

FORTIFYING AMERICA'S FUTURE: Pathways for Competitiveness



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EXECUTIVE SUMMARY

The national security of the United States is underpinned by its technological competitiveness. **Therefore, we must ensure that we are preparing our young people for the jobs of the future to maintain our innovation edge.**

Currently, the U.S. is facing talent gaps in many critical technological industries. To address this challenge, the Aspen Strategy Group, together with the Walton Family Foundation, convened three roundtables in 2022 and 2023 that brought together thinkers from the business, education, nonprofit, and national security sectors. We made recommendations to strengthen our education system and protect our competitiveness, identifying six key industries that will be particularly important in a global context: artificial intelligence, quantum computing, semiconductors, 5G/6G technologies, fintech, and biotechnology.

The final report, “[Re-Engineering American Security](#),” argued that to maintain our competitive advantage, national security professionals must partner with educators, and “we must invest both in the sectors that are most critical to our national security...and, importantly, in the human talent that will support those sectors and the innovations to come.”

Building on that initial project, the Aspen Strategy Group and the Walton Family Foundation convened two additional roundtables in early 2024 to deepen our recommendations on creating specific career pathways—beginning in K-12 through college—that will prepare our nation’s youth for jobs in the six identified sectors.

While the recommendations are discussed in detail below, in sum, to create pathways from our K-12 education system all the way to the jobs of the future, we must:

- **Leverage the National Security Community** in a call to action to create a sense of urgency around improving our education ecosystem.
- **Provide Federal Incentives and Spotlight State Approaches.**
 - **Build Strategic Partnerships** by investing in AI hubs that can connect stakeholders across sectors and creating a coalition to map the core competencies needed for key industries.
 - **Provide Incentives and Flexible Funding.** Incentivize employers to invest in career-connected K-12 education and combine funding streams related to workforce and career-connected learning for states to maximize their impact.
 - **Fund Coordinating Bodies to Break Down Silos and Scale Career-Connected Learning.** Support intermediaries that can scale connections between K-12 education and the workforce.
 - **Provide Place-Based and Ecosystem Support for States** by launching a Technical Assistance Center to help states develop K-12 pathways to key industries and developing a Career Counseling Corps to provide information about high-demand fields and high-quality pathways into them.
 - **Spotlight Impactful Place-Based Approaches in States** by developing a 50 State Bright Spots campaign to highlight place-based strategies that can be scaled and replicated.

- **Bolster Education R&D to Advance Career-Connected Learning.**
 - **Create and Fund ARPA-ED to Advance Career-Connected Learning** through new innovative solutions for students.
 - **Fund and Modernize Data Systems and Infrastructure** so we can track what is working, for whom, and under what circumstances.
 - **Promote Evidence-Based Practices in Career-Connected Learning** to strengthen our students' overall preparedness.
- **Encourage Students to Pursue Careers in Key Industries** by exposing K-12 students to more technology-related topics early and communicating the opportunities available to them.

By implementing these recommendations, our nation can continue to lead in innovation and thus shore up America's economic prosperity and security.

Disclaimer: While all participants contributed to these recommendations, this report does not necessarily reflect a consensus of all the meeting participants, the Aspen Strategy Group, or the Aspen Institute.

INTRODUCTION

The United States faces a looming talent gap in many industries that are critical to our technological competitiveness. Without a stronger education system capable of preparing our youth for the jobs of the future, our national security is at risk.

The challenges we face today require a comprehensive response that **breaks down the silos in national security, industry, higher education, and K-12 education** while continuing to value the local control that has created centers of innovation across the country.

This paper outlines how the U.S. can create and promote career pathways from K-12 into high-demand industries so we can continue to lead in an increasingly competitive global landscape.

