

# The Workforce Behind America's Innovation Edge: Federal Policy Actions to Secure U.S. Leadership in Advanced Manufacturing And Emerging Technologies

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## Introduction

As artificial intelligence and other emerging technologies change the way Americans live and work, a political consensus is growing around the need to prepare young people for a future they cannot yet imagine. Student test scores are declining while the challenges of securing in-demand, well-paying jobs are on the rise. Stronger workforce preparedness and economic prosperity for the next generation require federal leadership and robust investments in STEM education and workforce pathways. Furthermore, essential data and R&D infrastructure are necessary to ensure these investments are sustained and scaled.

STEM and workforce development saw bipartisan support in 2022 with the passage of the CHIPS and Science Act, which made strategic investments in emerging technologies and programs to grow a skilled technical workforce. The Trump Administration has attempted to expand upon CHIPS success through a series of executive orders and action plans.

For instance, a 2025 executive order titled *Preparing Americans for High-Paying Skilled Trade Jobs of the Future*<sup>1</sup> called for the development and scaling of nimble, non-college pathways to well-paying careers. This executive order emphasized the need for a rapid response to employer demands, ensuring students and workers gain the skills needed to maintain American leadership in emerging technologies. Similarly, the *Administration's Artificial Intelligence (AI) Action Plan*<sup>2</sup> underscores AI skill development for federal workforce and education programs, and provides federal support for rapid retraining programs. Additionally, the U.S. Departments of Labor, Education, and Commerce jointly published *America's Talent Strategy: Building the Workforce for the Golden Age*.<sup>3</sup> This publication calls for the federal government to scale industry-driven workforce systems. These systems provide flexible pathways into high-demand fields such as AI and quantum computing.

When done well, federal education and workforce research can serve as an essential capacity-building tool for state education policymakers and local school districts. By enabling high-quality data collection and offering grants to support national and regional research, the federal government can empower educators and workforce training organizations at the state and local levels to make the best decisions for their students and communities. Strong federal data and research infrastructure enable the identification and scaling of effective programs, ensuring school-based innovation aligns with the needs of an economy that is increasingly driven by technology.

<sup>1</sup> <https://www.whitehouse.gov/presidential-actions/2025/04/preparing-americans-for-high-paying-skilled-trade-jobs-of-the-future/>.

<sup>2</sup> <https://www.whitehouse.gov/wp-content/uploads/2025/07/Americas-AI-Action-Plan.pdf>.

<sup>3</sup> <https://www.dol.gov/sites/dolgov/files/OPA/newsreleases/2025/08/Americas-Talent-Strategy-Building-the-Workforce-for-the-Golden-Age.pdf>.

Federally-supported education and workforce research and development (R&D) is essential to ensure efficient, high-ROI investments in STEM education, career-connected learning, and workforce training. The purpose of R&D is to figure out what works for whom and in what context, which allows policymakers to make informed decisions about how to best allocate education and workforce development funds. Smarter investments, based on evidence of what works, leads to better outcomes for students and ultimately, a stronger American workforce.

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This white paper recommends specific investments and policy changes federal leaders can make to strengthen education and workforce R&D; improve STEM education and workforce pathways; and prepare American talent for the challenges of tomorrow. The future is ours to shape, and it starts with providing the next generation with the education and workforce opportunities they deserve.

### **Policy Recommendations**

Congress and the Administration should prioritize advancing research and innovation in education and workforce development. This would address the national imperative to cement the United States as a global leader in emerging technologies, while capitalizing on the existing bipartisan enthusiasm for expanding the skilled technical workforce. It would also enable reductions in federal funding for ineffective programs.

To make the U.S. more competitive, economically vibrant, and secure, ALI recommends the following federal investments and policy changes.



