WASHINGTON STATE

STEM EDUCATION INNOVATION ALLIANCE

2018 STEM Education Report Card

Washington State Governor Jay Inslee honors the first cohort of tech apprentices and companies who participated in the 2017 Apprenti program. May 5, 2017

IMAGE COURTESY OF WASHINGTON TECHNOLOGY INDUSTRY ASSOCIATION

Washington State STEM Education Innovation Alliance

WASHINGTON STUDENT ACHIEVEMENT COUNCIL

EDUCATION · OPPORTUNITY · RESULTS

THE SEAL OF THE STATE OF WASHINGTON 1889

WASHINGTON'S ADVANTAGE

A world-class innovative economy

Nationally, Washington ranks:

- **#1** for **business** by CNBC, with the nation's fastest growing economy,[1]
- **#2** in concentration of **STEM jobs**,[2]
- **#3** in **STEM job growth**,[3]
- **#3** in **tech innovation**,[4] and
- **#5** in percentage of **workforce in tech industries**.[5]

THE CHALLENGE

Keeping pace with rising STEM workforce demand

Employers in Washington's technology sector have a critical need for STEM-educated workers. But STEM training and degree production in Washington is not keeping pace with demand.

Washington ranks:

- **Low** in the production of **computer science, engineering and health degrees** relative to job openings in those fields.
- **#46** in the nation and **last** among high-tech-intensive states in the proportion of **high school graduates who go directly to college**.[6]
- **#19** in **higher education attainment**.[7]

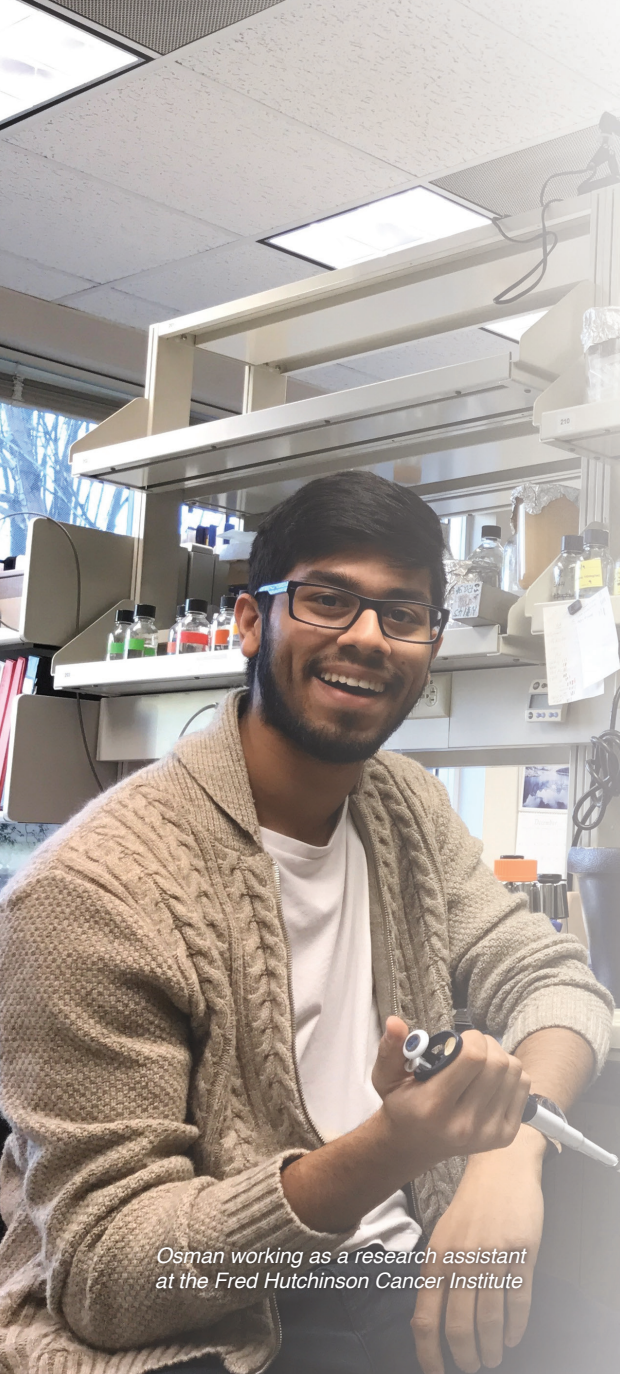
Recent regional focus groups and surveys of employers in STEM industries and others have revealed common workforce concerns across the state:

- Many graduates lack key **soft skills and communication proficiencies**.
- Both K–12 and postsecondary students need more opportunities for **work-based learning** to gain more direct knowledge and experience with careers and work environments in STEM industries.

IMAGE COURTESY OF WASHINGTON MATHEMATICS ENGINEERING AND SCIENCE ACHIEVEMENT (MESA)

IMAGE COURTESY OF TEALS/ MICROSOFT PHILANTHROPIES

IMAGE COURTESY OF THE AEROSPACE JOINT APPRENTICESHIP COMMITTEE (AJAC)



Osman working as a research assistant at the Fred Hutchinson Cancer Institute

SPOTLIGHT

Washington State Opportunity Scholarship Recipient, Osman Salahuddin

A volunteer experience first piqued Osman Salahuddin's interest in neuroscience several years ago. Volunteering at a local preschool with a five-year-old boy with high-functioning autism inspired Osman to understand how our neurological functions influence behavior. Now a senior at the University of Washington (UW), Osman's lab research and rigorous studies in a highly competitive neurobiology program have cemented his passion for health care advocacy.

As a Washington State Opportunity Scholarship (WSOS) Scholar, Osman has had so many opportunities to explore the field beyond the education he was getting in the classroom. "I came to the UW as a pre-med student thinking that medical school was the only career option," said Osman. "Through WSOS, I now realize that I have so much potential to be able to pursue a career in many different fields."

WSOS is a public-private partnership that fuels Washington's economy by providing scholarships and support services to low- and middle-income Washington kids pursuing high-demand STEM and health care degrees in Washington State. Every private sector dollar invested in WSOS is matched 1:1 by the State of Washington.

Industry partners like Battelle — the generous sponsor of Osman's $22,500 scholarship — are critical to helping Scholars build professional connections and explore career options while in school. Scholarship dollars also gave Osman the ability to pursue leadership opportunities, like his election as the 2017–18 ASUW Student Body President of UW-Seattle.

Thanks to the support and guidance he received as a Scholar, Osman is excited about his career path. He hopes to combine his passion for public health policy with a career in either medicine or biotechnology.

WASHINGTON STATE OPPORTUNITY SCHOLARSHIP

MESSAGE FROM WSOS EXECUTIVE DIRECTOR NARIA SANTA LUCIA

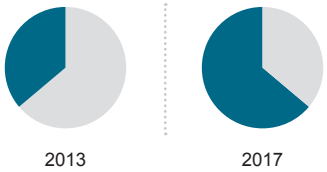
WSOS is grateful for the incredible leadership of the STEM Alliance to help close talent gaps by building pathways for Washington students to get the STEM education and training they need to compete for jobs in our economy. The STEM Alliance continues to champion funding for WSOS, which is essential to securing the state investment needed to build this innovative public-private partnership. Thank you for your part in supporting Scholars, like Osman, who will become the next generation of STEM and health care leaders in Washington state.

For further information about the Washington State Opportunity Scholarship: https://waopportunityscholarship.org.

