Washington State

STEM Education Innovation Alliance

2023 STEM Education Report Card Update

Science

Technology

Engineering

Math

In This Report:

2023 Year in Review

Washington's STEM Challenge

2023 Legislative Session Highlights







2023 STEM Year in Review – A Snapshot

Washington remains one of the leading states in the country for STEM employment.

- #1 In the ECONOMIC IMPACT OF TECHNOLOGY AS A PERCENT OF THE STATE ECONOMY. Washington has the highest concentration (9.4%) of technology workers relative to its overall employment base.
 - In INTENSITY OF THE TECHNOLOGY AND SCIENCE WORKFORCE.² Washington has the highest share of workers in computer and information technology, engineering, and life & physical sciences occupations as a percentage of total state employment.
- #4 In TECHNOLOGY CONCENTRATION AND DYNAMISM, a measure of tech industry growth.3
- #6 On the Milken Institute's STATE TECHNOLOGY & SCIENCE INDEX, one spot lower than the previous year.⁴

Demand for computer & information technology skills remains strong in a wide range of industries despite the recent wave of layoffs in high profile tech companies. ⁵

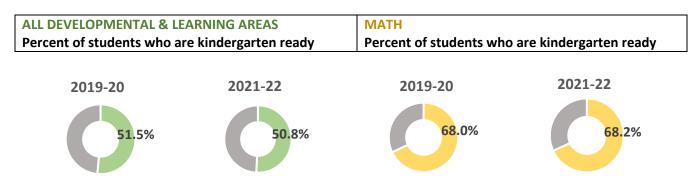
Opportunities for high wage jobs in computer & Information technology remain widespread. Nationally, nine out of ten jobs in computer & information technology are in companies outside the tech sector.6 And Washington data on IT jobs reflects this same trend. Many IT jobs are in industries such as scientific & technical services, retail trade, manufacturing, finance and insurance, and health care. Operations in many industries are becoming increasingly requiring workers skilled digital, information technology.

Unique Job Postings in Computer & Information Technology in 2022 A Selection of Top Industries



This demand presents a challenge and an opportunity for Washington to help residents attain the education they need to prepare for high wage careers in STEM.

The challenge begins with early learning and kindergarten readiness. In 2022, 68.2 percent of students were kindergarten ready in math and only 50.8 percent were kindergarten ready in all development and learning areas.⁷



In 2022, the percentage of students meeting the math standard on Washington's National Assessment of Educational Progress (NAEP) at the 4th grade level were near the national average, but 8th grade scores fell significantly below.⁸

35.0%

NAEP Math Scores - 4th Grade (2022) Percentage at Proficient Level or Higher

Students

Income

WA

WA

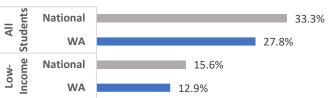
National

F

Percentage at Proficient Level or Higher National 36.3%

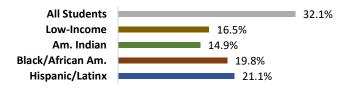
20.6%

NAEP Math Scores - 8th Grade (2022) Percentage at Proficient Level or Higher

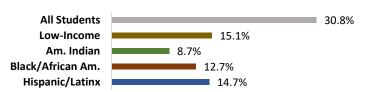


Smarter Balanced Assessment (SBA) math scores show the percentage of low-income students and students from underserved racial and ethnic groups that met standard were below the percent for all students, with scores declining as students proceed through the K-12 grades.⁹

3rd Grade Math- SBA Scores Percent Meeting Standard in 2022



10th Grade Math- SBA Scores Percent Meeting Standard in 2022



The same pattern in seen in the Washington Comprehensive Assessment of Science (WCAS) scores, with lower percentages of students from underserved racial and ethnic minorities meeting standard and overall scores declining in later grades.¹⁰

5th Grade Science 2021-22 Percent Meeting Standard

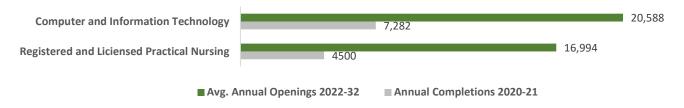


11th Grade Science 2021-22 Percent Meeting Standard



The STEM education and labor market outlook shows significant misalignment in the engineering field and in the field of computer & Information technology, where projected annual job openings far outnumber annual degree completions.¹¹

Key Gaps between STEM Degree & Certificate Completions and Projected Annual Job Openings



