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.
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 economy, #2 in the concentration of STEM jobs, #3 in STEM job growth and among the top states in tech innovation and the percentage of workforce in tech industries. 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.

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.

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.

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.

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.

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.

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.
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, 2017–18.¹

Smarter Balanced Assessment Math Scores, 2018²

<table>
<thead>
<tr>
<th>Grade</th>
<th>All</th>
<th>Low-Income</th>
<th>3rd Grade</th>
<th>5th Grade</th>
<th>8th Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 3rd Grade</td>
<td>58%</td>
<td>42%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-Income 3rd Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All 5th Grade</td>
<td>49%</td>
<td>32%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Low-Income 5th Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All 8th Grade</td>
<td>48%</td>
<td>30%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Low-Income 8th Grade</td>
<td></td>
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</tbody>
</table>

2018 AP Exam pass rates for Washington students significantly exceed national averages³

<table>
<thead>
<tr>
<th>Course</th>
<th>WA</th>
<th>National</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science</td>
<td>75%</td>
<td>67%</td>
</tr>
<tr>
<td>Computer Principles</td>
<td>74%</td>
<td>71%</td>
</tr>
<tr>
<td>Calculus</td>
<td>68%</td>
<td>64%</td>
</tr>
<tr>
<td>Biology</td>
<td>64%</td>
<td>61%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>58%</td>
<td>55%</td>
</tr>
<tr>
<td>Statistics</td>
<td>65%</td>
<td>60%</td>
</tr>
<tr>
<td>Environmental Science</td>
<td>55%</td>
<td>47%</td>
</tr>
</tbody>
</table>

A Need to Expand Opportunities for AP Computer Science⁴

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 2012.⁵

STEM degree and long-term certificate completions have shown steady increases in recent years (2013–17).⁶

At the Mid-level⁷:

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:

  - 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.

  - 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.

  - 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.

- 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.

**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.

- 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.

- 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.
Students from low-income and underserved minority families are disadvantaged at all stages in the STEM pipeline\textsuperscript{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.\textsuperscript{xiii}

ENDNOTES FROM 2019 LEGISLATIVE RECOMMENDATIONS


ENDNOTES FROM THE STEM LANDSCAPE


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.


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

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


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

IMAGE COURTESY OF LAKE WASHINGTON INSTITUTE OF TECHNOLOGY
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

Association of Educational Service Districts Network
Gene Sharratt

Association of Washington School Principals
Ron Sisson

Career Connect Washington
Maud Daudon

Chehalis Bicycle Inc
Gary Klein

Citizen Members
Jeff Estes, Marcie Maxwell
Code.org
Hadi Partovi

College Success Foundation
James Dorsey

Community Colleges of Spokane
Christine Johnson

Council of Presidents
Paul Francis

Everett Public Schools
Dana Riley Black

Gates Foundation
Isabel Munoz-Colon

General Biodiesel
Yale Wong

Highline School District
Susan Enfield

Independent Colleges of Washington
Terri Standish-Kuon

Microsoft Corporation
Brad Smith

Microsoft Philanthropies/Technology Education and Literacy in Schools
Kevin Wang

Monroe Public Schools
Nancy Truitt Pierce

North Central Educational Service District
Sue Kane

Office of Superintendent of Public Instruction
Chris Reykdal

Pacific Education Institute
Kathryn Kurtz

Pacific Northwest National Laboratory
Evangelina Galvan Shreeve

Puyallup School District
Glenn Malone

Renton School District
Brian Teppner

Student Representative
Rai Nauman Mumtaz

Thrive Washington
Deborah Jensen

US Partnership for Education for Sustainable Development
Abby Ruskey

University of Washington
Computer Science & Engineering
Ed Lazowska

Washington Mathematics Engineering and Science Achievement
Abel Pacheco

Washington State Board for Community and Technical Colleges
Jan Yoshiwara

Washington State Board of Education
Randy Spaulding

Washington State Department of Commerce
Brian Bonlender

Washington State Department of Labor & Industries
Joel Sacks

Washington State Employment Security Department
Suzan LeVine

Washington State Office of the Governor
John Aultman

Washington State Opportunity Scholarship
Naria Santa Lucia

Washington State University
Spokane
Janet Frost

Washington STEM
Caroline King

Washington Student Achievement Council
Mike Meotti

Washington Technology Industry Association
Michael Schutzler

Workforce Training and Education Coordinating Board
Eleni Papadakis

Zillah High School
Jeff Charbonneau