

WASHINGTON STATE STEM EDUCATION INNOVATION ALLIANCE

2019 STEM Education Report Card



More information about the STEM Education Innovation Alliance, including contact information and citation details, can be found on its website: <https://stem.wa.gov>.



IMAGE COURTESY OF LAKE WASHINGTON INSTITUTE OF TECHNOLOGY

2019 LEGISLATIVE RECOMMENDATIONS

Our state is fortunate to be favored with a dynamic economy driven by a growing number of innovative employers and a flourishing technological sector. Washington has been ranked as #1 for business, with the nation's fastest growing economyⁱ, #2 in the concentration of STEM jobsⁱⁱ, #3 in STEM job growthⁱⁱⁱ and among the top states in tech innovation and the percentage of workforce in tech industries^{iv}. In order to ensure that our youth and adults are prepared to

compete for exciting new careers in this STEM-driven economy, it is imperative that we expand and improve STEM education and career-connected learning opportunities from kindergarten to postsecondary.

For the 2019 legislative session, the STEM Education Innovation Alliance recommends that the Governor and Legislature provide crucial funding to advance the following priorities:



Expand career-connected learning opportunities in STEM-related fields.

Support the Career Connect Washington Plan to develop educator and employer partnerships, scale existing programs, expand opportunities, and integrate more career connected learning programs, with particular emphasis on those with a STEM focus. Legislative action and funding are needed to support **expanded learning opportunities throughout the entire spectrum from K-12 to postsecondary studies that give students and young people direct experience with existing and emerging STEM industries, jobs, and careers:**

- **Career Awareness and Exploration:** Structured activities designed for early exposure to careers through job fairs, guest speakers, job shadows, and job-site tours.
- **Career Preparation:** Programs that provide students with hands-on skills and knowledge in professional settings, including career and technical education courses, on-site internships, and pre-apprenticeship programs.

- **Increased enrollment in Career Launch Programs.** Career Launch programs are intensive programs that combine paid, meaningful work experiences with aligned classroom learning, giving students the opportunity to earn credentials and become competitive job candidates with career-ready skills.
- **Development of a sustainable, coherent career connected, computer and climate science learning system across the K-12 and postsecondary sectors, with statewide leadership collaborating with regional networks.** Create a powerful cross-institutional post-secondary partnership for innovation in STEM teacher preparation designed to increase diversity in the STEM teacher workforce, better articulate pathways for under-represented students to become elementary and secondary teachers to serve an increasingly diverse student population in Washington, and intentionally integrate computer science, engineering, and sustainability to teacher preparation as part of meeting the workforce needs of our state's STEM-driven economy.



Expand data and measurement capacity.

Support transparent, timely, and clear data collection, connection, and sharing about the Washington education system and workforce in order to measure impact, effectiveness, and outcomes for students.

Expand the capacity of the Washington State Education Research and Data Center (ERDC) in data linking and matching, data visualization, governance, and creating a data enclave tool.



Broaden computer science education.

Increase funding for the K-12 Computer Science Education Grant program. This program is vital to improving access to computer science and related educational programs in Washington, expanding teacher training and credentialing in computer science, and upgrading classroom technology.



Enhance climate science education.

Increase the state's investment in climate science education in our schools. These funds are needed to provide more opportunities for professional development of teachers in science education, to measure student learning and other impacts, and foster partnerships between community-based organizations and schools to advance training and curricula.



Fully fund the State Need Grant (Washington College Promise Scholarship).

Guarantee student access to the State Need Grant by eliminating the waitlist and providing it with full funding. This crucial support for the state's low-income undergraduate students who are pursuing degrees or retraining and gaining credentials for new careers is necessary to promote equitable access and opportunity for STEM education in Washington.



Continue support for the Washington State Opportunity Scholarship.

The Opportunity Scholarship is a crucial resource for low- and middle-income students who have received their high school diploma or GED certificate in Washington and are pursuing a degree or certificate in approved fields such as STEM or health care, and ensure that College Bound students who also receive the Opportunity Scholarship receive a full College Bound award.



Extend broadband access to all rural communities.

Access to affordable high-speed broadband service is essential for rural schools to develop STEM programs and for rural students to communicate with their teachers, conduct online research, and participate in distance learning programs. Broadband access is also crucial for the growth of software and other STEM-based jobs in rural areas and allow rural employees the opportunity to work remotely and communicate with collaborative teams in the context of modern decentralized work environments.

To provide broadband access to all currently unserved or underserved rural communities, funding is needed for state-level planning and coordination to expand fiber-optic networks and other infrastructure components.