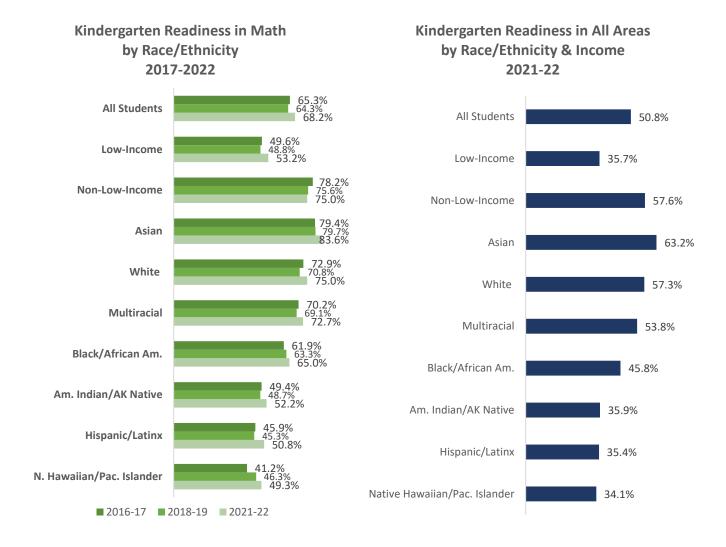
FARLY LEARNING

Masser & Masser & Masser & Masser & Masser

Kindergarten readiness is a persistent area of concern. More effort is needed to help students be fully prepared at this critical stage, particularly for those from demographic groups furthest from educational justice. Students who demonstrate kindergarten readiness in math, literacy, and four other developmental areas are more likely to meet standards in math and English language arts assessments in 3rd grade and beyond.¹²

In 2021–22, over 50.8 percent of students were kindergarten ready in all six developmental and learning areas, a slight decline from 51.5 percent two years before. A little over 68 percent of incoming kindergarteners demonstrated "kindergarten readiness" in math among students assessed by WaKIDS in 2021-22, a 4 percent improvement over the previous year.

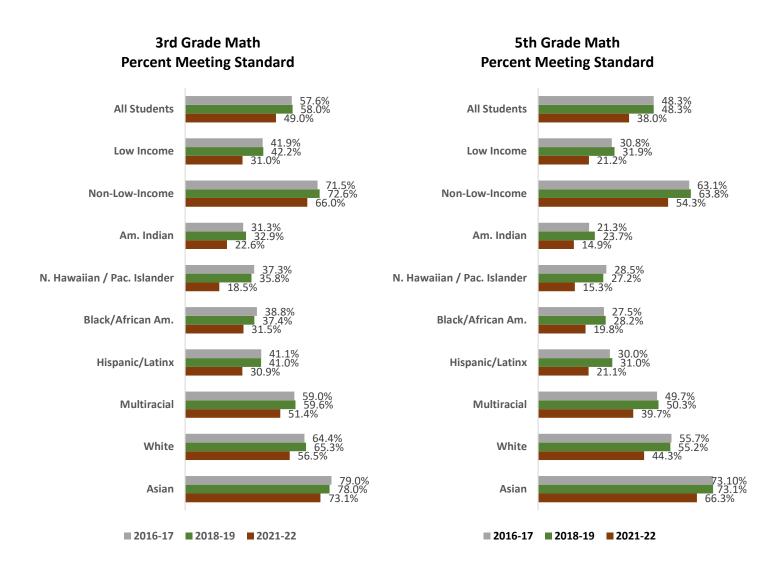
However, readiness is not evenly spread across racial and ethnic groups. The chart below on math readiness reveals that American Indian/Alaskan Native, African American, Hispanic/Latinx, and low-income students are significantly less likely to be prepared with the skills and abilities necessary to succeed at the next level as they enter kindergarten



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

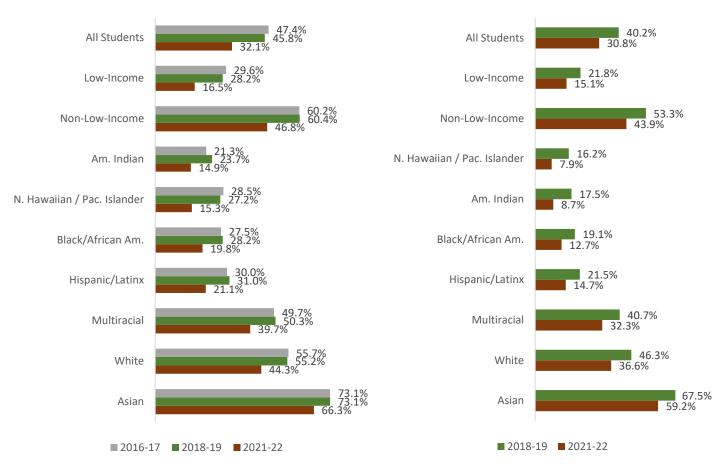
The Percentage of Students Meeting Standard in Math Declined in 2022

