the creative solutions and breakthrough ideas that emerge from diverse teams can lead to significant advancements and market leadership.

To bridge the talent gap domestically and remain competitive in the global marketplace, it is essential to broaden participation across all segments of society.

NCWIT'S RESEARCH-BACKED, ECOSYSTEM-BASED APPROACH TO BRIDGING THE TALENT GAP

1. TEACH ENGINEERING DESIGN SKILLS EARLY
2. EDUCATE PROFESSIONAL SCHOOL COUNSELORS ON TECH FIELDS AND CAREERS
3. GET AHEAD OF RAPIDLY ADVANCING FIELDS
4. FOSTER A COMMUNITY THAT ENCOURAGES PERSISTENCE
5. WORK WITH ORGANIZATIONS TO CREATE CULTURES THAT ALLOW ALL STUDENTS AND EMPLOYEES TO THRIVE
6. CONVENE THE TECH COMMUNITY TO ENCOURAGE COLLABORATION

1. TEACH ENGINEERING DESIGN SKILLS EARLY

The National Academy of Engineering and the Board on Science Education at the Center for Education, along with the National Research Council, have recommended three guiding principles for K-12 classrooms: 1) emphasize engineering design; 2) incorporate important and developmentally appropriate mathematics, science, and technology knowledge and skills; and 3) promote “engineering habits of mind.” Engineering habits of mind are ways of thinking that affect how people look at the world or react to challenges and have been found even in young children. Cultivating this mindset in children’s everyday thinking can cement lifelong skills and prepare them for productive careers later in life.

NCWIT’s Teach Engineering program (TE) encourages and empowers educators intimidated by the prospect of bringing engineering design into their classroom by offering access to a free digital library that provides standards-aligned, simple activities, as well as the educational support systems and videos needed to help educators succeed. In addition, the program includes the 2025 launch of a teach-the-teacher model that prepares Teacher Champions to offer professional development sessions and presentations to school districts, curriculum coordinators, teachers, and students in their local area.

Each year more than 2.1M people access the TE digital library, promoting technological and scientific literacy for the tens of millions of youth these adults teach. Incorporating engineering activities into the K-12 curriculum can spark interest in technology from an early age and can help ensure that students are better prepared for future tech roles.

PROGRAM IMPACTS

100% AGREED THEY KNEW MORE ABOUT ENGINEERING RESOURCES AFTER PROFESSIONAL DEVELOPMENT.

91% USED ENGINEERING DESIGN ACTIVITIES TO SUPPORT THEIR STEM CONTENT IN THE CLASSROOM.

100% AGREED THEIR ABILITY TO BRING ENGINEERING DESIGN INTO THE CLASSROOM HAD IMPROVED.

2.1

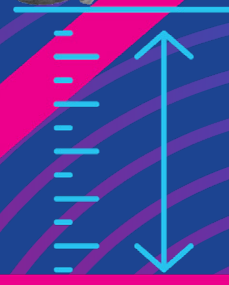
2.1 million unique annual website users and more than 7.8 million annual page views.

1900

More than 1,900 engineering and engineering-related STEM materials contributed by 100+ university partners.

20K+

20K+ YouTube subscribers in nearly 550 “how-to” videos.



“Teach Engineering’s greatest strength lies in its ability to support teachers at all levels, from novice to expert. This program has been there to support my growth as an educator and my students’ learning. Thanks to Teach Engineering, many of my STEM students have gone on to work as engineers in various fields, and I am confident that this program will continue to inspire and support future generations of engineers.”

2. EDUCATE PROFESSIONAL SCHOOL COUNSELORS ON TECH FIELDS AND CAREERS

School counselors are an oft-overlooked yet essential part of the overall computing and technology ecosystem. They are uniquely situated to encourage K-12 students to develop a passion for computing and tech. By equipping counselors with knowledge and understanding of the diverse and rewarding computing opportunities in the tech ecosystem, they can encourage students from all backgrounds to imagine themselves as future technologists and innovators. It is also the responsibility of counselors to eliminate barriers that discourage students from studying computing so that all students can succeed in our digital world.

However, research shows that counselors face obstacles when it comes to advising about tech education and careers. In studies conducted by NCWIT, approximately half of the respondents reported that a lack of awareness of computer science careers and the limited number of computer science classes, labs, and/or teachers have hampered their counseling practices. To address this gap, Counselors for Computing (C4C) empowers counselors with knowledge, resources, and confidence to promote and expose computing skills to all students, and to equip them for career success in a technologically driven world. By connecting computing education to essential career readiness skills and providing counselors with up-to-date information about labor market trends and emerging technologies, C4C ensures that students are prepared for the jobs of the future.