Expand early learning math literacy programs.

New research shows that children's interest and enthusiasm for math begins in pre-school. The best time to cultivate confidence in math is during these early years. This is particularly important for encouraging girls, who research shows are still less likely than boys to enroll in advanced math courses in high school and pursue STEM careers. Low-income and underrepresented minority students will also greatly benefit from the expansion of early opportunities to build on math skills.

THE STEM LANDSCAPE

Progress in Some Areas but Challenges Remain

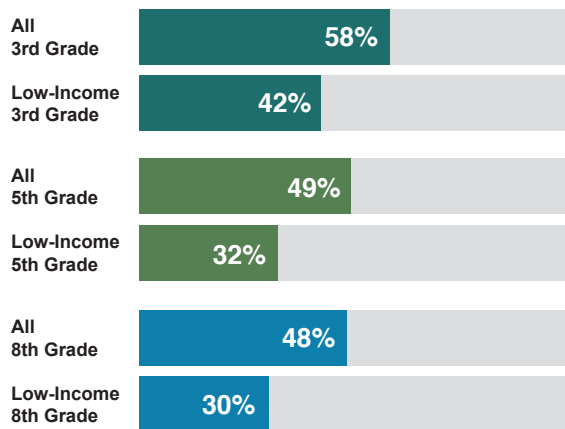
★ STEM Achievement: Pre-school through K–12

Kindergarten Readiness in Math

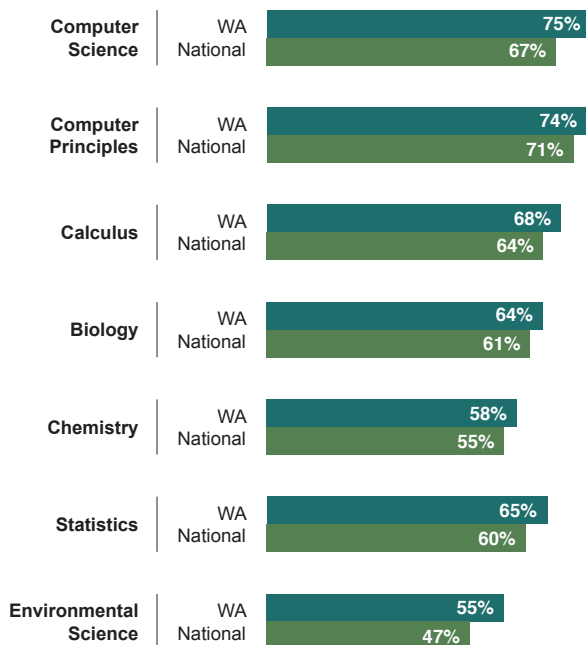
About **66%** of incoming kindergarteners demonstrated “kindergarten readiness” in math among students assessed by WaKIDS, 2017–18.ⁱ

Smarter Balanced Assessment Math Scores, 2018ⁱⁱ

Percent meeting math standard



2018 AP Exam pass rates for Washington students significantly exceed national averagesⁱⁱⁱ



A Need to Expand Opportunities for AP Computer Science^{iv}



The number of high schools offering AP Computer Science in Washington has grown substantially from **21 schools** in 2011 to **130 schools** in 2018.



The number of students taking the AP Computer Science exam has grown from **1,048** in 2014 to **2,020 students** in 2018. Among those, **75%** earned a score consistent with college credit, up from **66%** in 2014.

Yet, despite this progress less than **25%** of high schools currently offer AP computer science.

★ Alignment of STEM Education Programs with Workforce Demand

We have made progress in raising the number of Washington higher education graduates earning degrees in STEM fields, but the percentage is still too low to meet workforce needs.

More than one-fourth (**28%**) of bachelor’s degrees awarded at Washington public and private institutions in 2017 were in STEM subjects, up from **22%** in 2012.^v

STEM degree and long-term certificate completions have shown steady increases in recent years (2013–17).^{vi}

At the Mid-levelⁱⁱ:



Degree and certificate completions in STEM fields increased by more than **14%**.

At the Baccalaureate Level:



Degree completions in Computer and Information Sciences grew by **70%**, in Engineering by **40%**, and in Health by **26%**.

At the Graduate Level:



Degree and certificate completions in Computer and Information Sciences grew by **87%**, in Engineering by **41%**, and in Health by **13%**.

However, many STEM programs remain highly selective and limited enrollment capacity remains a barrier in some fields, particularly in computer science.