As students proceed through successive grades in the K–12 system, the knowledge and skills they acquire at each level are crucial to their academic success at the next level. The Smarter Balanced Assessment (SBA) measures student progress to determine if they are meeting established learning standards. Smarter Balanced Assessment (SBA) Results show a decline over the last two years, across all demographic groups, in the number of students meeting standard in math, as they progress through successive grades. The percentages decreased at each grade level, through 3rd, 5th, 8th, and 10th grades. In addition, low-income, American Indian/Alaskan Native, African American, and Hispanic/ Latinx students meeting Smarter Balanced learning standards in math and science remain relatively low. This is a point of concern and indicates a need for expanded student support services to help them stay on track. Data was not collected in 2020 due to the COVID-19 pandemic.



8th Grade Math Percent Meeting Standard

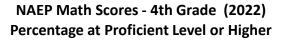
10th Grade Math Percent Meeting Standard

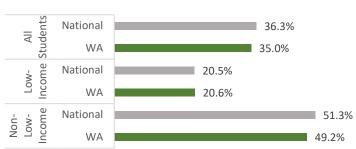


Source: Washington State Office of Superintendent of Public Instruction, Report Card. Smarter Balanced Assessments. 14

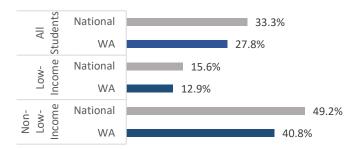
The Percent of Students Meeting Standard in Math in Grades 4 and 8 is Below the National Average

The National Assessment of Educational Progress (NAEP) mathematics assessment is given every two years to students at grades 4 and 8. The assessment measures both mathematics knowledge and the students' ability to apply their knowledge in problem-solving situations. The results present a broad view of students' mathematics knowledge, skills, and performance over time. In 2022, the assessment showed the largest score declines at grades 4 and 8 since initial assessments in 1990. Washington scores were below the national average for percent meeting standard for all students and for low-income and non-low-income students at the 8th grade level and in all but one category at the 4th grade level.



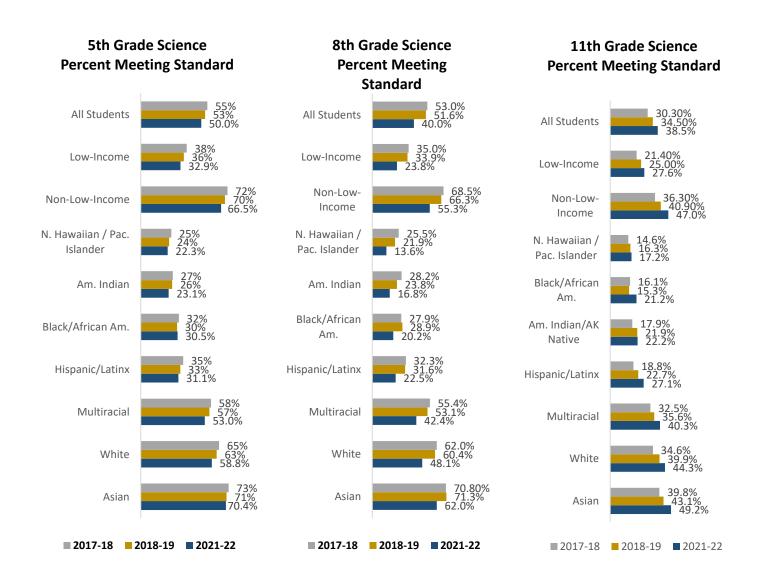


NAEP Math Scores - 8th Grade (2022) Percentage at Proficient Level or Higher



The Percent of Students Meeting Standard in Science Reveal the Challenges That Low-Income, Hispanic/Latinx, Black, American Indian, and Native Hawaiian/Pacific Islander Students Face

The Washington Comprehensive Assessment of Science (WCAS) measures the level of proficiency that Washington students have achieved based on the Washington State 2013 K-12 Science Learning Standards, which are the Next Generation Science Standards (NGSS). All students are assessed on their knowledge of the standards at grades 5, 8, and 11. The assessment shows that the percentage meeting standard for low-income students and students from underserved minorities (Hispanic/Latinx, Black/African/American, American Indian, and Native Hawaiian/Pacific Islander) are significantly lower. Percentages for all student groups declined from 2018 to 2022 at the 5th and 8th grade levels but improved at the 11th grade level. However, the overall trend in percentages meeting standard shows a steady decline as students move from 5th grade to the 11th.