***Congress should:***

- **Authorize and Fund High-Potential, High-Impact R&D at the Institute of Education Sciences (IES):** In line with the Administration’s goal to re-envision IES as a more nimble and responsive agency, Congress should authorize a new center at IES focused on high-potential, high-impact research at the Department of Education through passage of the New Essential Education Discoveries Act.<sup>4</sup> This new center would be responsive to concerns from the Administration and the field about the usability, relevance, and timeliness of past education research by serving as launching pad for education and workforce development programs that increase student achievement and workforce preparedness.
- **Promote Cross-Agency Partnerships to Advance STEM Goals:** Congress should continue to encourage collaboration between IES and other federal funding agencies that support STEM research and workforce development, including the National Science Foundation (NSF) Directorates for STEM Education (EDU) and Technology, Innovation, and Partnerships (TIP). NSF recently created new programs supporting evidence-based STEM and workforce development programs, such as the Experiential Learning for Emerging and Novel Technologies (ExLENT) program.<sup>5</sup> Furthermore, Congress should authorize increased investments in programs focused on the translation of STEM education knowledge into classroom applications. For example, the Centers for Transformative Education Research and Translation (CTERT) program was authorized by the CHIPS and Science Act. But, with insufficient funding attached, the centers’ have limited potential to bring successful STEM education and workforce innovations to scale.
- **Utilize the Workforce Innovation and Opportunity Act (WIOA) to Modernize and Streamline Youth Workforce Development Programs:** WIOA is overdue for reauthorization. As the nation’s main legislation focused on federal workforce development, it enables Congress to streamline and enhance ongoing youth federal workforce development efforts for the purpose of scaling innovative programs in emerging technology fields. Congress should modernize the Workforce Data Quality Initiative (WDQI) by increasing its interoperability with State Longitudinal Data Systems (SLDS) and improving the accessibility of the data for stakeholders. These improvements to the WDQI should also prioritize the adoption and use of open data related to skills and credentials needed in different job sectors.
- **Utilize Perkins CTE to Center Data and Innovation within Programs of Study:** Congress should leverage Perkins Career and Technical Education (CTE) reauthorization to modernize the Perkins Innovation account. Updates should include explicitly allowing and encouraging federal funding to be used to support

<sup>4</sup> <https://www.bennet.senate.gov/2024/07/30/press-releases-id-a069f670-5dcb-4cb1-b6c6-0389a5c75a38/>.

<sup>5</sup> <https://www.nsf.gov/funding/opportunities/exlent-experiential-learning-emerging-novel-technologies>.

pilots that bolster career-connected learning in emerging technology fields of importance to our national security, like advanced manufacturing.

- **Leverage the National Defense Authorization Act (NDAA) to Support Apprenticeships:** Given the national security implications of emerging technologies like AI, quantum computing, and advanced manufacturing, Congress should enter into exploratory investigations about how the NDAA can be used to support civilian apprenticeships in fields that are essential to the defense industry. There should be special consideration (e.g., through competitive grant priorities) of how defense-connected individuals (e.g., Department of Defense Education Activity students, veterans) could take advantage of these opportunities.



In tandem with the actions we propose for Congress, ***the Trump Administration should:***

- **Align Federal Efforts and Investments in Career-Connected Learning at the Departments of Education (ED), Labor (DOL), Commerce (DOC), Defense (DOD) and the National Science Foundation (NSF).** These agencies all have a role to play, and a coordinated effort would leverage the strengths of each one. For instance, ED/DOL's expertise and practitioner connections in CTE could be applied to NSF's Advanced Technological Education (ATE) program to help inform ATE grantees of best practices related to CTE, scale successful programs, and increase industry involvement in training programs. As another example, DOL's leadership in advancing sectoral partnerships should be aligned with DOC's regional and industry programs and engagements to ensure K-12 involvement in those agencies' investments. Through collaboration, individual agency investments in crucial STEM fields can be amplified for greater impact.

- **Eliminate Data Silos and Coordinate across Agencies to Identify and Scale Effective Programs:** Federal support for data linkages is fractured with minimal federal investments in programs like DOL's WDQI and IES's SLDS Grant Program. Improving data quality and connectivity, especially at the K-12 level and transition stages, will help identify talent gaps and scale successful programs. This is particularly important when supporting talent development efforts for sectors such as advanced manufacturing, which must reflect local and regional employer demands.
- **Maintain a Role for Federally Funded Education Research:** While re-envisioning the structure and operations of IES, the Administration should preserve its critical role as a national leader in education data collection and research funding. When done properly, federally funded education data and research investments provide essential support to states, allowing them to focus on utilizing the evidence-base to make the best policy decisions for their students and communities. A reimagined



and enhanced IES should more intentionally facilitate actionable, quick turnaround research that is shared with teachers in ways that they can easily apply to their instructional practice.