KEY STEM PROGRESS INDICATORS

★ STEM awareness

In 2017, approximately **62%** of Washington voters had heard of STEM, almost double the portion familiar with the term in 2013 (**32%**).[8]



★ Interest in STEM studies among high school students

In 2017, approximately **31%** of Washington SAT-takers indicated an intention to pursue a degree in a STEM major, an increase from **25%** in 2010.[9]

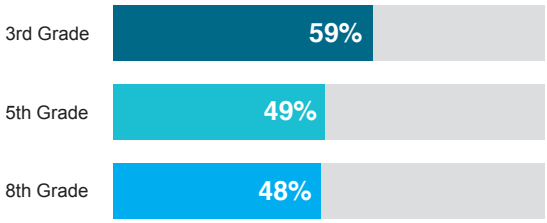
★ STEM Achievement: Pre-school through K–12

Kindergarten readiness in math

About **66%** of incoming kindergarteners demonstrated "kindergarten readiness" in math among students assessed by WaKIDS, 2016–17.[10]

Smarter Balanced Assessment math scores, 2016–17:[11]

- At the 3rd grade level, more than one-half (**59%**) of students met the math standard.
- At the 5th grade level, **49%** met the standard.
- At the 8th grade level, **48%** met the standard.



Student readiness for college-level studies in STEM subjects:[12]

Advanced Placement (AP) Computer Science:

The number of high schools offering AP Computer Science in Washington has grown substantially from **14 schools** in 2011 to **98 schools** in 2017.

Simultaneously, the number of students taking the AP Computer Science exam has grown from **1,048 students** in 2014 to **1,900 students** in 2017. Among those, **73%** earned a score consistent with college credit, up from **66%** in 2014.

Yet, despite this progress, less than 15% of high schools offer AP computer science.

★ Alignment of STEM education programs with workforce demand in key economic sectors

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 undergraduate degrees awarded at all Washington baccalaureate institutions in 2016 were in STEM subjects, up from **22%** in 2012.[13]

Increased STEM baccalaureate degree completions, 2012–2016:

ENDNOTES and data sources for the 2018 STEM Education Report Card are available at stem.wa.gov. The endnotes are included in this electronic version of the Report Card on page 9.

STEM degree and certificate completions have shown steady increases in recent years (2012–2016).[14]

At the Mid-level:

Associate degree and long-term certificate completions in STEM fields increased by **13%**.

At the Baccalaureate level:

Degree completions in Computer and Information Sciences grew by **83%**, in Engineering and Related Fields by **25%**, and in Health by **30%**.

At the Graduate level:

Degree completions in Computer and Information Sciences grew by **150%**, in Engineering and Related Fields by **35%**, and in Health by **15%**.

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 for computer scientists and the number of graduates in Washington prepared to fill them. Projections for the years 2020–2025 estimate that:[15]

- Out of a total of about **9,125** annual job openings, there will be **5,883** more openings in Computer Science than there are graduates completing degree programs prepared to take them.

Graduates prepared for computer science jobs

Unfilled computer science jobs

- Out of a total of about **2,589** annual job openings, there will be **429** more openings in Engineering than there are graduates prepared to fill them.

Graduates prepared for engineering jobs

Unfilled engineering jobs

★ Underrepresented Populations in STEM

Gender imbalance in STEM achievement widens 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 2016–17 WaKIDS assessment.[16]

Ready for Pre-k

- As they move through the education pipeline, however, interest and achievement in STEM tends to fade for female students. In 2017, only 29% of students completing AP Computer Science were female.[17]

- Male students also complete STEM degrees in greater numbers than female students. In 2015, only **34%** of students completing associate degrees or bachelor's degrees in STEM were female and only **22%** completed degrees in computer science.[18]

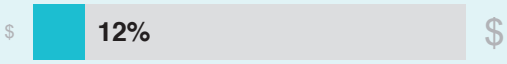
STEM

Computer Science

Students from low-income families are disadvantaged at all stages.[19]

- Among low-income pre-K students, only **50%** demonstrated "kindergarten readiness" in math in 2016–17.[19]

- Among students completing AP Computer Science courses, only **12%** were from low-income families in 2015–16.