Source: Washington State Office of Superintendent of Public Instruction, Report Card. Washington Comprehensive Assessment of Science (WCAS).

Spotlight on Computer Science

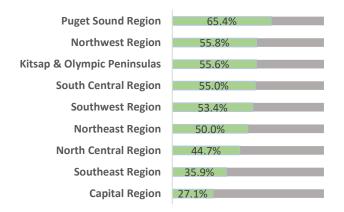
Only 52.3 percent of high schools in Washington statewide offer computer science, compared with 53 percent nationally.

Percent of High Schools offering Computer Science Courses Statewide

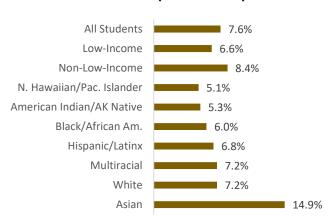


These are already inadequate numbers to meet the need for access to computer science in the state's high schools. But percentages also vary widely by region, with some areas, particularly in more rural parts of the state, with much lower computer science availability. The enrollment numbers are even more concerning. The percentage of all students in Washington statewide who were enrolled in computer science courses was only 7.6 percent, and the percentage of low-income and underserved racial and ethnic minorities was even lower.

Percent of High Schools offering Computer Science Courses by Region 2022



Percentage of Students Enrolled in Computer Science Courses Statewide 2020-21 (Grades 9-12)



Source: Washington State Office of Superintendent of Public Instruction, Report Card.

Opportunities for high wage jobs in computer & information technology are abundant despite a recent wave of layoffs

Despite a wave of layoffs in high profile tech companies in the latter part of 2022, overall employment opportunities in information technology remain robust. Nationally, nine out of ten jobs in computer & information technology are in companies outside the tech sector. ¹⁶ Washington data on jobs reflects this same trend. In fact, most information technology jobs are in industries such as professional and scientific services, finance and insurance, retail, healthcare and manufacturing. Operations in all these industries are becoming increasingly digital, requiring workers skilled in Information technology.

Computer & Information Technology

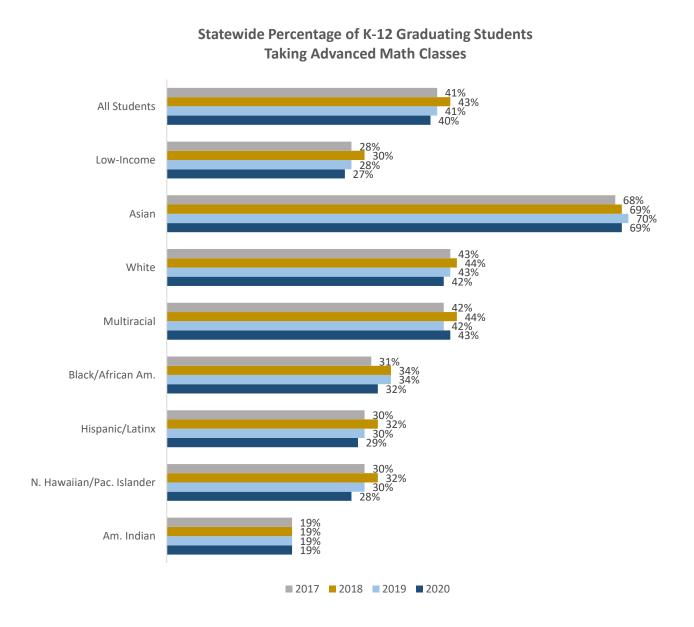
Projected Annual Job Openings 2022-32
Compared to Annual Degree & Certificate
Completions in Computer Science



Source: WSAC staff analysis of IPEDS and Lightcast labor market data.

Low-Income students and students from underserved minorities are less likely to taking advanced math classes in high school

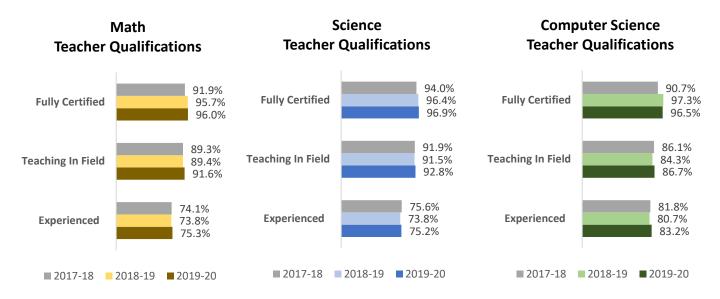
In 2020, 40 percent of all Washington students graduating high school had taken advanced math classes beyond algebra 2. That figure matches the national percentage. ¹⁷ There has been slight variation from year to year since 2017, but the percentage has not changed significantly. More concerning is the trend showing that low-income students and students from underserved minorities are less likely to take these courses. Studies have shown that students' who take advanced math coursework in high school have an easier time transitioning to college STEM courses and are more likely to persist in STEM studies and to enter STEM careers. ¹⁸