CALL TO ACTION

Our country has invested hundreds of billions of dollars in recent years to solidify the United States' place as a global leader in technological innovation. Yet without a paradigmatic shift in how we prepare our young people for the jobs of the future, this investment is at risk. For example, despite the large investments made in semiconductor manufacturing through the CHIPS and Science Act, the Semiconductor Industry Association projects that 67,000 of the new jobs—or 58% of them—will not be filled based on current degree completion rates.¹ And in the manufacturing sector, 2.1 million jobs are projected to go unfilled by 2030 due to a lack of qualified talent.² An unprepared workforce threatens our nation's competitiveness and national security readiness.

We identified several key challenges that must be addressed to prepare the next generation for the jobs of the future:

1. There is a lack of coordination amongst the K-12 education, higher education, private sector, and national security communities, which prevents us from creating cohesive talent pipelines for critical industries.
2. Young people are largely unaware of the opportunities in emerging industries and may have misconceptions about pathways outside of college.
3. Young people lack access to career-connected learning and the academic preparation needed to be successful in emerging fields.
4. Backward mapping is necessary to capture the competencies needed for new industries.
5. Our education systems must provide a stronger foundation in science, technology, engineering, and math (STEM) subjects, which is necessary for any learner, especially those who are entering pathways into these jobs.
6. Despite its critical importance, education research and development (R&D) lacks sufficient investment and infrastructure. With further investment, education R&D can fuel innovations in career-connected learning and pathways.
7. The lack of underlying data infrastructure hinders our ability to analyze the effectiveness of programs and determine the factors that drive success.

How Can the Federal Government Lead?

The federal government has the potential to scale innovative approaches that are piloted and implemented by states. The federal government should:

1. Express the critical need to strengthen K-12 education pathways into the jobs of the future and emphasize the impact this has on our national security.
2. Incentivize states to develop public-private partnerships to infuse career-connected learning throughout our education system, including by increasing work-based learning experiences, developing and updating credentials, and developing aligned curriculum.
3. Direct and leverage existing grant programs, tools, and resources toward talent development.

How Can States Lead?

As the economic engines of the country, states must focus on understanding the workforce needs of the future, developing talent to meet those needs, and increasing coordination between K-12 education, higher education, and workforce sectors. States should:

1. Test out new approaches to industry-aligned talent development.
2. Develop coordinating bodies that facilitate collaboration and support efficient use and blending of federal funding.
3. Generate new tools and resources such as roadmaps, curricula, and workforce websites that provide crucial information to prospective workers and employers about talent and job opportunities.

To address the challenges identified, we recommend that the federal government:

- **Leverage the National Security Community** to create a sense of urgency around improving our education ecosystem.
- **Provide Federal Incentives and Spotlight State Approaches.** Build coalitions around key industries, support states in their efforts to develop K-12 pathways, and highlight impactful place-based approaches that can be scaled.
- **Bolster Education R&D to Advance Career-Connected Learning** by creating and funding ARPA-ED, improving our data systems, and promoting evidence-based practices in career-connected learning.
- **Encourage Students to Pursue Careers in Key Industries** by exposing them to more technology-related topics early and communicating the opportunities available to them in key industries.

Enacting these recommendations will require coordination between the national security, workforce, and education sectors. We hope this report will help spur much-needed action at this critical moment.

LEVERAGE THE NATIONAL SECURITY COMMUNITY

Our ability to fill high-demand jobs for our technological competitiveness impacts our national security. The national security community can therefore be an important voice calling for a stronger education system that provides pathways into critical jobs.

Use National Security as a Call to Action

Given bipartisan support for many national security aims, the national security community is uniquely positioned to create a sense of urgency around improving our education ecosystem and career pathways. When significant investments have been made in education in the past, they have been fueled by a national security need, like the investments made after the launch of Sputnik. A national security argument can be a useful way to spur the necessary actions.

Indeed, this is already beginning to happen. Competition with China was the impetus for the CHIPS and Science Act, which, in turn, has incentivized states to try new approaches, build new coalitions between the public and private sectors, and form new Tech Hubs that are fueling our innovation ecosystem. One major way to demonstrate our commitment is to ensure that the CHIPS and Science Act is fully funded. Right now, less than 10% of the five-year place-based vision of the CHIPS Act has been funded, and there is a \$3 billion funding gap for its important basic science research and development goals.³ The federal government must fully fund the CHIPS Act to ensure that the partnerships that are now in their infancy are allowed to grow to fruition.