- **Continue to Promote Public-Private and Cross-Agency Collaboration for Workforce Development:** As the Administration implements the Preparing Americans for High-Paying Skilled Trade Jobs of the Future executive order, it should continue to advocate for public-private partnerships and encourage collaborations between workforce partners like Manufacturing X Digital (see inset) with successful, scalable models of career-connected learning. Engaging and empowering stakeholders across the education and workforce ecosystem will make investments in workforce development more effective by pairing expertise and evidence-based policies with local knowledge and needs. Furthermore, federal agencies should collaborate to establish workforce efforts in emerging technology fields like AI. As an example, the DOL's Bureau of Labor Statistics and DOC's Census Bureau and Bureau of Economic Analysis could work together to study the impact of AI on the labor market and provide analysis to support workforce development training and education activities.

Manufacturing X Digital (MxD),<sup>6</sup> a Department of Defense-sponsored manufacturing institute, demonstrates what is possible when the right government and industry partners support education and workforce training in an area of national importance. MxD works with industry partners to bolster U.S. advanced manufacturing. Through its workforce program, MxD Learn,<sup>7</sup> the institute advances knowledge building, training, and career exploration opportunities for individuals of all ages interested in joining the advanced manufacturing technology workforce. MxD implemented a four-week manufacturing career awareness program to help high school students explore advanced manufacturing careers. It provides free access to relevant curricula via its Virtual Training Center.<sup>8</sup> MxD also works with small and medium-sized businesses to expand their access to skilled workers and inform new curricula. A strong federal education and workforce R&D ecosystem would enable the scaling of effective workforce development programs like these, and build stronger connections between emerging technologies, workforce development, and K-12 spaces.

<sup>6</sup> <https://www.mxdusa.org/about/>.

<sup>7</sup> <https://www.mxdusa.org/workforce/>.

<sup>8</sup> <https://www.mxdusa.org/vtc/>.

- **Encourage Federal Agencies to Prioritize Funding Requests Related to Advancement of Emerging Technology Sectors:** A recent Government Accountability Office (GAO) report found that some federal agencies, including the Department of Defense, are not quickly reviewing the funding requests of federal partners like Manufacturing USA Institutes. In turn, this slowed process limits their capacity to implement workforce development efforts in advanced manufacturing.<sup>9</sup> Federal agencies that provide financial support to the Manufacturing USA Institutes and other federal partners focused on advancing emerging technologies should be encouraged to review funding proposals in a timely manner. The Administration should also work with Congress to confirm that the Administration's priorities, such as the National Strategy for Advanced Manufacturing and the AI Action Plan, are aligned with statutory requirements for agencies.
- **Integrate K-12 Education into the Next STEM Strategic Plan:** When developing the next five-year STEM strategic plan, the Trump Administration should prioritize meaningful career-connected STEM education in K-12 settings to ensure students entering high school have the STEM skills necessary to engage in workforce development opportunities or further learning in emerging technology fields, both in and beyond high school.

## Conclusion

A coordinated and well-funded education and workforce R&D system can help practitioners and policymakers make informed decisions about investments that will expand opportunities for students and workers in the United States. The federal government's resources, departmental expertise, and program and data infrastructure confirms the clear role that federal leaders must play in unlocking innovations that the nation needs to meet this critical moment in education and workforce development. Together, Congress and the Administration can make the strategic investments and policy changes needed to secure U.S. leadership in global competitiveness, national security, and economic opportunity for decades to come.

<sup>9</sup> [https://www.gao.gov/products/gao-25-107369#summary\\_recommend](https://www.gao.gov/products/gao-25-107369#summary_recommend).