PROGRAM IMPACTS

HELD MORE THAN 250 EVENTS.

REACHED MORE THAN 11,500 PROFESSIONAL SCHOOL COUNSELORS.

HAD A POTENTIAL STUDENT REACH OF NEARLY 5,000,000 STUDENTS.



100%

100% of the survey respondents "strongly agree" or "agree" that they know where to get resources on computer science for students and feel equipped to talk to students, teachers, and counselors about computer science.

More than 90% of survey respondents indicated that they have reflected on their language or perceptions of who is "right" for computer science, adjusted their approach to guiding students, and provided resources about computer science "a lot" or "a great deal" since participating in C4C.

90%



At least 90% of respondents indicated that they have discussed computer science with students or other counselors.

"I am so happy that I made the decision to attend a C4C event. It has been awesome learning and sharing the knowledge I have obtained."

-SCHOOL COUNSELOR

3. GET AHEAD OF RAPIDLY ADVANCING FIELDS

Quantum Information Technology (QIT) is poised to be at the forefront of the next wave of technological advancements, with an estimated \$3.5 trillion in potential economic impact. QIT's advancements will revolutionize various sectors, including artificial intelligence, climate technology, healthcare, and national security. It is imperative that the U.S. be at the forefront of QIT innovation to protect our national interests, and to do that, the workforce must be prepared. In this case, preparation means an educational system that teaches quantum and quantum-adjacent skills from the start, and that encourages participation from all students. In 2024, NCWIT was selected to lead expansive workforce development programming for the Elevate Quantum Tech Hub, across the QIT ecosystem, from rising seniors to career professionals. With partners across the Rocky Mountain Region, NCWIT will lead the effort to close the gap for high school students and non-degree holders, increase access to STEM and quantum fields, and foster the growing need for a skilled quantum workforce.

PROGRAM OBJECTIVES

20+ GROUPS AND INSTITUTIONS ENGAGED IN QIT UPSKILLING, RESKILLING, AND CREDENTIALING PROGRAMS BY 2029.

10,000 ENGAGED IN QIT PATHWAYS (TRAINING, RESKILLING, AWARENESS).

3+ NOVEL AND SCALABLE TECHNICIAN TRAINING PROGRAMS ACROSS THE MOUNTAIN WEST.

Quantum industry growth is outpacing qualified graduates' supply, with an 18% annual growth in QIT demand versus a 3% rise in graduates.

18%

6

There are only six U.S. universities with experiential quantum training labs, which further limits workforce preparation.

NCWIT is leveraging more than 100 partner organizations to build the Quantum workforce.

100

"To build the quantum workforce of the future, we must tap into the full potential of our nation's talent. NCWIT is working to ensure every American, regardless of background, has the opportunity to contribute to the technologies that will power our future."

-LUCY SANDERS



4. FOSTER A COMMUNITY THAT ENCOURAGES PERSISTENCE

Aspirations in Computing (AiC) continues to grow and demonstrate outstanding rates of persistence of technologists from high school through the workforce. It is a private, independent program dedicated to supporting individuals marginalized by gender. As a mission-driven community that is focused on fostering leadership, connection, and personal growth, AiC provides a dedicated space where individuals can find empowerment, mentorship, and opportunities for development. Participation in AiC gives students more confidence and makes them feel more positive about their technical abilities and their future. AiC members cherish the Community's features, and critically, members feel they "belong" in the AiC Community, with 78% agreeing or strongly agreeing with the statement, "The Aspirations community is oriented toward people like me."

AiC offers a unique longitudinal experience that includes a multitude of engagement opportunities ranging from award programs to mentorship, educational programming, and career fairs. In 2024, more than 3,000 high school students from 81 locations throughout the U.S., Canada, Puerto Rico, Guam, and overseas military bases received awards.

PROGRAM IMPACTS

89% OF EXISTING AIC COMMUNITY MEMBERS REPORT A COLLEGE MAJOR OR MINOR IN A SCIENCE, TECHNOLOGY, ENGINEERING, OR MATHEMATICS (STEM) FIELD, INCLUDING 76% IN COMPUTING OR ENGINEERING SPECIFICALLY.