National security remains an area of bipartisan cooperation. As we think about new legislation centered on emerging threats and opportunities, like AI for example, we can use national security as a lens to fuel new public-private partnerships from the K-12 level through to the workforce, motivate greater investment, and foster meaningful change in education.

While this recommendation was included in “Re-Engineering American Security,” it bears repeating. National security is a powerful motivator. **The federal government must start treating a strong education system as a national security priority.**

PROVIDE FEDERAL INCENTIVES AND SPOTLIGHT STATE APPROACHES

States are taking the lead on developing thoughtful career development pathways. Federal efforts can accelerate states' progress, provide incentives for greater coordination, and increase state capacity in these efforts.

Build Strategic Partnerships

- **Invest in AI Hubs for AI-Connected Career Pathways:** In future AI legislation, authorize and appropriate a new AI Hub program, modeled after the Regional Technology and Innovation Hubs (Tech Hubs), funded through CHIPS. The program would be jointly administered by the Commerce Department and the National Science Foundation (NSF) to promote AI-connected career pathways. The Hubs would require K-12, higher education, and employers to develop innovative approaches to prepare young people for careers in AI-connected fields. Like for the Tech Hubs, regions would develop comprehensive plans—but unlike the Tech Hubs, K-12 education must be included. Ten AI Hubs could each be granted \$70 million for two years.⁴ The AI Hubs should coordinate with postsecondary institutions to offer credential programs or programs for credit while students are in high school.
- **Identify Needed Competencies for Key Industries:** The Department of Labor, in partnership with industry and the national security community, should conduct a mapping project, building on the Bureau of Labor Statistics' efforts, to provide a more granular view of the core competencies needed for key industries—particularly those that are expected to grow in the future—and share with industry where new standards and curricula are needed. For example, the Federal Aviation Administration has developed a high school curriculum specific to schools with an aviation focus. This curriculum has been adopted by schools across the country, such as the Alabama Aerospace and Aviation High School.⁵

Through the mapping project, the Department of Labor could also analyze the uptake of industry-driven standards. Schools across the country are leading the way in providing career-connected learning experiences that could be models for others. For example, the Cyber Academy in Ohio's Lakota Local School District has certification opportunities and provides direct mentorship with industry professionals in a high-demand field.⁶ In another example, eleven school districts across the U.S. are partnering with IBM and Digital Promise's Center for Inclusive Innovation on a three-year pathway at the high school level that allows students to earn a CompTIA A+ certificate.⁷ With this certificate, students are able to enter entry-level jobs while in high school as they continue to build their skills. There are many similar programs, but we must continue to scale them.

Provide Incentives and Flexible Funding

- **Combine Funding Streams to Promote Career-Based Learning:** Currently, federal funding related to workforce and career-connected learning (from K-12 through higher education and into workforce training) comes in multiple, complex funding streams.⁸ This should be combined into one funding stream to allow for maximum flexibility for public-private partnerships and better coordination of high-quality pathways that begin in K-12 education. It would fuel innovative approaches such as in-house partnerships with industry and industry-hosted internships and apprenticeships.

In the interim, the U.S. Department of Education and the U.S. Department of Labor should allow Career and Technical Education Funding under Perkins V and workforce funding under the Workforce Innovation and Opportunity Act (WIOA) to be used for industry-hosted, career-connected learning experiences. When states do navigate the various requirements to blend and braid federal funding streams, they can have a big impact. For example, Delaware set common metrics for Every Student Succeeds Act (ESSA) and WIOA funding, allowing it to combine the forces of multiple programs for a stronger collective impact.

- **Incentivize Employers to Invest in Career-Connected K-12 Education for the Future Workforce:** Provide federal incentive funds and tax credits to support employers investing in high-quality career pathways for students. For example, the Tech Hubs could develop a competitive priority—allowing for additional points to be awarded—for including pathways that connect to K-12 education. Federal investments would support employers in developing apprenticeships and training in the K-12 space as a talent strategy, as well as in working with coalition partners to create pathways from K-12 into their workforce. By developing these programs, companies will help create the credentials and define the skills necessary for success in the workplace, which can then guide K-12 preparatory efforts.