And rapidly growing workforce demand is still outpacing STEM degree production.

- There is a **widening gap** between projected annual job openings in STEM fields and the number of graduates in Washington prepared to fill them. Projections for the years 2020–2025 estimate that:^{viii}

- In Computer Science, out of a total of more than **9,000 annual job openings**, there will be nearly **6,000 more openings** than there are graduates completing degree programs prepared to take them.

Graduates prepared for computer science jobs



Unfilled computer science jobs

- In Engineering, out of a total of about **2,500 annual job openings**, there will be more than **400 more openings** than there are graduates prepared to fill them.

Graduates prepared for engineering jobs



Unfilled engineering jobs

- In Health fields, out of a total of more than **11,000 annual job openings**, there will be nearly **1,400 more openings** than there are graduates prepared to fill them.

Graduates prepared for jobs in health fields

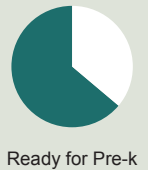


Unfilled jobs in health fields

★ Underrepresented Populations Continue to Face Challenges in STEM

A gender imbalance in STEM achievement tends to widen as students move through the pipeline.

- Among pre-K students, girls tend to do as well as boys in math, with about **66%** demonstrating “kindergarten readiness” in the 2017–18 WaKIDS assessment.^{ix}



- As they advance in their education, however, interest and achievement in key STEM subjects tends to fade for female students. In 2018, only **46%** of students completing AP Calculus exams and **27%** of students completing AP Computer Science exams were female.^x



- Male students also complete STEM degrees in greater numbers than female students. In 2017, only **35%** of students completing associate degrees or bachelor’s degrees in STEM were female and only **22%** completed degrees in computer science.^{xi}

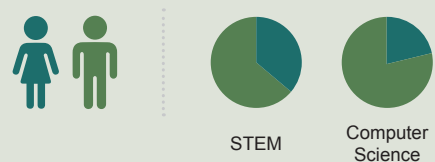


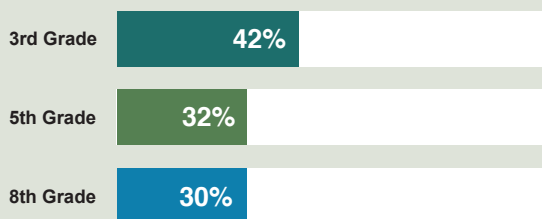
IMAGE COURTESY OF LAKE WASHINGTON INSTITUTE OF TECHNOLOGY.

Students from low-income and underserved minority families are disadvantaged at all stages in the STEM pipeline^{xii}

- Among low-income pre-K students, only **50%** demonstrated “kindergarten readiness” in math in 2017–18.



- Smarter Balanced Math scores for low-income and underserved minority students are low compared to other groups. Among low-income students, only **42%** of 3rd graders, **32%** of 5th graders, and **30%** of 8th graders met the standard for this test in 2018. The percentages are even lower for Hispanic/Latino and Black/African American students.



- AP exam pass rates in key STEM subjects are also low for underserved minority students. In 2018 only **49%** of Hispanic/Latino students and **44%** of Black/African American students passed AP Calculus exams.^{xiii}

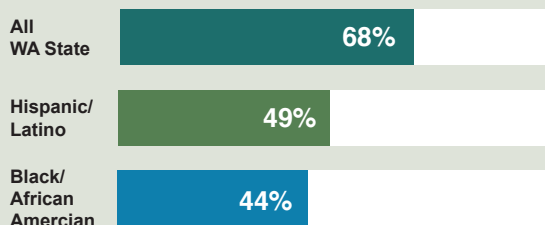


IMAGE COURTESY OF AEROSPACE JOINT APPRENTICESHIP COMMITTEE

ENDNOTES FROM 2019 LEGISLATIVE RECOMMENDATIONS

ⁱ CNBC. (2017) America’s Top States for Business. Retrieved August 16, 2017, from <https://www.cnbc.com/2017/07/11/washington-is-americas-top-state-for-business-in-2017.html>.

ⁱⁱ U.S. Chamber Foundation, Enterprising States. (2016) Retrieved July 9, 2017, from <https://www.uschamberfoundation.org/enterprisingstates/#WA>.

ⁱⁱⁱ U.S. Chamber Foundation, Enterprising States. (2016) Retrieved July 9, 2018, from <https://www.uschamberfoundation.org/enterprisingstates/#WA>.

^{iv} Computing Technology Industry Association (CompTIA). (2018) Cyberstates 2018. Retrieved October 11, 2018, from https://www.cyberstates.org/pdf/CompTIA_Cyberstates_2018.pdf.