91% OF COMMUNITY MEMBERS PLAN TO STAY IN A TECHNOLOGY FIELD, DESPITE RESEARCH THAT SHOWS 57% OF TECHNICAL WOMEN PLAN TO LEAVE WITHIN THE NEXT TWO YEARS.

2% OF COMMUNITY MEMBERS REPORT HAVING RECEIVED A PATENT, AND 20% OF THOSE IN THE WORKFORCE ARE IN LEADERSHIP ROLES.

"I truly believe that even just being nominated for the award had a significant impact on my decision to pursue a degree in computing [...], and winning the award further showed me that there is a place for me in computing."

- AIC HIGH SCHOOL AWARD WINNER

97%

97% of AiC Community members say they are likely to stay in a technology field.

92% of AiC award winners agreed winning the award increased their confidence.

92%



30,000

Community includes more than 30,000 technologists.

In 2024 and 2025, NCWIT is producing videos highlighting the inspiring journeys of (left to right), Hope Chambers, Ashley Marie Lardizabal, Kaylie Sampson, Neith Reid-E, Bryn Loftness, and Gia Ramos (opposite page)

5. WORK WITH ORGANIZATIONS TO CREATE CULTURES THAT ALLOW ALL STUDENTS AND EMPLOYEES TO THRIVE

From K-12 through career, classroom and workplace environments significantly shape people's educational and career trajectories and technical accomplishments. Whether it be an elementary school science experiment, a college classroom, a staff meeting, or myriad other experiences from childhood through retirement, people are influenced by the people and places around them.

NCWIT works with organizations and individuals to help ensure that these environments are places where people are encouraged to expand their skills, pursue meaningful achievements that accelerate technological development, and build fulfilling careers based on their talents and efforts. Below is how we accomplish these goals in higher education and in industry.

Representatives from higher education institutions engage with NCWIT to comprehensively transform their departmental cultures through initiatives that improve the holistic experiences of students (undergraduate/graduate), faculty, and staff. For undergraduate students, this means addressing multiple touch points such as program entry, classroom experience, program curriculum/supports, and community/belonging within the department.

NCWIT's Workforce Alliance (WA) provides companies with powerful, research-backed solutions for expanding access and opportunities, ensuring that future technologies are powered by the full range of human potential. Member companies learn how to implement effective, systemic, and sustainable approaches that attract, activate, and retain highly qualified talent, regardless of background. To do so, our members use tools such as the Tech Inclusion Journey (TIJ), PowerTilt, and the Ambassador program to improve their team cultures and performance.

PROGRAM IMPACTS

PARTICIPATING IN A HIGHER ED LEARNING CIRCLE INCREASED PARTICIPANTS' KNOWLEDGE OF THE ELEMENTS OF SYSTEMIC CHANGE (87%) AND DEEPENED THEIR UNDERSTANDING OF HOW TO MAKE SYSTEMIC CHANGE (84%).

70% OF NCWIT CORPORATE MEMBERS REPORTED THAT THEIR ORGANIZATION MADE "SIGNIFICANT OR SOME PROGRESS" TOWARD INCREASING WOMEN'S MEANINGFUL PARTICIPATION IN COMPUTING (2024 MEMBERS SURVEY).



34 postsecondary institutions engaged in in-depth work under NCWIT's guidance to transform the culture of their computing departments with BPC efforts.

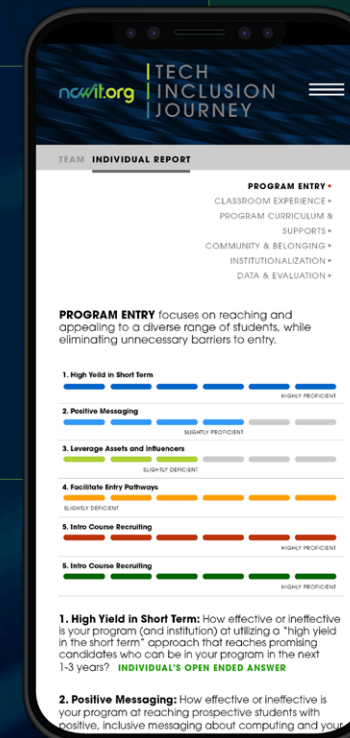
34

88%

88% of employees reported an improved ability to create inclusive environments.

83%

83% of employees reported increased attention to whose voices are heard in meetings.