STEM Teacher Qualifications

The percentage of teachers who are fully certified in Math, Science, or Computer Science is above 96 percent, but the percentage with more than 5 years of experience teaching in field is significantly lower. For example, in 2022, only 75 percent of math and science teachers had more than 5 years of experience in the field. And the percent of experienced teachers in computer science was only slightly higher at 83 percent. Adequate experience in teaching is important in the STEM field, since many of the concepts involved are relatively complex and effective teachers must develop an

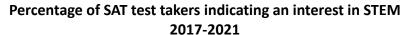
expansive repertoire of teaching strategies and instructional approaches for a diverse range of students with varying levels of preparation. Developing and retaining qualified teachers is crucial to advancing STEM education.¹⁹

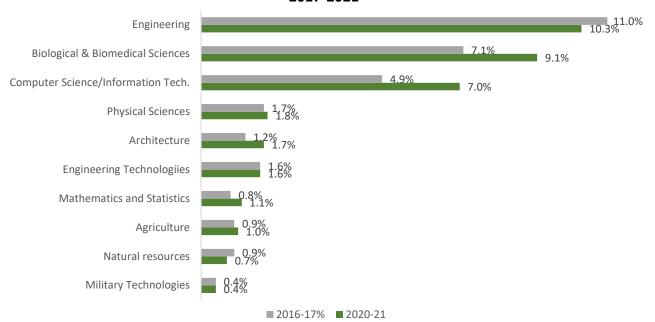


Source: Washington State Office of Superintendent of Public Instruction, Report Card.

Interest in postsecondary STEM studies is rising²⁰

Over the past decade, the percentage of students taking SAT tests who indicated they intend to major in a STEM subject in college has shown a moderate but consistent increase each year in most subject areas. The percentage interested in a STEM major rose from 25 percent in 2016–17 to nearly 35 percent in 2020–21.

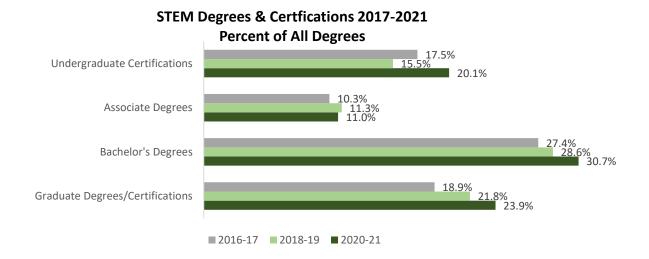




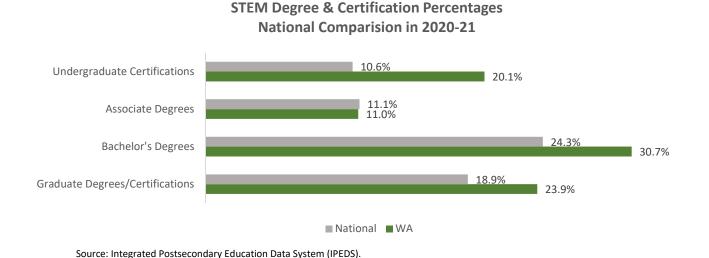
Source: College Board. AP Program Participation and Performance Data

Postsecondary

STEM Degree Completions as a percentage of all degrees have been increasing at the associate, bachelor's, and graduate levels. Since 2016-17, STEM degree and certificate percentages have grown by 3 percent at the bachelor's level and by 5 percent at the graduate level.



A national comparison for the 2020-21 academic year shows that Washington STEM percentages exceed the national average in most categories. STEM bachelor's degree completions represented 30.7 percent of all bachelor's degrees and exceeded the national average (24.3 percent) by more than 6 percentage points. Graduate Degree completions in STEM fields as a percentage of all graduate degrees (23.9 percent) exceeded the national average (18.9 percent) by 5 percentage points.