ENDNOTES FROM THE STEM LANDSCAPE

ⁱ Washington State Office of Superintendent of Public Instruction, Report Card. Washington Kindergarten Inventory of Developing Skills (WaKIDS).

ⁱⁱ Washington State Office of Superintendent of Public Instruction, Report Card. Smarter Balanced Assessments.

ⁱⁱⁱ College Board. AP Program Participation and Performance Data 2018.

^{iv} College Board. AP Program Participation and Performance Data 2018.

^v Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

^{vi} Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

^{vii} Mid-level is defined as including associate degrees and long-term certificates of one year or more.

^{viii} Washington Student Achievement Council (WSAC), Workforce Training and Education Coordinating Board (WTECB), and State Board for Community and Technical Colleges (SBCTC) joint analysis of 2018 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; and 2018 Census PUMS data.

^{ix} Washington State Office of Superintendent of Public Instruction, Report Card. Washington Kindergarten Inventory of Developing Skills (WaKIDS).

^x College Board. AP Program Participation and Performance Data 2018.

^{xi} Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

^{xii} Washington State Office of Superintendent of Public Instruction, Report Card. Smarter Balanced Assessment.

^{xiii} College Board. AP Program Participation and Performance Data 2018.

THE STEM EDUCATION INNOVATION ALLIANCE'S IMPACT

A History of Successful Advocacy for STEM Education in Washington

Since its inception in 2013, the STEM Education Innovation Alliance has advised the State of Washington Governor and Legislature on strategies to expand opportunities and improve STEM education in Washington. In collaboration with its partners, the STEM Alliance's advocacy has helped secure key legislation and funding to drive STEM advancement in Washington State.

- ✓ Increased enrollment slots in computer science and engineering at the University of Washington, Washington State University, and Western Washington University.
- ✓ Washington Mathematics Engineering and Science Achievement (MESA) program expanded to be offered at additional community colleges.
- ✓ Computer Science and Education grants for early learning and K-12 curriculum development, teacher training, technology, and digital access for historically underserved groups, including girls and students from low-income, rural and ethnic minority communities.
- ✓ Increased funding for the Washington State Opportunity Scholarship.
- ✓ Extension of the Washington State Opportunity Scholarship to include students pursuing sub-baccalaureate professional and technical degree and certificate programs offered at our state's 34 community and technical colleges.
- ✓ Expansion of Apprenti, an innovative program of the Washington Technology Industry Association Workforce Institute that is developing apprenticeship programs in STEM and other fields beyond the traditional trades.
- ✓ Increased resident undergraduate enrollment at the University of Washington for students majoring in science, technology, engineering, and mathematics.
- ✓ Expansion of computer science and engineering degree programs at University of Washington Seattle.
- ✓ Creation of Washington State University's Software Engineering and Data Analytics programs at Washington State University Everett.
- ✓ Support for K-12 science teacher training in Next Generation Science Standards.
- ✓ Increased funding for the State Need Grant to provide critical aid to students with financial barriers.

Advocating for Future-Ready STEM Education



STEM EDUCATION INNOVATION ALLIANCE

The STEM Education Innovation Alliance, legislatively created in 2013 [E2SHB 1872], brings together leaders from a broad range of business, labor, education, government, and nonprofit organizations, with the role of advising Washington's Governor and Legislature on policy and strategic planning in support of STEM education initiatives.

Mission

The STEM Education Innovation Alliance is committed to promoting innovative policies that will enhance STEM education and career pathways, advance economic development, meet our state's urgent workforce demands, incentivize regional public and private partnerships, and provide opportunities for more Washingtonians to compete for jobs in this vital high-wage sector.

Goals

- ✓ Inspire youth through career connected and real-world STEM learning opportunities.
- ✓ Provide every K–12 student access to computer science education.
- ✓ Prepare Washington's future workforce by increasing attainment of technical credentials, two- and four-year degrees, and contributing to Washington's 70% postsecondary education attainment goal.
- ✓ Improve equity by implementing interventions to close educational opportunity gaps from cradle to career, providing excellent preparation and support for STEM teachers and improving workforce diversity.
- ✓ Raise public awareness and support for STEM.

STEM ALLIANCE MEMBERSHIP

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Association of Washington School Principals
Ron Sisson

Career Connect Washington
Maud Daudon

Chehalis Bicycle Inc
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Citizen Members
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Code.org *Hadi Partovi*

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Community Colleges of Spokane *Christine Johnson*

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