Fund Coordinating Bodies to Break Down Silos and Scale Career-Connected Learning

- **Utilize Existing or New Funding Streams to Support Intermediaries That Can Scale Connections Between K-12 Education and the Workforce:** In discretionary grant competitions funded by the CHIPS and Science Act, the federal government should make it clear in requests for proposals that funds can be utilized to partner with intermediary organizations to address workforce needs.

In addition, when the Elementary and Secondary Education Act (ESEA) or WIOA are reauthorized, there should be a dedicated program in both laws to support intermediary organizations that can connect education to workforce, particularly in high-priority industries. Intermediary organizations help connect K-12 school systems, higher education, and employers, making it easier to create aligned career pathways.

This approach can allow for greater exposure and skill building in critical fields. Additionally, new partnerships can build on existing efforts to partner with entities such as Historically Black Colleges and Universities (HBCUs) to expand and strengthen the talent pathways for critical sectors. Existing examples of such intermediaries include CareerWise Colorado, which is focused on apprenticeship models, and Career Ready Pennsylvania, which leads training and professional development for career-ready programming in K-12 education.

Provide Place-Based and Ecosystem Support for States

- **Build and Launch a Novel Technical Assistance Center to Foster New Career-Connected Learning:** Authorized in the CHIPS and Science Act, the Centers for Transformative Education Research and Translation, if funded, could support a Technical Assistance (TA) Center designed to support states in developing K-12 pathways to key industries. The TA Center would provide support tailored to the emerging industries in each state and informed by overall economic and national security needs.

States would be encouraged to periodically develop strategic plans for workforce development that identify high-demand occupations, develop industry-aligned pathways, and incorporate industry-recognized credentials into ESSA state accountability systems for schools and districts. The TA Center could also provide support for networks that coordinate federal and state investments in emerging industries. Additionally, the TA Center could help connect community colleges to K-12 education systems, facilitating solutions like dual enrollment and partnerships with employers to align course offerings to needed competencies, with employers completing the “last mile” of the training.

- **Develop a Career Counseling Corps:** Modeled on the Youth Mental Health Corps, develop a Career Counseling Corps in partnership with the U.S. Department of Education, the Department of Defense, and the Department of Labor, with AmeriCorps administering the program.⁹ The Career Counseling Corps would use the AmeriCorps model and train young people to provide counseling. Corps members would be deployed to states and work on-site to support regional needs, providing information about high-demand fields and high-quality pathways into them. The program could also offer professional development programming to counselors in the field, allowing them to learn from the approaches developed by Corps members.

Spotlight Impactful Place-Based Approaches in States

States are our nation's laboratories of innovation, where new ideas for public-private partnerships and ecosystem support are developed. To capitalize on this, the **Department of Commerce should develop a 50 State Bright Spots campaign to highlight place-based strategies that could be scaled and replicated.**

State examples include:

- **Alabama** created a Governor's Office of Education and Workforce Transformation to increase labor force participation and create career pathways.¹⁰ The office is tasked with braiding federal funds. The state also developed the Talent Triad, a public-private partnership sponsored by the Office of Education and Workforce Transformation and AlabamaWorks! to provide easily accessible online information about jobs and credentials.¹¹
- **Colorado** was one of the first states to publish longitudinal data on educational and career pathways. By sharing this data, a state can better understand program effectiveness, including for K-12 education pathways.¹²
- **Delaware** pursued a sector-based approach that was grounded in a needs assessment of Delaware's career preparation system and student outcome data. The Delaware Department of Education revised its Strengthening Career and Technical Education for the Twenty-First Century Act (Perkins V) plan and made changes to the state accountability system for schools.¹³ Delaware also funded the Learning for Careers Program to support the Workforce Development Board to engage employer groups, chambers of commerce, and industry associations in creating paid work experiences for youth, including work-based learning and co-operative education programs for secondary school students.¹⁴
- **Indiana** decided that every child should graduate with a diploma and at least one credential.¹⁵ Indiana aligned longitudinal data systems from Pre-K to the workforce across all agencies to better track outcomes. The state also developed the first Career Scholarship Account program in the country, providing \$5,000 annually for tenth- through twelfth-grade students for work-based learning programs.¹⁶
- **Ohio** developed a roadmap for advanced manufacturing in the state with the Governor's Office of Workforce Transformation and the Ohio Manufacturers' Association that includes information on skills and competencies.¹⁷
- **Texas** provided incentive funding to Pathways in Technology Early College High Schools (known as P-TECH) to support stronger career-connected learning.¹⁸
- **Virginia** organized all workforce initiatives into a central state department, facilitating better coordination and collaboration.¹⁹ Additionally, the state brings together workforce and pathways-connected cabinet members regularly to align education from K-12 through postsecondary.²⁰

BOLSTER EDUCATION R&D TO ADVANCE CAREER-CONNECTED LEARNING

Education R&D is foundational to developing new approaches to learning, including career-connected learning. Without education R&D to find evidence-based ways to equip students with career-ready skills, our nation is at risk of spending its already severely limited education resources on ineffective practices.

Create and Fund ARPA-ED to Advance Career-Connected Learning

R&D at the U.S. Department of Education is drastically underfunded when compared to other agencies and does not have the infrastructure to easily fund and scale innovative solutions.

The New Essential Education Discoveries (NEED) Act would create a new agency—called the National Center for Advanced Development in Education (NCADE)—that would function as an ARPA-ED, developing and disseminating effective practices that could support pathways into critical sectors.²¹ Modeled on the Defense Advanced Research Projects Agency (DARPA), it would sit within the Institute of Education Sciences at the U.S. Department of Education.²² Investing \$500 million to launch this new agency could lead to breakthrough innovations in learning and career pathways.

The “Re-Engineering American Security” report also recommended creating an ARPA-ED. The NEED Act was reintroduced in the House by Congresswoman Suzanne Bonamici (D-OR) and Congressman Brian Fitzpatrick (R-PA) in December 2023 and will likely be introduced in the Senate on a bipartisan basis in 2024, presenting a fresh chance to make ARPA-ED a reality.²³

Fund and Modernize Data Systems and Infrastructure

Data systems and infrastructure are lacking as key components of our education and workforce systems, and we know longitudinal data gives states direct feedback on how K-12 policies translate into future careers. To facilitate faster and more efficient use of data on what works to support career-connected learning, the Statewide Longitudinal Data Systems (SLDS) Grant program and Workforce Data Quality Initiative (WDQI) should be funded at higher levels. States should also invest in connecting data sets to produce more actionable information and should draw on resources like the Bureau of Labor Statistics.

Promote Evidence-Based Practices in Career-Connected Learning

Promoting existing evidence-based practices will strengthen American students’ overall preparedness to enter fields that are important for national security. For instance, promoting mastery of algebra in eighth grade to prepare for more advanced coursework in high school is an evidence-based practice that could be promulgated through means such as additional summits, similar to the Institute of Education Sciences’ Math Summit, to share more about evidence-based approaches.²⁴ It is estimated that 92% of all future careers will require some digital skill.²⁵ By updating the federal Education Sciences Reform Act (ESRA), Congress could add STEM and computer science education to the list of topics of focus for the Regional Educational Laboratories, which provide research support and assistance to school districts and others in the education ecosystem.²⁶ The National Science Foundation (NSF) could conduct a review of STEM research projects that have been funded to share lessons learned and evidence-based best practices. NSF could also conduct a meta-analysis of the Education Innovation and Research STEM and Computer Science grantee evaluations to identify evidence-based practices to share.