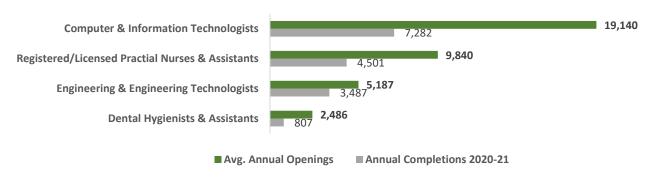




Keeping pace with rising employer demand for skilled, STEM-educated workers remains a challenge

Demand for workers with STEM skills remains strong, with projected annual job openings outpacing the number of students completing STEM degree and certificate programs each year. In the engineering and related technology field, annual job openings exceed annual completions by more than 21 percent. The gap is even larger in the computer and information technology field, with 20,588 projected annual job openings compared to only 4,293 annual completions.

Key Gaps between STEM Degree & Certificate Completions and Projected Annual Job Openings 2023-33

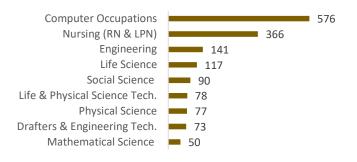


Source: WSAC staff analysis of IPEDS and Lightcast Q4 2023 labor market data

STEM employment opportunities are prevalent in all regions of the state

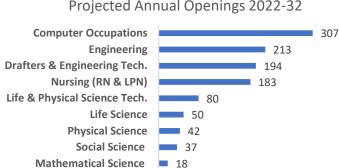
Projected STEM job openings vary by region but share some commonalities. Computer and engineering occupations hold the top positions in all regions, with much higher numbers in Puget Sound and the other more densely populated areas of the state. Openings for scientific and engineering technician positions are also prominent in most areas.

Capital Region STEM Occupations Projected Annual Openings 2022-2032



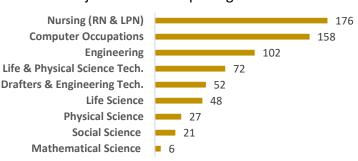
Kitsap & Olympic Region

STEM Occupations
Projected Annual Openings 2022-32



North Central Region

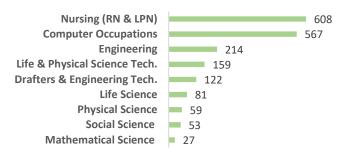
STEM Occupations
Projected Annual Openings 2022-32



Northeast Region

STEM Occupations

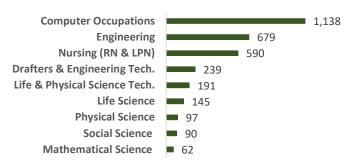
Projected Annual Openings 2022-2032



Northwest Region

STEM Occupations

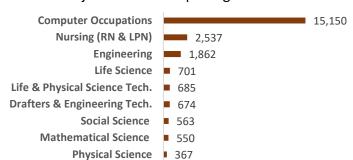
Projected Annual Openings 2022-32



Puget Sound Region

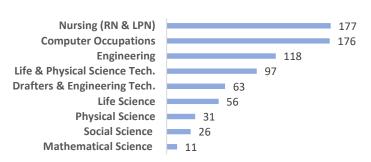
STEM Occupations

Projected Annual Openings 2022-32



South Central Region

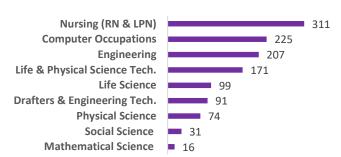
STEM Occupations
Projected Annual Openings 2022-32



Southeast Region

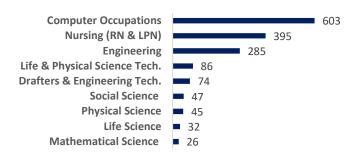
STEM Occupations

Projected Annual Openings 2022-32



Southwest Region

STEM Occupations
Projected Annual Openings 2022-2032

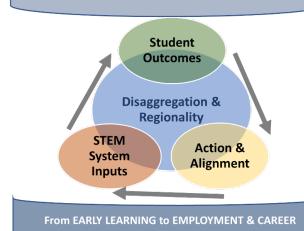


Source: WSAC staff analysis of Lightcast Q4 2022 labor market data

STEM Education Innovation Alliance

Framework for Action & Accountability

GOAL: To equitably expand STEM learning opportunities and improve educational outcomes in STEM for Washingtonians



Measuring Progress

In October 2022, the STEM Alliance approved a revised Framework for Action and Accountability, with an expanded set of progress indicators. The overarching goal of the Alliance is to provide the Governor with vision, guidance, assistance, and strategies to increase advice on learning opportunities and improve educational outcomes in STEM across the full spectrum from early learning to employment and careers. The Framework pictured to the left captures the dynamics of how various measures associated with STEM System Inputs, Student Outcomes, and Action & Alignment elements are tracked to monitor progress, with Disaggregation and Regionality acting as guiding principles.