"Uplight has been a proud partner of NCWIT for the past few years, and we deeply appreciate the value they bring to advancing diversity, equity, and inclusion in tech. Their responsiveness in providing meaningful resources and their flexibility in co-developing training content tailored to our organization's needs have made a real impact."

-STEPH L. PÉREZ-PROKOP, UPLIGHT, SENIOR PEOPLE EXPERIENCE MANAGER

6. CONVENE THE TECH COMMUNITY TO ENCOURAGE COLLABORATION

Bridging the technical talent gap requires a holistic approach that involves the entire tech ecosystem. As such, leaders from K-12 through the workforce need to convene and unite in the strategies and approaches most likely to lead to change. NCWIT's Summit serves to heighten awareness, understanding of key issues, knowledge of how to lead, sense of community, and shared goals among tech sector leaders.

In 2024, NCWIT's Summit focused on the Future of Tech and how technology can be found throughout our lives in unexpected ways. Nearly 300 in-person attendees witnessed code-empowered dance, learned about ethics in rapidly advancing technologies, and were inspired by the story of Indigenous Olympian Billy Mills, to name a few highlights.

The conference facilitated networking opportunities, connected members, and helped everyone feel a part of a larger community. With workshop and plenary sessions focused on leading systematic change in higher education and industry, increasing student persistence in computing, and navigating educational censorship, attendees were able to discover a variety of valuable resources and tactics to ingrain NCWIT's mission within their communities.

A few specific session examples include "The Professional Culture of STEM: Challenges and Possibilities with Erin Cech"; "Beyond Tech Skills, Supporting First-Generation Professionals as They Navigate Their Career with Jacob Martinez and Kelsey Flood"; and "Macroeconomics in Color with Nikki Lanier."

When asked about how NCWIT membership motivates them to change, one member said that networking with other members (through the Summit at times) motivates them: "I worked with Tracy Camp. She's now CRA CEO. Because of her, my school 'does' Data Buddies. What I'm saying is the ripples from NCWIT covered the last 20 years. It's impossible to say where NCWIT begins and its influence ends!"

PROGRAM IMPACTS

91% OF ATTENDEES FOUND THE SUMMIT EXTREMELY OR VERY VALUABLE.

92% OF ATTENDEES AGREE THEY WILL BUILD ALLIES OR ADVOCATES IN THEIR ORGANIZATION FOR WIDENING PARTICIPATION IN COMPUTING.

99% OF ATTENDEES INDICATED THEY WERE LIKELY TO ATTEND THE SUMMIT AGAIN.



the future of tech

2024 SUMMIT

FUTURE

THE

"The Summit is always great. I think it's my favorite professional gathering, and I look forward to it every year. I feel that all of the sessions are carefully thought out and inclusive of everyone in the NCWIT community."

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KEYNOTE
SPEAKER &
OLYMPIC
GOLD MEDALIST
BILLY MILLS



KC



20
24



A PLANE, BUT IF I HAV
TO WALK I'M GONNA
-GET-KANSAS
THERE KANSAS
JUST THE SAME CITY,
I'M GOING TO
KANSAS HERE
CITY GOTTA FIND A
CITY



THE TALENT GAP IN THE U.S. TECHNOLOGY SECTOR POSES A SIGNIFICANT CHALLENGE, BUT IT ALSO PRESENTS AN OPPORTUNITY FOR SYSTEMIC CHANGE.

TECH TALENT

On the global stage, other nations are rapidly advancing their technological capabilities, posing an escalating threat to U.S. leadership. But with focused attention on engineering and computational thinking, professional school counselors, students themselves, and the environments in which we educate and employ individuals, the U.S. can cultivate a robust and dynamic tech workforce. Broader participation drives innovation, boosts economic output, and secures the nation's competitive position in an increasingly globalized market. Bridging this gap is essential to ensuring that the U.S. remains at the forefront of technological innovation and economic growth in the 21st century.

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DoDSTEM

Jane Street

Wells Fargo

**THE
IDEA YOU
DON'T
HAVE** **IS THE
VOICE
YOU
HAVEN'T
HEARD.**

SUPPORT STUDENTS WHO ARE THE FUTURE OF TECH

Aspirations in Computing (AiC) engages, inspires, and supports thousands of high school and college students who want to change the world, and you can help them realize their dreams!

A monthly donation of \$25 will fund their participation in our Community and give them access to opportunities like scholarships, internships, mentorships, jobs, and more.

aspirations.org/sponsor