ENCOURAGE STUDENTS TO PURSUE CAREERS IN KEY INDUSTRIES

Building out the career pathways for the jobs of the future will not be sufficient unless **students are excited enough to pursue them.**

Expose K-12 Students to More Technology-Related Topics

Technological innovation has always underpinned national security, from gunpowder to steamships. Today is no different, and the critical industries of the future—artificial intelligence, quantum computing, biotechnology, etc.—will require a workforce with strong STEM skills.

Unfortunately, not enough American students want to pursue careers in these fields. A recent poll from Gallup and the Walton Family Foundation found that although 75% of Gen Z students are interested in at least one STEM field, only 29% hope to pursue a STEM-related occupation in the future.²⁷ At our current pace, it is projected that by 2030 there will be 3.85 million additional jobs requiring proficiency in technical fields in the U.S. and 1.4 million of them will go unfilled, including roles like computer scientists, engineers, and skilled technicians.²⁸

The good news is we know how to change this. The poll by Gallup and the Walton Family Foundation also found that “students exposed to four or five technology-related topics in school are 2.6 times more likely to want a future STEM job, 2.2 times more likely to declare a college STEM major and 5.3 times more likely to be employed in a STEM role than their peers who are exposed to just one technology-related topic or none at all.”²⁹ Exposing students to more technology-related topics is key to generating the workforce for the future.

Communicate the Opportunities

There is a great need to encourage young people to pursue careers in emerging fields by **communicating the multitude of opportunities available to them and informing them of what those jobs will look like.** Young people and adult learners frequently lack basic information on pathways, high-needs sectors, and local jobs. Initiatives to address this gap could be similar to *My World of Work* in Scotland, which provides information on careers for learners at various stages of life—from students who are in school, to those who are looking for work, to college students, parents, and educators.³⁰

Students and families may also view non-college pathways negatively and/or have outdated views of what certain careers entail. Yesterday’s blue-collar manufacturing jobs are not today’s manufacturing jobs—today’s advanced manufacturing is a high-tech industry. We need to incentivize students by sharing more about what these careers are like in the current era.

Messaging should also meet young people where they are by focusing on what they care about: access to jobs, economic security and mobility, and creating a sustainable future, amongst other things. Additionally, the messaging must appeal to a diverse audience, promoting greater representation in high-demand sectors.

CONCLUSION

For the U.S. to maintain its innovation lead and compete in a global technological context, we will need to strengthen our education systems and career pathways from K-12 through to the workforce. Only by doing so can we ensure our future national security. We have the policy and programmatic tools at hand to take bold action. We hope you will join us.

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This report seeks to capture the essence of participant conversations, but individual participants may not agree with every aspect of the report. Rather, in affixing their name as a signatory, a participant is signaling support for the overarching concept of the series and the broad outcomes discussed herein.

SIGNING STATEMENTS

“The ‘Fortifying America’s Future’ report highlights the critical importance of preparing our young people for jobs in key technological sectors to maintain the United States’ competitive edge and national security. There are other areas where the government and NGOs can play a more explicit role in enhancing these efforts.

Firstly, it is essential for the federal government to facilitate the regular sharing of best practices among practitioners funded through these initiatives. An annual ‘Fortifying the Future’ event could bring together stakeholders from national security, federal and state governments, and employers, ensuring rapid ongoing communication and learning. Other employer-based initiatives, like the National Talent Collaborative, can be leveraged to ensure fast learning about new national security workforce pathways across organizations.

A programmatic effort to allow regions and states to compete for grants specifically based on national security workforce initiatives could be beneficial. ‘STEM Hubs’ could be part of the critical broader push to fully fund CHIPS and Science.

Lifelong learning is another crucial aspect. As technology advances, new skills are required more frequently. States should consider models like Singapore’s subsidy scheme for upskilling individuals aged 40 and above, albeit with a broader focus beyond full-time diploma courses.

The report provides a robust framework for fortifying America’s future workforce, and there are additional steps that can be taken to ensure continuous improvement and adaptability. Regular convening of stakeholders, explicit STEM hub initiatives, and a focus on lifelong learning are essential to keep pace with the evolving demands of national security and technological competitiveness.”

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