LEGISLATIVE RECOMMENDATIONS

Legislative Session 2018: Recommendations to the Governor and the Legislature

In today's world, STEM (Science, Technology, Engineering and Math) knowledge and skills have led to scientific and technological innovations that have permeated our everyday lives and brought immense benefits and challenges. In order to ensure that our youth and adults can compete for exciting new careers in STEM, the STEM Education Innovation Alliance recommends increasing STEM education and career-connected learning opportunities from kindergarten to graduate school.

These strategies must include a focus on increasing participation of underrepresented students and reengaging working adults in postsecondary STEM programs. While most of the recommendations are specific to STEM education, progress is dependent upon a strong foundation through a high quality, well-funded and well-aligned early learning, K–12 and postsecondary education system.

Inspire interest in and preparation for STEM careers through career-connected learning and enhanced STEM curricula.

- Provide additional math support to K–2 students who need it, and professional learning for K–2 teachers to implement math standards.
- Integrate the High School and Beyond plan into the school curriculum, beginning in Grade 8.
- Assign computer science specialists at all educational service districts and ensure initiatives reach all students in the district.
- Expand computer science and education grants to build foundational math skills in elementary school, provide teacher training, make technology purchases and support equity of access for historically underserved groups, including girls and students from low-income, rural and ethnic minority communities.*
- Provide work-based learning and state-approved industry apprenticeships to high school students integrating academic and occupational curricula, and support training and time to implement the new programs.*
- Support funding for professional development strategies that support the Next Generation Science standards.
- Expand dual credit opportunities in STEM: e.g fully fund College in the High School, provide support for books and transportation in Running Start for low-income students, and support K–12 to postsecondary articulation of STEM dual credit opportunities that includes CTE dual credit.
- Provide funding for STEM laboratories, equipment, and classrooms in K–12. (Capital budget)

Support collaboration of industry, educators, foundations, and related state and local government entities to design STEM education strategies, including a focus on equitable access and retention.

- The power of partnership has been invaluable in identifying needs, goals and strategies that will support STEM in the future. The STEM Education Innovation Alliance requests funding support for the partnership to continue this vital collaboration.

Expand postsecondary STEM education, with a focus on equitable access and retention.

- Expand **financial aid** opportunities to increase equity of access and retention in STEM programs:
  - ✓ Rebuild State Work Study and increase the state share of match for positions in STEM fields. This form of financial aid is available for both undergraduate and graduate students at both public and independent schools.*
  - ✓ Fully fund the State Need Grant to serve 21,000 students who are eligible but unserved. It is estimated that 25 percent of students receiving SNG are in STEM.
  - ✓ Expand the Opportunity Scholarship to students in professional-technical certificate and degree programs as well as programs that address the healthcare skills gap.*
  - ✓ Provide Tech Apprenticeship Training stipends to support adults returning to pursue STEM education.*
- Expand **postsecondary STEM education** opportunities:
  - ✓ Support college and university operating and capital budget requests:

    UW: Funding for continued enrollment expansion in Computer Science & Engineering.

    TESC: CS (network analysis, robotics, and cybersecurity) program development and expansion that leverages private and National Science Foundation grant funding and alumni donations, including applied learning experiences for students and faculty.

    CWU: Game On (Coding in K–12) and Cybersecurity program development and expansion. Support curriculum development for CS endorsement (teacher preparation).

    WWU: STEM bottleneck reduction and gateway program expansion (math, physics and chemistry) and high-demand STEM program expansion (CS, engineering and pre-health sciences). Includes pre-advising and cohort support model for improved outcomes for underserved students. Marine, coastal and watershed sciences program expansion; and the Poulsbo Marine Science Center

    WSU: Renewable Energy Program start-up and maintenance funding to implement Senate Bill 5939; and the Joint Center for Deployment and Research in Earth Abundant Materials (JCDREAM) in collaboration with the Pacific Northwest Laboratory and the University of Washington to develop and commercialize next-generation technologies. These technologies are designed to support energy security, economic stability and environmentally sound stewardship.