2023 Legislative Session Highlights²¹

Early Learning

SB 5225 Increased access to the Working Connections Child Care Program.

K-12

- \$135,000 in fiscal year 2024 and \$135,000 in fiscal year 2025 for STEM lighthouse projects.
- \$100,000 in fiscal year 2024 and \$100,000 in fiscal year 2025 for the Mobius science center to expand mobile outreach of STEM education to students in rural, tribal, and low-income communities.
- \$75,000 in fiscal year 2022 and \$75,000 in fiscal year 2023 for the office of the superintendent of public instruction to coordinate and promote efforts to develop integrated math, science, technology, and engineering programs in schools and districts across the state.
- SB 5048 Fees eliminated for dual credit programs to address cost barriers for low-income students.
- HB 1316 Access to dual credit programs expanded. Every school district, charter school, and state-tribal
 education compact school must allow eligible students to participate in the Running Start (RS) program.
 Students may earn credits during summer terms.

Postsecondary

- \$150,000 in fiscal year 2024, \$150,000 in fiscal year 2025, and \$200,000 of the workforce education investment account for University of Washington MESA programs to provide enrichment opportunities to students who are traditionally underrepresented in these programs.
- \$500,000 for Washington State University to plan and implement expansion of MESA activities at the Everett campus.
- \$2,636,000 for Eastern Washington University to maintain a computer engineering degree program in the college of science, technology, engineering, and math.
- \$3,426,000 for Western Washington University to maintain access to science, technology, engineering, and mathematics degrees.

Concluding Comments

STEM education is vital to Washington's innovation-driven economy and aligning the state's STEM education system with labor market demand is imperative. The focus must be on improving the full spectrum from early learning and K-12 to career-connected learning and postsecondary programs. All stages are crucial to helping students develop the key STEM skills and credentials they will need to prepare for good career opportunities in Washington's dynamic and evolving economy. Expanding institutional enrollment capacity in key fields may remove barriers that are driving some of the skilled worker supply and demand gaps, particularly in fields such as computer science and information technology. Another key to advancing STEM education and labor market alignment is to address equity issues, to ensure that groups that have been historically underrepresented and underserved, including low-income students and students from racial and ethnic minorities, are given the supports and resources they need to succeed in their education and career goals.

References

Federman, M. (2007). State graduation requirements, high school course taking, and choosing a technical college major. B.E. Journal of Economic Analysis & Policy: Advances in Economic Analysis & Policy, 7(1), 1-32.

¹ Computing Technology Industry Association (CompTIA). (2022). STATE OF THE TECH WORKFORCE, CYBERSTATES 2022. https://www.cyberstates.org/pdf/CompTIA Cyberstates 2022.pdf.

² Milken Institute Center for Regional Economics. (2022) State Technology and Science Index 2022. https://milkeninstitute.org/sites/default/files/2022-11/State Technology and Science Index 2022 Milken Institute 0.pdf.

³ Milken Institute Center for Regional Economics (2022).

⁴ Milken Institute Center for Regional Economics (2022).

⁵ WSAC staff analysis of Lightcast Q4 2022 labor market data.

⁶ Burning Glass Technologies. (2019). Beyond Tech: Rising Demand for IT Skills in Non-Tech Industries. https://www.burning-glass.com/wp-content/uploads/BGT_Oracle_BeyondTech_v7.pdf.

⁷ Washington State Office of Superintendent of Public Instruction, Report Card. Washington Kindergarten Inventory of Developing Skills (WaKIDS)

National Center for Education Statistics (NCES), National Assessment of Education Progress (NAEP), 2022.

⁹ Washington State Office of Superintendent of Public Instruction, Report Card. Smarter Balanced Assessments.

¹⁰ Washington State Office of Superintendent of Public Instruction, Report Card, Washington Comprehensive Assessment of Science (WCAS).

¹¹ WSAC staff analysis of IPEDS and Lightcast Q4 2022 labor market data. This report uses a broad definition of STEM that includes healthcare as an important STEM-related field.

¹² Washington State Institute for Public Policy, "Outcome Evaluation of Washington State's Early Childhood Education and Assistance Program," December 2014, https://www.wsipp.wa.gov/ ReportFile/1576/Wsipp_ Outcome-Evaluation-of-Washington-StatesEarly-Childhood-Educationand-Assistance-Program_Report.pdf

¹³ Note: Data was not collected in 2020 due to the COVID-19 pandemic.