    EWU: Provide funding to support the Interdisciplinary Science Building to enable growth of 20 percent in the STEM college.
  - ✓ Support **SBCTC** Guided Pathways planning funding for 22 colleges to organize courses along clear career paths. This initiative focuses on helping more students, especially low-income, first-generation students and students of color, to pursue pathways that lead into the workforce or into a college or university for further education. Career pathways include STEM-focused fields such as science, information technology, allied health, and advanced manufacturing technologies.
  - ✓ Expand **work-based learning** and state-approved industry **apprenticeships**.*

**Includes a private match component.*

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 devising 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*

Citizen Members *Jeff Estes, Marcie Maxwell*

Code.org *Hadi Partovi*

College Success Foundation *Michael Cheever*

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 *Violet Boyer*

Microsoft Corporation *Brad Smith*

Monroe Public Schools *Nancy Truitt Pierce*

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*

Seattle Metropolitan Chamber of Commerce *Maud Daudon*

Society of Professional Engineering Employees in Aerospace *Vacant*

Student Representative *Rai Nauman Mumtaz*

Technology Education and Literacy in Schools / Microsoft Philanthropies *Kevin Wang*

Thrive Washington *Alan Cohen*

University of Washington Computer Science & Engineering *Ed Lazowska*

Washington Mathematics Engineering and Science Achievement *James Dorsey*

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 *Dale Peinecke*

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*

ENDNOTES

[1] 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.

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

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

[4] Computing Technology Industry Association (CompTIA). (2017) Cyberstates 2017. Retrieved October 11, 2017 from http://www.cyberstates.org/pdf/CompTIA%20Cyberstates%202017.pdf.

[5] Computing Technology Industry Association (CompTIA). (2017) Cyberstates 2017. Retrieved October 11, 2017 from http://www.cyberstates.org/pdf/CompTIA%20Cyberstates%202017.pdf.

[6] National Center for Higher Education Management Systems (NCHEMS) Information Center. (2016) Multistate analysis based on NCES, IPEDS Enrollment Survey and WICHE, Knocking at the College Door: Projections of High School Graduates, 2016. Retrieved June 6, 2017 from http://www.higheredinfo.org/dbrowser/index.php?submeasure=63&year=2010&level=nation&mode=graph&state=0.

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

[8] Washington STEM and Strategies 360. (2017) Public Attitudes Towards STEM Education in Washington: Findings from a Statewide Survey of Registered Voters. Retrieved July 28, 2017 from http://www.washingtonstem.org/STEM/media/Media/STEM%20Policy/16-485-WA-STEM-2017-Survey-Analysis.pdf.

[9] College Board. (2017) SAT Suite of Assessments Annual Report: Washington. Retrieved December 10, 2017 from https://reports.collegeboard.org/pdf/2017-washington-sat-suite-assessments-annual-report.pdf.

[10] Washington State Office of Superintendent of Public Instruction, Report Card. Washington Kindergarten Inventory of Developing Skills (WaKIDS). Retrieved December 15, 2017 from http://reportcard.ospi.k12.wa.us/WaKidsDetailPage.aspx.

[11] Washington State Office of Superintendent of Public Instruction, Report Card. Smarter Balanced Assessments.

[12] College Board. AP Program Participation and Performance Data 2017.

[13] Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

[14] Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

[15] Washington Student Achievement Council (WSAC), Workforce Training and Education Coordinating Board (WTECB), and State Board for Community and Technical Colleges (SBCTC) joint analysis of 2017 Washington ESD long-term employment forecast; Bureau of Labor Statistics Training levels; IPEDS; 2017 Census PUMS data.

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

[17] Washington State Office of Superintendent of Public Instruction, Report Card.

[18] Integrated Postsecondary Education Data System (IPEDS), National Center for Education Statistics.

[19] Washington State Office of Superintendent of Public Instruction, Report Card.