¹⁴ Due to school facility closures and the suspension of end-of-year testing due to the COVID-19 crisis, assessment data for 2019-20 is not available.

¹⁵ NAEP Report Card: 2022 NAEP Mathematics Assessment. https://www.nationsreportcard.gov/highlights/mathematics/2022/.

¹⁶ Burning Glass Technologies. (2019). Beyond Tech: Rising Demand for IT Skills in Non-Tech Industries. https://www.burning-glass.com/wp-content/uploads/BGT Oracle BeyondTech v7.pdf.

¹⁷ Source: National Center for Education Statistics (NCES), Fast Facts, Advanced Mathematics and Science Courses. https://nces.ed.gov/fastfacts/display.asp?id=97.

¹⁸ Sadler, P., Sonnert, G., Hazari, Z., and Robert, T. (2014) The Role of Advanced High School Coursework in Increasing STEM Career Interest. Science Educator, Summer 2014 Vol. 23, No. 1.

¹⁹ Council of Scientific Society Presidents. (2018). The Need for Well-Qualified Science and Mathematics Teachers. https://www.sciencepresidents.org/assets/docs/2018-CSSP-Statement-Need-for-STEM-teachers.pdf.

²⁰ Note: The use of stated postsecondary interests of SAT test takers has inherent limitations with respect to drawing more general conclusions. SAT test takers are not broadly representative of the diverse range of students in the state, and a measure based on their interests may not capture those of students from historically underserved racial and ethnic groups.

²¹ The STEM investments highlighted in this section use a broad definition of STEM that includes healthcare as an important STEM-related field.



Washington State

STEM Education Innovation Alliance

The STEM Education Innovation Alliance, legislatively created in 2013, 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.

ALLIANCE MEMBERSHIP

Amazon

Lindsay Hopkins

Program Manager, AWS Educate Cloud Degree

Association of Washington Principals

Scott Friedman, Associate Director

Ballmer Group

Andi Smith, Executive Director, Washington

Bill & Melinda Gates Foundation

Bish Paul, Senior Program Officer, Policy, Advocacy & Communications

Washington State Initiative & Washington Charters

Career Connect Washington

Maud Daudon, Executive Leader

Citizen Member

Jeff Estes

College Success Foundation

James Dorsey, President & CEO

Council of Presidents,

Ruben Flores, Interim Executive Director

Greater Spokane Inc.

Alisha Benson, CEO

Independent Colleges of Washington

Terri Standish-Kuon, President and CEO

Mentors in Tech

Kevin Wang, Founder and Program Director

Microsoft Philanthropies

Jolenta Coleman-Bush, Senior Program Manager

North Central Educational Service District | Apple STEM Network

Sue Kane, Director of STEM Initiatives and Strategic Partnerships

Pacific Education Institute

Kathryn Kurtz, Executive Director

Pacific Science Center

Will Daugherty, President and CEO

Raikes Foundation

Dina Blum Burlingame, Program Officer, Education

Starbucks Corporation

Evan Smith, Vice President, Technology Strategy and Business

Transformation STEMCore Consulting

Deidre Holmberg, Founder and Lead Consultant

The Museum of Flight

Dana Riley Black, Vice President of Education

University of Washington Computer Science & Engineering

Ed Lazowska, Bill & Melinda Gates Chair

Wagstaff, Inc.

Kevin Person, CEO

Washington Mathematics Engineering and Science Achievement

(MESA), Gregory King, Executive Director Washington State Board of Education Randy Spaulding, Executive Director

Washington State Department of Children, Youth and Families

Ross Hunter, Secretary

Washington State Department of Commerce

Carolyn Busch, Innovation Workforce & Industry Sector Development

Coordinator, OEDC-ISD, Industry Sector Development Washington State Department of Labor & Industries

Joel Sacks, Director

Washington State Employment Security Department

Cami Feek, Commissioner, Executive Programs

Washington State Labor Council

April Sims, President

Washington State Office of Superintendent of Public Instruction

Shandy Abrahamson, Career Connected Learning Tribal Engagement

Specialist, Office of Native Education

Washington State Office of Superintendent of Public Instruction

Chris Reykdal, Superintendent

Washington State Office of the Governor

John Aultman, Executive Policy Advisor | Higher Education and

Workforce Development

Washington State Opportunity Scholarship

Kimber Connors, Executive Director

Washington State Workforce Training and Education Coordinating

Board, Eleni Papadakis, Executive Director

Washington STEM Lynne Varner, CEO

Washington Student Achievement Council

Mike Meotti, Executive Director